Annual Groundwater Monitoring Report

Appalachian Power Company

John E. Amos Plant

Landfill CCR Unit

Winfield, West Virginia

January 2025

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APPALACHIAN POWER℠

An AEP Company

BOUNDLESS ENERGY℠

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Abbreviations:
ASD – Alternate Source Demonstration
CCR – Coal Combustion Residual
GWPS – Groundwater Protection Standard
SSI – Statistically Significant Increase
SSL – Statistically Significant Level
AMLF – Amos Landfill

I. Overview

This *Annual Groundwater Monitoring and Corrective Action Report* (Report) has been prepared to report the status of activities for the preceding year for an existing Landfill CCR unit at Appalachian Power Company's, a wholly-owned subsidiary of American Electric Power Company (AEP), John E. Amos Power Plant. The USEPA's CCR rules require that the Annual Groundwater Monitoring Report be posted to the operating record for the preceding year no later than January 31.

In general, the following activities were completed:

- The Amos Landfill (AMLF) CCR Unit began 2024 in detection monitoring and continued in detection monitoring throughout the year.
- Groundwater data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units.
- Groundwater data summary tables, groundwater velocity, and flow direction maps are included in **Appendix 1**.
- The Amos Landfill (AMLF) continued in detection monitoring throughout all of 2024.
- Statistical analysis for the October 2023 detection monitoring sampling event was completed in March 2024. The statistical report for the event resulted in confirmed statistically significant increases (SSIs) of the following:
    - MW-1801: Chloride
    - MW-1802: Calcium and Sulfate

  Due to these confirmed SSIs, an alternative source demonstration (ASD) was successfully completed in June 2024. The AMLF continued in detection monitoring. The statistical analysis is included in **Appendix 2** and the ASD is included in **Appendix 3**.
- Statistical analysis for the May 2024 detection monitoring sampling event was completed in October 2024. The statistical report for the event resulted in confirmed SSIs of the following:
    - MW-1801: Chloride
    - MW-1802: Calcium and Sulfate

  An alternative source demonstration (ASD) was successfully completed in early January 2025. The AMLF continued in detection monitoring. The statistical analysis is included in **Appendix 2** and the ASD is included in **Appendix 3**.
- A detection monitoring event was conducted at the AMLF in October 2024. This event is undergoing statistical analysis still.

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

- A map/aerial photograph showing the Amos Landfill CCR management unit, 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 (**Appendix 1**).
- Statistical comparison of monitoring data to determine if there have been SSI(s) or SSL(s) (Attached as **Appendix 2**, where applicable);
- Discussion of the alternative source demonstrations (**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 statistically significant increase over background concentrations, if applicable (Appendix 4). This is not applicable to this report
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement as to why that happened (Appendix 5). This is not applicable to this report.
- Other information required to be included in the annual report such as assessment of corrective measures, if applicable.

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

Figure 1 depicts the PE-certified groundwater monitoring network, the monitoring well locations, and their corresponding identification numbers. The groundwater monitoring well network was updated in 2020. MW-1801 and MW-1802 replaced MW-1 and MW-5.

The monitoring well distribution adequately covers downgradient and upgradient areas as detailed in the revised *Groundwater Monitoring Well Network Evaluation Report*, referenced above, that was placed on the American Electric Power CCR public internet site on June 5, 2020.The groundwater quality monitoring network includes the following:

- Five upgradient wells: MW-6, MW-7R, MW-8, MW-9, and MW-10; and
- Four downgradient wells: MW-1801, MW-1802, MW-2, and MW-4.

Legend

- Upgradient Sampling Location
- Downgradient Sampling Location
- FGD Landfill

Notes

- Monitoring well coordinates provided by AEP.

700 350 0 700 Feet

Site Layout
FGD Landfill

AEP Amos Generating Plant
Winfield, West Virginia

Geosyntec consultants

Columbus, Ohio | 2022/01/26

Figure **1**

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Amos\AEP-Amos_Landfill_Site_Layout_v2.mxd. ASoltero. 1/26/2022. CHA8423/04/08.

III. Monitoring Wells Installed or Decommissioned

No monitoring wells were installed or decommissioned in 2024. The network design, as summarized in the *Groundwater Monitoring Well Network Evaluation* (2020) and as posted at the CCR website for Amos Plant's John E. Amos Landfill, 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 Calculations and Discussion

Appendix 1 contains tables showing the groundwater quality data collected since initiating CCR background sampling through results received in 2024. Static water elevation data from each monitoring event in 2024 are also 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

Statistical analysis for the October 2023 detection monitoring sampling event was completed in March 2024. The statistical report for the event resulted in confirmed statistically significant increases (SSIs) at MW-1801 for Chloride and at MW-1802 for Calcium and Sulfate. Due to these confirmed SSIs, an alternative source demonstration (ASD) was performed and successfully completed in June 2024. The AMLF continued in detection monitoring. The statistical analysis is included in **Appendix 2** and the ASD is included in **Appendix 3**.

Statistical analysis for the May 2024 detection monitoring sampling event was completed in October 2024. The statistical report for the event resulted in confirmed SSIs at MW-1801 for Chloride and at MW-1802 for Calcium and Sulfate. An alternative source demonstration (ASD) was successfully completed in early January 2025. The AMLF continued in detection monitoring. The statistical analysis is included in **Appendix 2** and the ASD is included in **Appendix 3**.

A detection monitoring event was conducted at the AMLF in October 2024. This event is undergoing statistical analysis still.

VI. Alternative Source Demonstrations

An alternative source demonstration (ASD) relative to the Appendix III SSIs (chloride at MW-1801, calcium and sulfate at MW-1802) resulting from the October 2023 detection monitoring

event was completed in June 2024. The demonstration concluded that the groundwater quality and Appendix III indicator parameter SSIs identified in the statistical evaluation is attributable to an alternative source. The successful ASD for this event is attached in **Appendix 3**.

Because the ASD for the October 2023 samples was successful, the landfill remained in detection monitoring for the first semiannual samples of 2024.

An ASD relative to the Appendix III SSIs (chloride at MW-1801, calcium and sulfate at MW-1802) resulting from the May 2024 detection monitoring event was completed in January 2025. The demonstration concluded that the groundwater quality and Appendix III indicator parameter SSIs identified in the statistical evaluation is attributable to an alternative source. The successful ASD for this event is attached in **Appendix 3**.

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

As of this annual report date there has been no transition between detection monitoring and assessment monitoring. Detection monitoring will continue in 2025 pending the results of the aforementioned statistical analysis regarding the October 2024 groundwater sampling event. If the statistical analysis of the October 2024 event confirms any SSIs, an ASD will be investigated. If the ASD is successful, the AMLF will remain in detection monitoring. If the ASD is not successful, the AMLF will proceed with assessment monitoring as required by 40 CFR 257.95.

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 detection monitoring rules in 40 CFR 257.94, sampling all CCR wells for the Appendix III parameters was completed in 2024. All required information has been included in this annual groundwater monitoring report.

IX. Description of Any Problems Encountered in 2024 and Actions Taken

No significant problems were encountered. The low flow sampling effort went smoothly and the schedule was met to support the 2024 annual groundwater report preparation covering the groundwater monitoring activities in 2024.

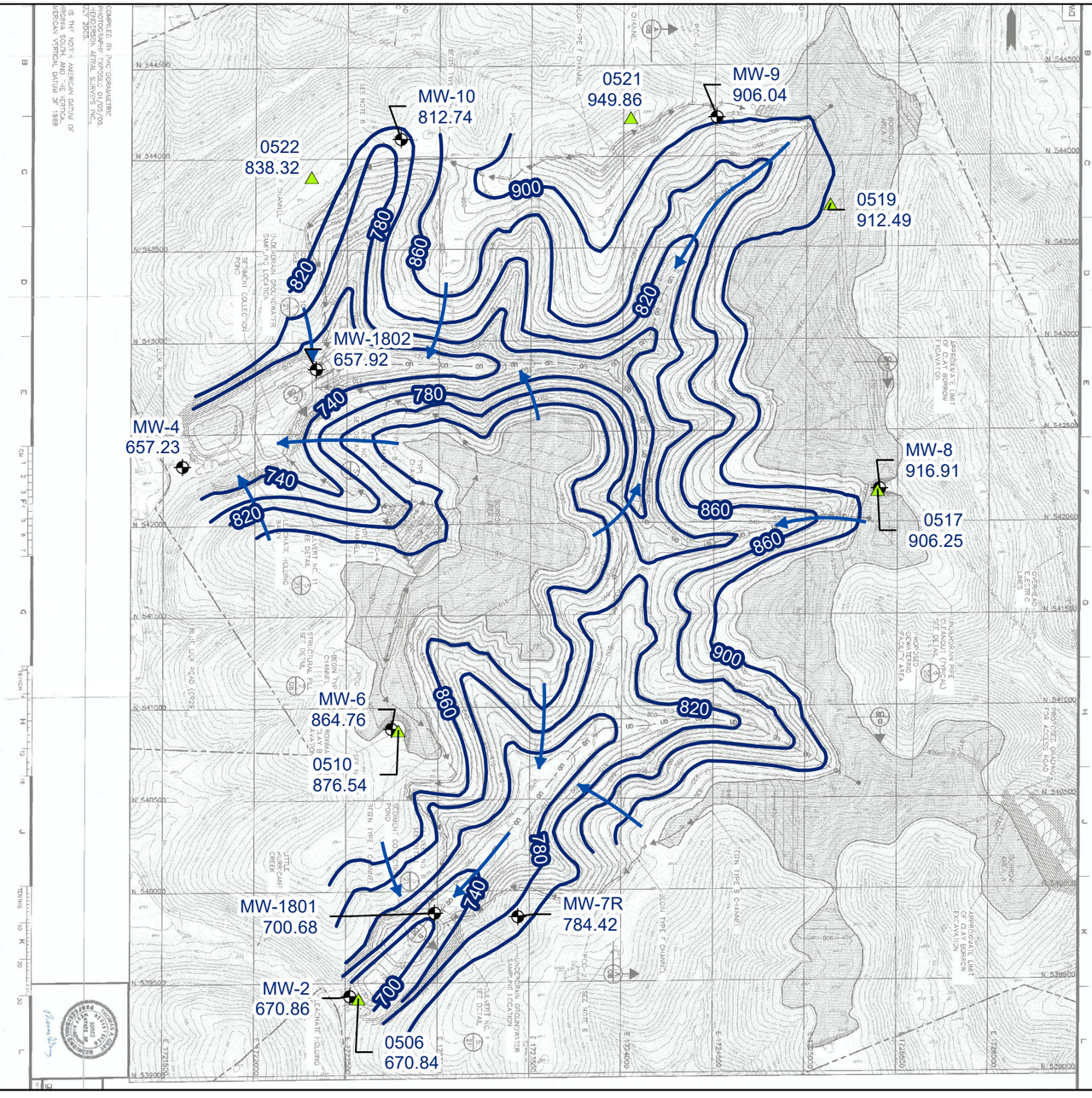
X. A Projection of Key Activities for the Upcoming Year

Key activities for 2025 include:

- Complete statistical evaluation for the October 2024 detection monitoring event.
- Perform an ASD, if necessary, for the October 2024 detection monitoring event if any SSIs are confirmed. If the ASD if necessary and is unsuccessful, the CCR unit will transition into assessment monitoring. If it is successful or no SSIs are confirmed, the CCR unit will continue detection monitoring on a semi-annual basis.
- Respond to any new data received in light of what the CCR rule requires.
- Preparation of the 2025 annual groundwater report.

APPENDIX 1

Figures and Tables showing the groundwater monitoring network, data collected, and the rate and direction of groundwater flow.



Legend

- Groundwater Monitoring Well
- Piezometer
- Groundwater Elevation Contour
- Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on May 6, 2024) provided by AEP.
2. As of 2023, a portion of the liner in Cell 4 was replaced with a riprap drainage blanket; re-lining construction is ongoing.
3. Topography and drainage system basemap from AEP Drawing No. 13-30500-05-A (topographic contour interval: 10 feet).
4. Groundwater elevation units are feet above mean sea level (amsl).

1,000 500 0 1,000 Feet

Potentiometric Surface Map - Uppermost Aquifer
May 2024

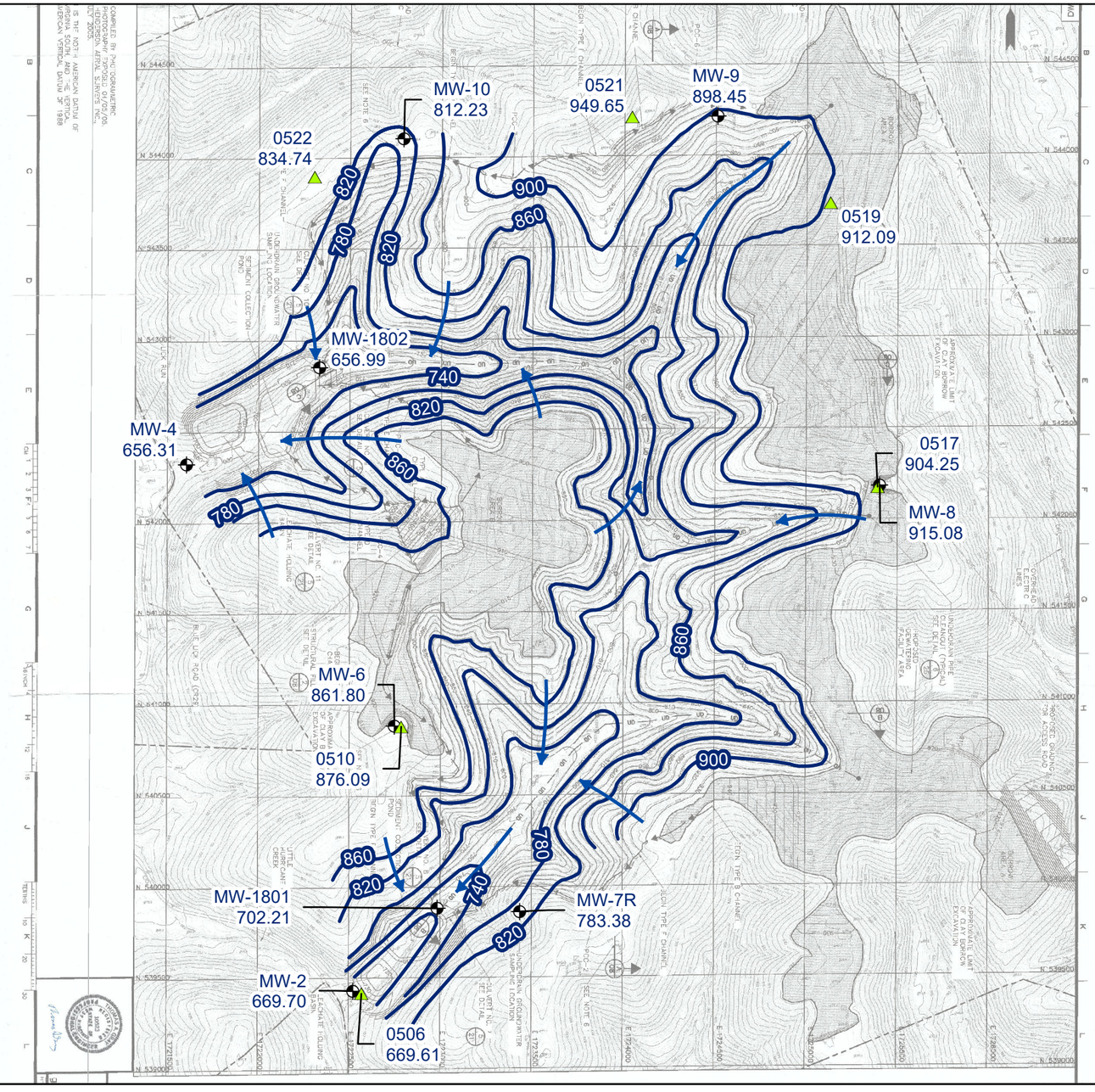
AEP Amos Generating Plant
Winfield, West Virginia

Geosyntec consultants

Columbus, Ohio | 2024/06/06

Figure
X

A:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Amos\2024\AEP-Amos_Landfill_GW_2024-05 May.mxd. Okiemute.Commander. 6/6/2024. CHA8423/04/08.



Legend

- Groundwater Monitoring Well
- Piezometer
- Groundwater Elevation Contour
- Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on October 14, 2024) provided by AEP.
2. As of 2023, a portion of the liner in Cell 4 was replaced with a riprap drainage blanket; re-lining construction is ongoing.
3. Topography and drainage system basemap from AEP Drawing No. 13-30500-05-A (topographic contour interval: 10 feet).
4. Groundwater elevation units are feet above mean sea level (ft amsl).

1,000 500 0 1,000 Feet

Potentiometric Surface Map - Uppermost Aquifer
October 2024

AEP Amos Generating Plant
Winfield, West Virginia

Geosyntec consultants

Columbus, Ohio | 2025/01/07

Figure **X**

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Table 1: Residence Time Calculation Summary
Amos Landfill

Geosyntec Consultants, Inc.

			2024-01[3]		2024-05		2024-07[3]		2024-10	
CCR Management Unit	Monitoring Well	Well Diameter (inches)	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)
Landfill	MW-2 [2]	2.0	3.1	20	2.7	22	3.9	16	3.7	17
	MW-4 [2]	2.0	2.0	30	2.0	30	1.6	39	1.6	37
	MW-6 [1]	2.0	0.5	129.0	0.5	122	0.5	131	0.6	101
	MW-7R [1]	2.0	4.0	15.4	2.7	22	2.7	23	3.1	19
	MW-8 [1]	2.0	0.9	67.3	0.6	96	0.6	104	0.6	104
	MW-9 [1]	2.0	0.9	70.4	0.9	66	0.8	72	0.8	76
	MW-10 [1]	2.0	0.9	67.7	2.2	28	2.2	27	2.3	26
	MW-1801 [2]	2.0	2.4	26	2.5	25	2.5	25	2.1	28
	MW-1802 [2]	2.0	2.9	21	3.0	20	3.1	20	3.1	19

Notes:
[1] - Background Well
[2] - Downgradient Well
[3] - Two-of-two verification sampling

Table 1. Groundwater Data Summary: MW-1
Amos - LF
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
8/23/2016	Background	0.044	31.1	3.45	0.09 J1	6.2	30.6	182
10/18/2016	Background	0.060	29.0	3.31	0.09	6.5	30.8	232
11/9/2016	Background	0.076	29.9	3.42	0.10	6.5	31.3	194
12/13/2016	Background	0.065	29.3	3.08	0.07 J1	6.1	27.7	250
2/9/2017	Background	0.050	26.8	3.16	0.09	6.3	27.9	234
3/16/2017	Background	0.046	28.4	3.32	0.09	7.5	29.4	216
5/23/2017	Background	0.123	30.2	3.19	0.09	6.6	28.5	215
6/21/2017	Background	0.037	28.1	4.94	0.08	6.4	31.9	204
11/1/2017	Detection	0.047	28.7	3.08	0.10	6.4	30.2	224
5/2/2018	Detection	0.134	27.2	3.22	0.10	6.5	29.9	194
11/29/2018	Detection	0.143	26.4	3.07	0.11	6.7	27.8	191
12/18/2018	Detection	0.07 J1	--	--	--	6.5	--	--
6/11/2019	Detection	0.04 J1	28.1	2.86	0.11	7.0	29.9	184
11/6/2019	Detection	0.04 J1	30.1	3.20	0.10	6.2	29.4	193

Table 1. Groundwater Data Summary: MW-1
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/23/2016	Background	0.04 J1	0.27	207	0.024	0.02 J1	0.3	0.097	0.0848	0.09 J1	0.186	0.017	< 0.002 U1	0.04 J1	0.9	0.01 J1
10/18/2016	Background	0.04 J1	0.62	206	0.050	0.03	0.627	0.306	1.24	0.09	0.567	0.017	0.002 J1	0.08 J1	1.4	0.05 J1
11/9/2016	Background	0.04 J1	0.44	210	0.036	0.03	0.564	0.200	1.001	0.10	0.450	0.020	< 0.002 U1	0.14	1.3	0.088
12/13/2016	Background	0.05 J1	1.09	232	0.100	0.01 J1	2.16	0.613	0.6701	0.07 J1	1.45	0.027	< 0.002 U1	0.11	1.7	0.02 J1
2/9/2017	Background	0.03 J1	0.37	184	0.026	0.02 J1	0.401	0.174	0.836	0.09	0.340	0.015	< 0.002 U1	0.21	1.6	0.02 J1
3/16/2017	Background	0.06	0.67	200	0.057	0.06	0.993	0.393	0.73	0.09	1.03	0.012	0.003 J1	0.10	1.1	0.02 J1
5/23/2017	Background	0.08	0.40	211	0.032	0.05	0.555	0.292	3.243	0.09	0.697	0.026	< 0.002 U1	0.11	1.1	0.01 J1
6/21/2017	Background	0.07	0.43	200	0.031	0.06	0.547	0.289	1.379	0.08	0.753	0.013	< 0.002 U1	0.10	1.2	0.02 J1

Table 1. Groundwater Data Summary: MW-2
Amos - LF
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
8/23/2016	Background	0.201	1.99	4.00	1.34	8.7	12.0	362
10/17/2016	Background	0.198	1.53	4.21	1.26	9.1	11.8	354
11/8/2016	Background	0.216	1.46	4.13	1.30	8.2	11.3	378
12/13/2016	Background	0.217	1.65	2.99	1.19	8.5	7.6	350
2/8/2017	Background	0.190	1.56	2.66	1.33	8.7	7.4	374
3/14/2017	Background	0.184	1.81	3.91	1.20	8.4	7.7	354
5/23/2017	Background	0.187	1.42	4.23	1.17	8.7	8.1	354
6/21/2017	Background	0.189	1.56	3.47	1.19	8.5	7.4	356
11/1/2017	Detection	0.202	1.88	2.34	1.46	8.8	8.6	394
1/8/2018	Detection	0.251	--	--	1.07	8.4	--	353
5/1/2018	Detection	0.241	3.50	3.90	1.45	8.5	9.4	344
6/19/2018	Detection	0.338	1.79	--	1.28	8.5	--	--
9/24/2018	Detection	0.215	--	--	--	--	--	--
11/28/2018	Detection	0.235	1.84	5.09	1.15	8.5	8.5	355
12/17/2018	Detection	--	--	--	--	8.6	--	--
1/24/2019	Detection	0.218	--	--	--	--	--	--
6/11/2019	Detection	0.215	1.80	3.26	1.63	8.7	9.4	379
7/22/2019	Detection	--	--	--	1.41	8.7	--	--
11/6/2019	Detection	0.203	1.73	3.44	1.66	8.6	9.5	379
2/11/2020	Detection	--	--	--	1.37	8.5	--	--
5/5/2020	Detection	0.174	2.76	5.08	1.37	8.6	7.8	368
7/7/2020	Detection	--	2.74	--	--	8.5	--	--
11/3/2020	Detection	0.179	1.69	4.31	1.45	8.8	9.0	378
5/4/2021	Detection	0.220	2.04	3.60	1.62	8.7	8.2	386
7/21/2021	Detection	--	--	--	1.41	8.4	--	--
11/2/2021	Detection	0.221	1.80	2.85	1.70	8.6	6.97	380
3/1/2022	Detection	--	--	--	0.09	6.3	--	--
5/24/2022	Detection	0.227	1.82	3.39	1.60	6.1	9.29	370 L1
7/27/2022	Detection	--	--	--	--	8.7	--	--
11/1/2022	Detection	0.215	1.89 M1	2.93	1.63	8.8	8.31	380
5/26/2023	Detection	0.187	1.52	3.55	1.68	8.7	9.5	380
10/17/2023	Detection	0.217	2.20	3.39	1.51	8.5	8.7	360
5/9/2024	Detection	0.185	1.66	4.25	1.39	8.6	8.1	370
10/17/2024	Detection	0.226	2.04	3.76	1.49	8.4	7.3	380

Table 1. Groundwater Data Summary: MW-2
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/23/2016	Background	0.03 J1	6.57	51.8	0.129	0.14	1.3	1.02	0.904	1.34	1.24	0.009	< 0.002 U1	6.04	0.2 J1	0.03 J1
10/17/2016	Background	0.01 J1	3.94	25.7	0.040	0.005 J1	0.592	0.290	0.208	1.26	0.258	0.010	< 0.002 U1	3.70	0.09 J1	0.067
11/8/2016	Background	0.01 J1	3.54	23.7	0.02 J1	< 0.004 U1	0.295	0.107	0.8825	1.30	0.077	0.008	< 0.002 U1	3.84	0.05 J1	< 0.01 U1
12/13/2016	Background	0.01 J1	4.36	27.1	0.009 J1	< 0.004 U1	0.952	0.075	0.288	1.19	0.068	0.011	< 0.002 U1	6.11	0.05 J1	< 0.01 U1
2/8/2017	Background	< 0.01 U1	4.09	25.5	0.032	0.005 J1	0.571	0.287	1.109	1.33	0.279	0.009	< 0.002 U1	5.55	0.1	0.02 J1
3/14/2017	Background	0.02 J1	3.72	31.9	0.071	0.02	1.01	0.573	2.863	1.20	0.651	0.010	0.002 J1	3.46	0.2	0.02 J1
5/23/2017	Background	0.03 J1	3.59	27.2	0.043	0.009 J1	0.605	0.341	0.796	1.17	0.333	0.010	< 0.002 U1	3.70	0.1	< 0.01 U1
6/21/2017	Background	0.03 J1	3.80	27.7	0.028	0.01 J1	0.490	0.234	1.1188	1.19	0.229	0.004	0.003 J1	4.57	0.08 J1	0.03 J1

Table 1. Groundwater Data Summary: MW-4
Amos - LF
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
8/23/2016	Background	0.173	0.914	14.1	1.49	9.9	10.7	368
10/18/2016	Background	0.165	0.807	13.9	1.33	9.8	11.7	386
11/7/2016	Background	0.203	0.842	14.6	1.44	9.5	11.1	376
12/13/2016	Background	0.180	0.836	15.7	1.34	9.0	8.0	372
2/8/2017	Background	0.170	0.807	14.9	1.40	9.3	8.0	412
3/14/2017	Background	0.173	0.855	14.5	1.46	8.8	7.4	381
5/23/2017	Background	0.190	0.750	15.3	1.38	9.2	7.9	390
6/20/2017	Background	0.161	0.814	15.1	1.36	9.1	7.6	392
11/1/2017	Detection	0.194	0.766	14.2	1.36	9.4	9.3	404
1/8/2018	Detection	0.145	--	--	1.37	3.3	--	--
5/1/2018	Detection	0.199	0.783	14.9	1.47	9.2	9.0	380
11/27/2018	Detection	0.188	0.807	14.1	1.42	8.8	8.8	383
6/12/2019	Detection	0.167	0.788	14.4	1.46	8.6	9.0	415
11/6/2019	Detection	0.173	0.761	14.9	1.49	9.2	9.4	382
5/5/2020	Detection	0.150	0.790	15.2	1.37	9.2	8.4	397
11/3/2020	Detection	0.157	0.783	17.1	1.53	9.4	9.7	397
1/5/2021	Detection	--	--	18.0	1.48	9.4	--	--
5/4/2021	Detection	0.168	0.695	19.7	1.50	9.2	8.8	410
7/21/2021	Detection	--	--	20.8	--	9.0	--	--
11/4/2021	Detection	0.167	0.7	21.8	1.40	9.1	7.86	390
3/1/2022	Detection	--	--	25.1	--	9.3	--	--
5/25/2022	Detection	0.171	0.95	24.2	1.34	8.3	9.79	400 L1
7/26/2022	Detection	--	0.89	--	--	9.2	--	--
11/1/2022	Detection	0.170	0.87	26.1	1.28	9.3	9.39	400
2/8/2023	Detection	--	--	27.5	--	9.2	--	--
5/26/2023	Detection	0.151	0.77	23.8	1.39	9.0	9.8	400
10/17/2023	Detection	0.165	0.90 M1	23.3	1.35	9.4	9.5	370
5/9/2024	Detection	0.151	0.85	23.7	1.34	9.1	9.3	390
10/17/2024	Detection	0.153	0.77	22.7	1.36	9.2	8.6	410

Table 1. Groundwater Data Summary: MW-4
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/23/2016	Background	0.01 J1	9.61	24.1	0.020	0.11	0.9	0.158	0.444	1.49	0.371	0.008	< 0.002 U1	8.82	0.09 J1	< 0.01 U1
10/18/2016	Background	< 0.01 U1	8.81	20.2	< 0.005 U1	0.006 J1	0.064	0.014	0.152	1.33	0.021	0.002	< 0.002 U1	8.01	< 0.03 U1	0.03 J1
11/7/2016	Background	< 0.01 U1	9.07	21.5	< 0.005 U1	< 0.004 U1	1.68	0.029	1.56	1.44	0.007 J1	0.003	< 0.002 U1	8.14	< 0.03 U1	< 0.01 U1
12/13/2016	Background	< 0.01 U1	9.44	22.4	< 0.005 U1	< 0.004 U1	0.169	0.011	0.16	1.34	0.009 J1	0.007	< 0.002 U1	8.94	< 0.03 U1	0.02 J1
2/8/2017	Background	< 0.01 U1	8.78	19.2	0.006 J1	< 0.004 U1	0.122	0.043	0.567	1.40	0.064	0.006	< 0.002 U1	8.15	< 0.03 U1	0.03 J1
3/14/2017	Background	< 0.01 U1	10.1	20.4	0.005 J1	0.005 J1	0.523	0.041	1.456	1.46	0.114	0.006	< 0.002 U1	9.70	< 0.03 U1	< 0.01 U1
5/23/2017	Background	0.02 J1	8.96	21.1	< 0.004 U1	< 0.005 U1	0.104	0.008 J1	0.872	1.38	0.01 J1	0.012	< 0.002 U1	8.21	< 0.03 U1	< 0.01 U1
6/20/2017	Background	0.02 J1	9.15	21.8	0.004 J1	0.005 J1	0.157	0.037	0.905	1.36	0.039	0.005	< 0.002 U1	7.86	0.05 J1	< 0.01 U1

Table 1. Groundwater Data Summary: MW-5
Amos - LF
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
8/23/2016	Background	0.032	18.4	3.59	0.14	9.9	29.3	124
10/18/2016	Background	0.034	15.6	3.61	0.12	6.4	29.3	148
11/8/2016	Background	0.034	14.3	3.52	0.11	6.3	25.5	92
12/13/2016	Background	0.015	14.6	3.61	0.07	8.2	24.3	100
2/8/2017	Background	0.030	14.1	3.54	0.09	6.4	24.0	126
3/16/2017	Background	0.026	15.9	3.72	0.09	7.0	24.9	158
5/23/2017	Background	0.032	13.7	3.70	0.09	6.3	24.2	108
6/20/2017	Background	0.017	14.5	3.66	0.08	6.0	27.8	102
11/1/2017	Detection	0.046	15.6	4.09	0.09	6.1	28.4	136
1/8/2018	Detection	--	--	4.22	--	6.7	--	--
5/2/2018	Detection	0.123	14.3	4.39	0.09	6.2	26.3	122
6/20/2018	Detection	0.126	--	4.61	--	6.1	--	--
11/29/2018	Detection	0.122	14.1	4.86	0.13	7.4	24.5	113
12/17/2018	Detection	--	--	4.77	--	6.2	--	--
6/12/2019	Detection	0.02 J1	16.2	4.60	0.11	6.1	26.4	132
7/22/2019	Detection	--	--	4.61	--	6.0	--	--
11/5/2019	Detection	0.03 J1	18.3	5.21	0.10	--	28.3	131
11/6/2019	Detection	--	--	--	--	6.0	--	--
2/11/2020	Detection	--	18.5	--	--	5.8	--	--

Table 1. Groundwater Data Summary: MW-5
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/23/2016	Background	0.04 J1	0.47	93.3	0.02 J1	0.07	0.3	0.188	1.025	0.14	0.263	0.006	< 0.002 U1	0.17	0.1	0.01 J1
10/18/2016	Background	0.04 J1	0.34	82.5	0.02 J1	0.02	0.546	0.198	0.353	0.12	0.250	0.005	< 0.002 U1	0.16	0.2	0.03 J1
11/8/2016	Background	0.04 J1	0.49	80.1	0.050	0.05	0.945	0.446	1.847	0.11	0.698	< 0.0002 U1	< 0.002 U1	0.14	0.1	0.01 J1
12/13/2016	Background	0.04 J1	0.51	80.9	0.033	0.03	0.622	0.339	1.18	0.07	0.442	0.010	< 0.002 U1	0.18	0.2	0.070
2/8/2017	Background	0.02 J1	0.30	70.2	0.022	0.02 J1	0.465	0.217	0.5868	0.09	0.257	0.005	< 0.002 U1	0.14	0.1	0.02 J1
3/16/2017	Background	0.09	2.32	121	0.183	0.21	4.43	2.92	1.096	0.09	3.77	0.002	0.008	0.40	0.9	0.04 J1
5/23/2017	Background	0.06	0.21	77.7	0.01 J1	0.02	0.248	0.072	1.312	0.09	0.093	0.011	< 0.002 U1	0.14	0.09 J1	< 0.01 U1
6/20/2017	Background	0.02 J1	0.25	80.6	0.01 J1	0.03	0.291	0.092	1.141	0.08	0.097	< 0.0002 U1	< 0.002 U1	0.09 J1	0.09 J1	< 0.01 U1

Table 1. Groundwater Data Summary: MW-6
Amos - LF
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
8/24/2016	Background	0.095	40.7	7.78	0.26	7.6	41.3	408
10/19/2016	Background	0.093	39.8	7.67	0.23	7.9	51.1	438
11/7/2016	Background	0.147	42.7	7.76	0.25	7.7	51.6	426
12/12/2016	Background	0.109	44.4	8.17	0.20	7.5	54.0	414
2/7/2017	Background	0.122	36.7	7.20	0.23	7.5	31.1	380
3/16/2017	Background	0.098	37.1	7.09	0.24	7.9	29.1	388
5/22/2017	Background	0.171	33.7	6.89	0.23	7.7	24.7	359
6/19/2017	Background	0.154	37.2	7.01	0.21	7.4	33.1	386
11/2/2017	Detection	0.159	41.3	7.77	0.22	7.5	51.8	440
5/1/2018	Detection	0.163	33.4	6.94	0.26	7.4	24.7	358
11/28/2018	Detection	0.156	35.8	6.85	0.24	7.6	22.9	333
6/12/2019	Detection	0.08 J1	32.8	6.85	0.28	7.7	21.9	363
11/6/2019	Detection	0.100	39.8	8.00	0.24	7.4	33.2	390
5/7/2020	Detection	0.092	37.0	6.61	0.21	7.6	14.9	349
11/4/2020	Detection	0.088	38.4	7.63	0.28	7.7	32.5	375
5/4/2021	Detection	0.101	34.7	7.33	0.27	7.5	19.0	354
11/4/2021	Detection	0.093	35.1	7.51	0.25	7.4	22.1	360
5/26/2022	Detection	0.092	45.5	8.63	0.24	7.5	19.2	350 L1
11/2/2022	Detection	0.099	42.3	8.56	0.23	7.6	23.8	360
5/31/2023	Detection	0.091	39.1	8.84	0.23	7.3	19.9	350
10/18/2023	Detection	0.096	43.4	8.44	0.23	7.4	30.7	360
5/8/2024	Detection	0.094	39.5	9.30	0.23	7.3	23.9	350
10/17/2024	Detection	0.091	43.1	8.96	0.24	7.4	33.6	430

Table 1. Groundwater Data Summary: MW-6
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/24/2016	Background	0.04 J1	6.03	245	0.036	0.03	0.5	0.183	2.318	0.26	0.461	0.015	< 0.002 U1	0.77	0.09 J1	0.138
10/19/2016	Background	0.02 J1	6.42	235	0.033	0.005 J1	0.413	0.148	0.697	0.23	0.381	0.015	< 0.002 U1	0.36	0.09 J1	0.02 J1
11/7/2016	Background	0.01 J1	6.64	250	0.009 J1	< 0.004 U1	0.160	0.023	2.70	0.25	0.053	0.011	< 0.002 U1	0.36	< 0.03 U1	< 0.01 U1
12/12/2016	Background	0.01 J1	7.36	246	0.006 J1	0.01 J1	0.104	0.020	1.878	0.20	0.039	0.023	< 0.002 U1	0.39	0.04 J1	0.03 J1
2/7/2017	Background	< 0.01 U1	5.47	199	0.02 J1	< 0.004 U1	0.207	0.073	1.151	0.23	0.160	0.013	< 0.002 U1	0.44	0.05 J1	0.01 J1
3/16/2017	Background	0.03 J1	4.44	224	< 0.005 U1	0.005 J1	0.498	0.028	1.844	0.24	0.048	0.009	0.003 J1	0.53	0.03 J1	< 0.01 U1
5/22/2017	Background	0.04 J1	4.58	218	0.02 J1	0.009 J1	0.175	0.063	2.4	0.23	0.117	0.019	< 0.002 U1	0.50	0.04 J1	0.01 J1
6/19/2017	Background	0.03 J1	4.86	233	0.01 J1	< 0.005 U1	0.274	0.051	1.617	0.21	0.136	0.011	< 0.002 U1	0.44	0.04 J1	< 0.01 U1

Table 1. Groundwater Data Summary: MW-7R
Amos - LF
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
8/24/2016	Background	0.106	31.0	4.13	0.36	7.7	228	678
10/18/2016	Background	0.083	30.9	3.86	0.32	8.0	229	706
11/8/2016	Background	0.102	33.5	3.78	0.31	7.0	209	618
12/14/2016	Background	0.084	32.2	3.94	0.26	7.6	217	606
2/9/2017	Background	0.071	37.7	3.45	0.22	7.6	186	542
3/14/2017	Background	0.078	33.6	3.79	0.30	7.7	215	640
5/24/2017	Background	0.072	30.4	3.80	0.29	7.6	226	663
6/21/2017	Background	0.092	32.5	3.60	0.26	7.6	246	680
11/2/2017	Detection	0.109	31.7	3.59	0.28	7.6	211	636
5/1/2018	Detection	0.145	30.3	4.09	0.36	7.7	239	688
11/28/2018	Detection	0.118	44.4	3.65	0.26	7.4	201	627
6/12/2019	Detection	0.1 J1	36.8	3.75	0.35	7.4	226	700
11/6/2019	Detection	0.099	26.6	4.15	0.34	7.5	217	655
5/6/2020	Detection	0.079	41.7	3.68	0.28	7.5	208	629
11/3/2020	Detection	0.077	37.9	3.93	0.35	7.6	247	731
5/4/2021	Detection	0.096	33.0	3.86	0.37	7.6	220	708
11/4/2021	Detection	0.090	29.0	3.76	0.33	7.5	210	730
5/26/2022	Detection	0.092	38.5	3.87	0.33	7.5	219	690 L1
11/2/2022	Detection	0.087	38.8	3.89	0.31	7.6	249	720
5/30/2023	Detection	0.071	46.8	3.55	0.26	7.3	198	650
10/17/2023	Detection	0.082	37.2	3.62	0.29	7.5	225	710
5/8/2024	Detection	0.095	30.4	3.62	0.33	7.4	197	670
10/17/2024	Detection	0.094	37.4 M1	3.70	0.30	7.4	224	720

Table 1. Groundwater Data Summary: MW-7R
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/24/2016	Background	0.11	8.37	60.8	0.155	0.04	1.0	0.368	1.043	0.36	1.52	0.016	0.004 J1	25.7	0.4	0.061
10/18/2016	Background	0.07	7.13	51.4	0.111	0.01 J1	0.760	0.279	0.959	0.32	0.961	0.012	0.002 J1	23.2	0.3	0.03 J1
11/8/2016	Background	0.08	5.81	42.2	0.026	0.02	2.82	0.084	1.895	0.31	0.261	0.013	< 0.002 U1	17.5	0.2	0.01 J1
12/14/2016	Background	0.09	7.33	44.3	0.028	0.01 J1	1.73	0.103	0.962	0.26	0.249	0.014	< 0.002 U1	24.6	0.2	0.02 J1
2/9/2017	Background	0.05	4.21	41.7	0.01 J1	0.01 J1	0.217	0.065	0.0996	0.22	0.156	0.012	< 0.002 U1	11.7	0.08 J1	0.02 J1
3/14/2017	Background	0.08	7.02	40.2	0.01 J1	0.01 J1	0.234	0.064	2.735	0.30	0.154	0.010	< 0.002 U1	24.6	0.1	0.02 J1
5/24/2017	Background	0.10	7.48	42.0	0.01 J1	0.01 J1	0.242	0.080	0.3888	0.29	0.171	0.016	< 0.002 U1	25.7	0.2	0.01 J1
6/21/2017	Background	0.08	6.69	39.1	0.006 J1	0.006 J1	0.154	0.043	1.497	0.26	0.064	0.010	< 0.002 U1	22.9	0.1	0.01 J1

Table 1. Groundwater Data Summary: MW-8
Amos - LF
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
8/24/2016	Background	0.021	141	13.3	0.16	7.0	73.6	578
10/19/2016	Background	0.037	135	12.6	0.15	7.2	66.5	538
11/9/2016	Background	0.029	137	5.12	0.07	6.9	26.1	532
12/14/2016	Background	0.017	136	14.2	0.13	6.8	59.7	504
2/8/2017	Background	0.092	132	12.9	0.15	6.9	67.5	540
3/15/2017	Background	0.074	151	13.5	0.16	7.2	74.5	623
5/24/2017	Background	0.031	137	13.9	0.14	6.8	73.2	596
6/20/2017	Background	0.034	139	12.6	0.13	6.9	77.2	574
11/2/2017	Detection	0.031	125	12.1	0.15	6.8	63.1	526
5/1/2018	Detection	0.065	136	13.1	0.17	6.9	78.8	592
11/29/2018	Detection	0.05 J1	126	13.2	0.17	6.8	58.8	558
6/12/2019	Detection	0.03 J1	125	8.58	0.20	7.6	54.5	540
11/6/2019	Detection	< 0.02 U1	134	21.2	0.16	6.8	78.6	613
5/7/2020	Detection	< 0.02 U1	115	15.3	0.15	7.0	98.4	590
11/4/2020	Detection	< 0.02 U1	112	9.87	0.20	6.8	87.3	549
5/4/2021	Detection	0.02 J1	94.1	6.32	0.20	7.1	73.8	472
11/3/2021	Detection	< 0.09 U1	111	60.9	0.18	7.0	64.9	570
5/26/2022	Detection	0.020 J1	102	63.8	0.17	7.4	76.3	560 L1
11/2/2022	Detection	0.023 J1	107	76.8	0.16	7.0	79.9	580
5/30/2023	Detection	0.045 J1	125	87.4	0.15	7.0	97.7	630
10/17/2023	Detection	0.023 J1	112	73.5	0.15	7.0	98.3	590
5/9/2024	Detection	0.022 J1	97.7	67.2	0.17	7.3	125	640
10/18/2024	Detection	0.024 J1	119	128	0.15	6.8	127	700

Table 1. Groundwater Data Summary: MW-8
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/24/2016	Background	0.04 J1	0.41	221	0.021	0.04	0.4	0.270	0.776	0.16	0.393	0.013	< 0.002 U1	0.40	0.2	0.03 J1
10/19/2016	Background	0.03 J1	0.35	195	0.01 J1	0.04	0.158	0.140	0.746	0.15	0.279	0.006	< 0.002 U1	0.07 J1	0.2	0.02 J1
11/9/2016	Background	0.02 J1	0.25	209	0.008 J1	< 0.004 U1	0.164	0.082	1.113	0.07	0.028	0.004	< 0.002 U1	0.08 J1	0.2	0.02 J1
12/14/2016	Background	0.03 J1	0.32	212	0.008 J1	0.008 J1	0.097	0.083	1.582	0.13	0.062	0.013	< 0.002 U1	0.10	0.2	0.02 J1
2/8/2017	Background	0.03 J1	0.37	192	0.01 J1	0.007 J1	0.131	0.059	1.223	0.15	0.109	0.007	< 0.002 U1	0.47	0.1	0.136
3/15/2017	Background	0.05 J1	1.44	270	0.069	0.02 J1	2.39	1.02	3.405	0.16	1.43	0.011	0.003 J1	0.28	0.4	0.02 J1
5/24/2017	Background	0.07	0.47	201	0.02 J1	0.009 J1	0.354	0.201	1.257	0.14	0.260	0.016	< 0.002 U1	0.11	0.2	0.01 J1
6/20/2017	Background	0.03 J1	0.35	182	0.02 J1	0.007 J1	0.192	0.077	1.065	0.13	0.142	0.005	< 0.002 U1	0.07 J1	0.3	0.02 J1

Table 1. Groundwater Data Summary: MW-9
Amos - LF
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
8/24/2016	Background	0.064	80.1	6.30	0.24	7.3	37.3	414
10/19/2016	Background	0.042	103	6.09	0.18	7.5	36.4	444
11/9/2016	Background	0.076	90.6	6.11	0.22	7.2	34.5	420
12/13/2016	Background	0.057	94.4	6.59	0.18	7.1	35.1	390
2/8/2017	Background	0.052	99.0	6.22	0.16	7.1	34.9	382
3/15/2017	Background	0.093	99.1	6.26	0.22	7.4	35.8	402
5/23/2017	Background	0.084	86.4	6.21	0.18	7.1	34.8	438
6/20/2017	Background	0.079	93.8	6.17	0.15	7.0	38.4	424
11/2/2017	Detection	0.075	79.1	5.97	0.20	7.1	33.1	404
5/1/2018	Detection	0.200	73.1	6.14	0.26	7.2	30.9	402
11/29/2018	Detection	0.09 J1	78.8	6.08	0.21	7.1	31.6	412
6/11/2019	Detection	0.04 J1	97.6	6.03	0.20	7.3	37.9	436
11/7/2019	Detection	0.04 J1	85.8	6.11	0.19	7.3	38.2	442
5/6/2020	Detection	0.03 J1	80.3	2.53	0.22	7.2	22.4	333
11/4/2020	Detection	0.056	61.5	2.73	0.30	7.1	28.4	362
5/4/2021	Detection	0.064	57.0	3.96	0.28	7.2	29.8	396
11/3/2021	Detection	0.054	72.7	4.47	0.23	7.2	28.2	410
5/26/2022	Detection	0.052	99.4	4.78	0.21	7.7	33.9	410 L1
11/3/2022	Detection	0.064	84.7 M1	4.77	0.22	7.2	31.1	420
5/31/2023	Detection	0.041 J1	74.3	3.66	0.20	6.9	27.7	400
10/17/2023	Detection	0.052	60.6	3.67	0.22	7.1	28.1	380
5/8/2024	Detection	0.066	71.2	4.38	0.22	7.0	28.2	410
10/18/2024	Detection	0.054	59.3	2.61	0.25	7.0	20.3	350

Table 1. Groundwater Data Summary: MW-9
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/24/2016	Background	0.07	1.45	443	0.025	0.03	0.8	0.464	1.831	0.24	0.565	0.017	< 0.002 U1	0.48	0.2	0.03 J1
10/19/2016	Background	0.04 J1	3.75	441	0.025	0.01 J1	0.625	0.372	3.035	0.18	0.478	0.010	< 0.002 U1	0.27	0.1	0.03 J1
11/9/2016	Background	0.05 J1	1.12	491	< 0.005 U1	0.02 J1	0.207	0.020	1.735	0.22	0.046	0.008	< 0.002 U1	0.41	0.1	0.03 J1
12/13/2016	Background	0.04 J1	1.23	497	< 0.005 U1	0.04	0.540	0.032	0.39	0.18	0.084	0.019	< 0.002 U1	0.56	0.2	< 0.01 U1
2/8/2017	Background	0.02 J1	1.78	388	< 0.005 U1	0.03	0.078	0.033	1.448	0.16	0.058	0.012	< 0.002 U1	0.27	0.1	0.02 J1
3/15/2017	Background	0.04 J1	4.40	603	0.074	0.04	1.43	1.51	2.365	0.22	1.81	0.009	0.002 J1	0.37	0.5	0.04 J1
5/23/2017	Background	0.07	0.96	425	< 0.004 U1	0.02 J1	0.117	0.021	2.173	0.18	0.063	0.021	< 0.002 U1	0.37	0.2	0.02 J1
6/20/2017	Background	0.05 J1	1.35	441	< 0.004 U1	0.03	0.094	0.066	1.992	0.15	0.038	0.014	< 0.002 U1	0.33	0.07 J1	0.02 J1

Table 1. Groundwater Data Summary: MW-10
Amos - LF
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
8/24/2016	Background	0.087	1.68	5.54	0.89	9.0	19.1	512
10/19/2016	Background	0.081	1.09	4.49	0.72	9.6	18.0	504
11/9/2016	Background	0.118	2.31	5.46	0.92	8.9	16.9	546
12/13/2016	Background	0.076	1.24	4.15	0.38	8.7	14.1	482
2/8/2017	Background	0.113	1.37	4.24	0.57	9.1	14.4	504
3/14/2017	Background	0.125	1.18	4.60	0.50	8.7	13.3	499
5/24/2017	Background	0.081	1.16	4.19	0.43	8.9	14.3	467
6/20/2017	Background	0.078	1.04	4.11	0.44	8.6	14.9	492
11/2/2017	Detection	0.095	1.12	5.08	0.55	9.2	17.0	508
5/2/2018	Detection	0.157	1.74	5.67	0.69	9.2	16.7	522
11/29/2018	Detection	0.174	1.03	5.27	0.59	8.7	15.3	506
6/11/2019	Detection	0.08 J1	1.03	5.12	0.72	9.0	16.0	524
11/6/2019	Detection	0.076	1.43	5.62	0.52	8.7	16.8	490
5/6/2020	Detection	0.074	1.25	4.90	0.60	8.6	13.0	526
11/4/2020	Detection	0.071	1.18	5.77	0.73	8.9	16.5	523
5/4/2021	Detection	0.081	0.916	5.48	0.73	9.0	14.7	519
11/5/2021	Detection	0.257	0.9	16.4	4.88	8.8	17.8	490
5/25/2022	Detection	0.083	1.44	4.10	0.51	6.0	14.1	510 L1
11/3/2022	Detection	0.088	1.68	5.60	0.65	7.5	14.4	520
5/30/2023	Detection	0.074	1.12	4.32	0.59	8.6	14.1	510
10/18/2023	Detection	0.068	1.96	5.22	0.57	8.4	15.2	450
5/14/2024	Detection	0.040 J1	0.74	5.07	0.38	8.4	13.8	470
10/17/2024	Detection	--	--	--	--	9.0	--	--
10/18/2024	Detection	0.065	1.25	4.28	0.37	--	12.7	500

Table 1. Groundwater Data Summary: MW-10
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
8/24/2016	Background	0.36	24.5	105	0.058	0.26	0.5	0.367	0.769	0.89	1.11	0.010	0.003 J1	3.08	0.5	0.01 J1
10/19/2016	Background	0.26	19.4	62.4	0.02 J1	0.01 J1	0.373	0.102	0.0283	0.72	0.357	0.008	< 0.002 U1	2.58	0.4	0.082
11/9/2016	Background	0.38	21.5	144	0.264	0.05	3.96	1.66	0.168	0.92	3.41	0.007	0.004 J1	2.53	1.1	0.057
12/13/2016	Background	0.63	17.1	69.8	0.029	0.20	1.63	0.212	0.0992	0.38	0.895	0.019	< 0.002 U1	2.79	0.7	< 0.01 U1
2/8/2017	Background	0.38	22.8	92.9	0.124	0.04	2.28	0.850	0.14643	0.57	1.89	0.008	0.003 J1	2.76	1.9	0.071
3/14/2017	Background	0.32	21.2	69.0	0.039	0.01 J1	0.965	0.280	2.089	0.50	0.635	0.010	0.003 J1	3.38	2.3	0.02 J1
5/24/2017	Background	0.23	9.07	55.6	0.022	0.02 J1	0.500	0.151	1.06	0.43	0.469	0.011	< 0.002 U1	3.52	0.5	0.01 J1
6/20/2017	Background	0.30	17.7	61.7	0.025	0.01 J1	0.577	0.170	0.1376	0.44	0.448	0.004	< 0.002 U1	2.40	1.0	0.01 J1

Table 1. Groundwater Data Summary: MW-1801
Amos - LF
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
12/18/2018	Background	0.273	1.76	10.4	5.01	8.9	8.1	498
1/24/2019	Background	0.247	1.59	10.8	5.19	8.9	7.2	490
2/21/2019	Background	0.219	1.38	11.0	5.26	9.0	6.8	550
3/13/2019	Background	0.251	1.55	11.1	5.32	9.0	6.6	509
4/23/2019	Background	0.246	1.50	11.3	5.35	9.1	8.2	507
6/11/2019	Background	0.260	1.45	10.4	5.03	9.4	6.5	506
7/23/2019	Background	0.246	1.41	10.8	5.47	8.8	7.2	502
11/5/2019	Background	0.255	1.46	11.7	5.36	8.7	7.0	501
5/7/2020	Detection	0.252	1.65	11.6	4.98	8.9	6.8	541
11/4/2020	Detection	0.215	1.52	12.5	5.34	9.0	7.5	535
1/5/2021	Detection	--	--	11.7	--	9.0	--	--
5/5/2021	Detection	0.250	1.65	13.1	5.24	8.8	9.1	542
7/21/2021	Detection	--	--	13.1	--	8.6	7.63	--
11/4/2021	Detection	0.245	1.5	13.5	5.13	8.7	6.31	530
2/28/2022	Detection	--	--	13.2	--	8.8	--	--
5/25/2022	Detection	0.265	1.78	14.4	5.22	8.4	5.42	510 L1
7/27/2022	Detection	--	--	14.0	--	8.8	--	--
11/1/2022	Detection	0.253	1.57	15.0	5.38	8.9	5.66	520
2/8/2023	Detection	--	--	14.2	--	8.8	--	--
5/31/2023	Detection	0.220	1.47	14.9	5.32	8.6	4.6	510
7/19/2023	Detection	--	--	15.3	--	8.8	--	--
10/17/2023	Detection	0.239	1.76	15.2	5.13	8.7	5.3	510
1/26/2024	Detection	--	--	14.2	--	8.8	--	--
5/9/2024	Detection	0.225	1.68	16.2	5.28	8.7	4.6	510
7/16/2024	Detection	--	--	16.3	--	8.9	--	--
10/17/2024	Detection	0.252	1.73	16.5	5.24	8.6	3.7	530

Table 1. Groundwater Data Summary: MW-1801
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
12/18/2018	Background	0.30	13.5	39.3	0.113	0.07	3.30	0.876	0.816	5.01	0.966	< 0.009 U1	< 0.002 U1	58.4	0.3	< 0.1 U1
1/24/2019	Background	0.14	11.8	34.6	0.08 J1	< 0.01 U1	2.56	0.436	0.983	5.19	0.544	0.032	< 0.002 U1	64.5	0.2 J1	< 0.1 U1
2/21/2019	Background	0.14	10.4	28.7	0.02 J1	< 0.01 U1	0.585	0.162	0.175	5.26	0.272	< 0.009 U1	< 0.002 U1	66.3	0.1 J1	< 0.1 U1
3/13/2019	Background	0.1 J1	9.02	26.6	< 0.02 U1	< 0.01 U1	0.463	0.143	0.58	5.32	0.116	< 0.009 U1	< 0.002 U1	60.8	0.05 J1	< 0.1 U1
4/23/2019	Background	0.14	9.95	30.9	0.02 J1	< 0.01 U1	0.722	0.180	0.751	5.35	0.240	< 0.009 U1	< 0.002 U1	69.4	0.06 J1	< 0.1 U1
6/11/2019	Background	0.1 J1	7.80	25.4	< 0.02 U1	< 0.01 U1	0.336	0.120	0.208	5.03	0.09 J1	< 0.009 U1	< 0.002 U1	61.6	0.05 J1	< 0.1 U1
7/23/2019	Background	0.06 J1	7.95	26.2	< 0.02 U1	< 0.01 U1	0.229	0.092	0.569	5.47	0.07 J1	< 0.02 U1	< 0.002 U1	62.7	< 0.03 U1	< 0.1 U1
11/5/2019	Background	0.04 J1	7.74	25.9	< 0.02 U1	< 0.01 U1	0.483	0.073	0.29	5.36	0.07 J1	0.00829	< 0.002 U1	62.8	< 0.03 U1	< 0.1 U1

Table 1. Groundwater Data Summary: MW-1802
Amos - LF
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
12/17/2018	Background	0.267	0.821	8.33	4.79	9.1	20.6	482
1/25/2019	Background	0.249	0.924	8.87	4.82	9.1	20.3	451
2/21/2019	Background	0.233	0.840	8.94	4.87	9.3	20.1	532
3/13/2019	Background	0.234	0.860	9.21	4.75	9.3	18.8	477
4/24/2019	Background	0.242	0.910	9.13	5.04	9.2	21.2	478
6/12/2019	Background	0.253	0.876	9.01	4.54	9.0	19.1	476
7/23/2019	Background	0.236	0.865	8.80	5.16	9.0	20.7	476
11/5/2019	Background	0.254	0.892	9.90	4.84	8.9	19.7	460
5/7/2020	Detection	0.258	0.963	9.12	4.91	8.8	15.2	490
11/4/2020	Detection	0.223	0.974	10.7	4.89	9.2	19.0	494
1/5/2021	Detection	--	--	10.7	--	9.3	--	--
5/5/2021	Detection	0.258	0.800	11.5	4.88	9.1	17.9	508
7/22/2021	Detection	--	--	13.5	--	8.8	--	--
11/4/2021	Detection	0.082	1.0	5.47	0.73	9.0	13.2	510
3/1/2022	Detection	--	1.0	--	--	9.1	--	--
5/25/2022	Detection	0.273	1.14	17.0	4.71	6.1	19.0	520 L1
7/27/2022	Detection	--	1.16	14.9	--	9.1	--	--
11/4/2022	Detection	0.261	1.13	17.0	4.86	9.2	18.2	510
2/8/2023	Detection	--	0.99	16.8	--	8.8	--	--
5/26/2023	Detection	0.221	0.82	17.2	4.99	8.9	19.3	510
7/19/2023	Detection	--	--	16.3	--	9.1	--	--
10/17/2023	Detection	0.247	1.14	12.9	5.01	9.2	32.8	480
1/26/2024	Detection	--	1.16	--	--	9.0	29.4	--
5/9/2024	Detection	0.226	1.10	12.6	5.33	9.0	36.2	500
7/17/2024	Detection	--	1.12	--	5.13	9.0	24.9	--
10/17/2024	Detection	0.247	0.97	13.3	5.25	8.9	34.2	520

Table 1. Groundwater Data Summary: MW-1802
Amos - LF
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	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
12/17/2018	Background	0.03 J1	6.08	15.5	< 0.02 U1	< 0.01 U1	0.296	0.081	0.445	4.79	0.1 J1	< 0.009 U1	< 0.002 U1	22.7	0.04 J1	< 0.1 U1
1/25/2019	Background	0.05 J1	6.00	17.1	0.03 J1	< 0.01 U1	0.497	0.219	0.522	4.82	0.214	0.03 J1	< 0.002 U1	23.1	0.05 J1	< 0.1 U1
2/21/2019	Background	0.03 J1	6.42	16.1	< 0.02 U1	< 0.01 U1	0.232	0.083	0.1739	4.87	0.08 J1	< 0.009 U1	< 0.002 U1	24.9	< 0.03 U1	< 0.1 U1
3/13/2019	Background	0.04 J1	6.28	15.2	< 0.02 U1	< 0.01 U1	0.269	0.074	0.0735	4.75	0.1 J1	< 0.009 U1	< 0.002 U1	23.9	< 0.03 U1	< 0.1 U1
4/24/2019	Background	0.08 J1	6.24	17.0	< 0.02 U1	< 0.01 U1	0.300	0.099	0.281	5.04	0.142	< 0.009 U1	< 0.002 U1	28.0	0.06 J1	< 0.1 U1
6/12/2019	Background	0.02 J1	5.66	13.6	< 0.02 U1	< 0.01 U1	0.08 J1	0.03 J1	0.418	4.54	0.04 J1	< 0.009 U1	< 0.002 U1	23.3	< 0.03 U1	< 0.1 U1
7/23/2019	Background	0.04 J1	6.43	15.5	< 0.02 U1	< 0.01 U1	0.281	0.071	0.0519	5.16	0.1 J1	< 0.02 U1	< 0.002 U1	26.9	0.05 J1	< 0.1 U1
11/5/2019	Background	0.04 J1	6.37	14.6	< 0.02 U1	< 0.01 U1	0.273	0.04 J1	0.2057	4.84	0.06 J1	0.00714	< 0.002 U1	26.8	0.05 J1	< 0.1 U1

Notes:
1. Combined radium values were calculated from the sum of the reported radium-226 and radium-228 results.
Radium data quality flags were not included. Reported negative radium-226 or radium-228 results were replaced with zero.
--: Not analyzed
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.
L1: The associated laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) recovery was outside acceptance limits.
M1: The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.
mg/L: milligrams per liter
pCi/L: picocuries per liter
SU: standard unit
µg/L: micrograms per liter

APPENDIX 2

The statistical analysis reports completed in 2024 follow.

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Memorandum

Date:	March 25, 2024
To:	David Miller (AEP)
Copies to:	Marie Gildow (AEP)
From:	Allison Kreinberg (Geosyntec)
Subject:	Evaluation of Detection Monitoring Data at Amos Plant's Landfill (LF)

In accordance with United States Environmental Protection Agency (USEPA) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257 Subpart D, "CCR rule"), the second semiannual detection monitoring event of 2023 at the Landfill (LF), an existing CCR unit at the Amos Power Plant located in Winfield, West Virginia was completed on October 27, 2023. Based on the results, verification sampling was completed on January 26, 2024.

Background values for the LF were previously calculated in January 2018. In May 2020, monitoring wells MW-1 and MW-5 were removed from the groundwater monitoring network and replaced with wells MW-1801 and MW-1802. Following completion of eight background monitoring events, upper prediction limits (UPLs) and lower prediction limits (LPLs) were calculated for MW-1801 and MW-1802. After a minimum of four detection monitoring events, the results of those events were compared to the existing background and the data set was updated as appropriate for all wells in the groundwater monitoring network. Revised UPLs were calculated for each Appendix III parameter to represent background values. LPLs were also calculated for pH. Details on the calculation of these revised background values are described in Geosyntec's *Statistical Analysis Summary – Background Update Calculations* report, dated August 26, 2022.

To achieve an acceptably high statistical power while maintaining a site-wide false-positive rate (SWFPR) of 10% per year or less, prediction limits were calculated based on a one-of-two retesting procedure. With this procedure, a statistically significant increase (SSI) is concluded only if both samples in a series of two exceed the UPL (or are below the LPL for pH). In practice, if the initial result did not exceed the UPL, a second sample was not collected or analyzed.

Detection monitoring results and the relevant background values are compared in Table 1 and noted exceedances are described in the list below.

- Calcium concentrations exceeded the intrawell UPL of 1.05 mg/L in both the initial (1.14 mg/L) and second (1.16 mg/L) samples collected at MW-1802. Thus, an SSI over background is concluded for calcium at MW-1802.

- Chloride concentrations exceeded the intrawell UPL of 14.0 mg/L in both the initial (15.2 mg/L) and second (14.2 mg/L) samples collected at MW-1801. Thus, an SSI over background is concluded for chloride at MW-1801.

- Sulfate concentrations exceeded the intrawell UPL of 24.2 mg/L in both the initial (32.8 mg/L) and second (29.4 mg/L) samples collected at MW-1802. Thus, an SSI over background is concluded for sulfate at MW-1802.

In response to the exceedance noted above, the Amos LF CCR unit will either transition to assessment monitoring or an alternative source demonstration (ASD) for calcium, chloride, and sulfate will be conducted in accordance with 40 CFR 257.94(e)(2). If the ASD is successful, the Amos LF will remain in detection monitoring.

The statistical analysis was conducted within 90 days of completion of sampling and analysis in accordance with 40 CFR 257.93(h)(2). A certification of these statistics by a qualified professional engineer is provided in Attachment A.

Table 1. Detection Monitoring Data Comparison
Detection Summary Memorandum
Amos Plant – Landfill

Analyte	Unit	Description	MW-2	MW-4	MW-1801		MW-1802	
			10/17/2023	10/17/2023	10/17/2023	1/26/2024	10/17/2023	1/26/2024
Boron	mg/L	Intrawell Background Value (UPL)	0.243	0.206	0.293		0.282	
		Analytical Result	0.217	0.165	0.239	--	0.247	--
Calcium	mg/L	Intrawell Background Value (UPL)	3.50	0.904	1.78		1.05	
		Analytical Result	2.20	0.90	1.76	--	**1.14**	**1.16**
Chloride	mg/L	Intrawell Background Value (UPL)	5.32	25.1	14.0		13.4	
		Analytical Result	3.39	23.3	**15.2**	**14.2**	12.9	--
Fluoride	mg/L	Intrawell Background Value (UPL)	1.74	1.55	5.58		5.32	
		Analytical Result	1.51	1.35	5.13	--	5.01	--
pH	SU	Intrawell Background Value (UPL)	8.9	9.8	9.3		9.4	
		Intrawell Background Value (LPL)	8.2	8.6	8.5		8.7	
		Analytical Result	8.5	9.4	8.7	8.8	9.2	9.0
Sulfate	mg/L	Intrawell Background Value (UPL)	12.1	11.5	9.05		24.2	
		Analytical Result	8.7	9.5	5.3	--	**32.8**	**29.4**
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	396	419	563		527	
		Analytical Result	360	370	510	--	480	--

Notes:

1. Bold values exceed the background value.

2. Background values are shaded gray.

LPL: Lower prediction limit

mg/L: milligrams per liter

SU: standard units

UPL: Upper prediction limit

ATTACHMENT A

Certification by a Qualified Professional Engineer

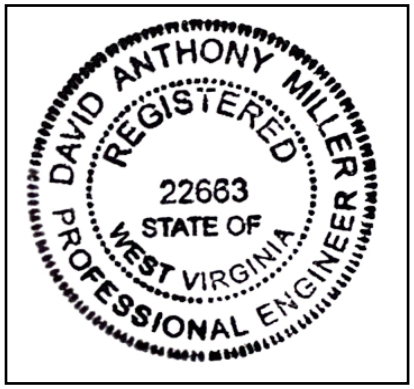
CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER

I certify that the selected statistical method, described above and in the August 26, 2022 *Statistical Analysis Summary* report, is appropriate for evaluating the groundwater monitoring data for the Amos LF CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

David Anthony Miller

Printed Name of Licensed Professional Engineer

Signature



22663	West Virginia	03.25.2024
License Number	Licensing State	Date

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Memorandum

Date:	October 16, 2024
To:	David Miller (AEP)
Copies to:	Marie Gildow (AEP)
From:	Allison Kreinberg (Geosyntec)
Subject:	Evaluation of Detection Monitoring Data at Amos Plant's Landfill (LF)

In accordance with United States Environmental Protection Agency (USEPA) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257 Subpart D, "CCR rule"), the first semiannual detection monitoring event of 2024 at the Landfill (LF), an existing CCR unit at the Amos Power Plant located in Winfield, West Virginia was completed on May 9, 2024. Based on the results, verification sampling was completed on July 16-17, 2024.

Background values for the LF were previously calculated in January 2018. In May 2020, monitoring wells MW-1 and MW-5 were removed from the groundwater monitoring network and replaced with wells MW-1801 and MW-1802. Following completion of eight background monitoring events, upper prediction limits (UPLs) and lower prediction limits (LPLs) were calculated for MW-1801 and MW-1802. After a minimum of four detection monitoring events, the results of those events were compared to the existing background and the data set was updated as appropriate for all wells in the groundwater monitoring network. Revised UPLs were calculated for each Appendix III parameter to represent background values. LPLs were also calculated for pH. Details on the calculation of these revised background values are described in Geosyntec's *Statistical Analysis Summary – Background Update Calculations* report, dated August 26, 2022.

To achieve an acceptably high statistical power while maintaining a site-wide false-positive rate (SWFPR) of 10% per year or less, prediction limits were calculated based on a one-of-two retesting procedure. With this procedure, a statistically significant increase (SSI) is concluded only if both samples in a series of two exceed the UPL (or are below the LPL for pH). In practice, if the initial result did not exceed the UPL, a second sample was not collected or analyzed.

Detection monitoring results and the relevant background values are compared in Table 1 and noted exceedances are described in the list below.

- Calcium concentrations exceeded the intrawell UPL of 1.05 mg/L in both the initial (1.10 mg/L) and second (1.12 mg/L) samples collected at MW-1802. Therefore, an SSI over background is concluded for calcium at MW-1802.

- Chloride concentrations exceeded the intrawell UPL of 14.0 mg/L in both the initial (16.2 mg/L) and second (16.3 mg/L) samples collected at MW-1801. Therefore, an SSI over background is concluded for chloride at MW-1801.

- Sulfate concentrations exceeded the intrawell UPL of 24.2 mg/L in both the initial (36.2 mg/L) and second (24.9 mg/L) samples collected at MW-1802. Therefore, an SSI over background is concluded for sulfate at MW-1802.

In response to the exceedance noted above, the Amos LF CCR unit will either transition to assessment monitoring or an alternative source demonstration (ASD) for calcium, chloride, and sulfate will be conducted in accordance with 40 CFR 257.94(e)(2). If the ASD is successful, the Amos LF will remain in detection monitoring.

The statistical analysis was conducted within 90 days of completion of sampling and analysis in accordance with 40 CFR 257.93(h)(2). A certification of these statistics by a qualified professional engineer is provided in Attachment A.

Table 1. Detection Monitoring Data Comparison
Detection Summary Memorandum
Amos Plant – Landfill

Analyte	Unit	Description	MW-2	MW-4	MW-1801		MW-1802	
			5/9/2024	5/9/2024	5/9/2024	7/16/2024	5/9/2024	7/17/2024
Boron	mg/L	Intrawell Background Value (UPL)	0.243	0.206	0.293		0.282	
		Analytical Result	0.185	0.151	0.225	--	0.226	--
Calcium	mg/L	Intrawell Background Value (UPL)	3.50	0.904	1.78		1.05	
		Analytical Result	1.66	0.85	1.68	--	**1.10**	**1.12**
Chloride	mg/L	Intrawell Background Value (UPL)	5.32	25.1	14.0		13.4	
		Analytical Result	4.25	23.7	**16.2**	**16.3**	12.6	--
Fluoride	mg/L	Intrawell Background Value (UPL)	1.74	1.55	5.58		5.32	
		Analytical Result	1.39	1.34	5.28	--	**5.33**	5.13
pH	SU	Intrawell Background Value (UPL)	8.9	9.8	9.3		9.4	
		Intrawell Background Value (LPL)	8.2	8.6	8.5		8.7	
		Analytical Result	8.6	9.1	8.7	--	9.0	--
Sulfate	mg/L	Intrawell Background Value (UPL)	12.1	11.5	9.05		24.2	
		Analytical Result	8.1	9.3	4.6	--	**36.2**	**24.9**
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	396	419	563		527	
		Analytical Result	370	390	510	--	500	--

Notes:
1. Bold values exceed the background value.
2. Background values are shaded gray.
--: not sampled
LPL: lower prediction limit
mg/L: milligrams per liter
SU: standard units
UPL: upper prediction limit

ATTACHMENT A

Certification by a Qualified Professional Engineer

CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER

I certify that the selected statistical method, described above and in the August 26, 2022 *Statistical Analysis Summary* report, is appropriate for evaluating the groundwater monitoring data for the Amos LF CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

David Anthony Miller

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature

22663	West Virginia	10.18.2024
License Number	Licensing State	Date

APPENDIX 3

The alternative source demonstrations follow.

Geosyntec consultants

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ALTERNATIVE SOURCE DEMONSTRATION REPORT – SECOND SEMIANNUAL DETECTION EVENT 2023

FEDERAL CCR RULE

Amos Power Plant

Landfill

Winfield, West Virginia

Prepared for

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

Prepared by

Geosyntec Consultants, Inc.
500 West Wilson Bridge Road, Suite 250
Worthington, Ohio 43085

Project CHA8495

June 2024

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ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
CCR	coal combustion residuals
CFR	Code of Federal Regulations
ft/yr	feet per year
LPL	lower prediction limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
SSI	statistically significant increase
UPL	upper prediction limit
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1. INTRODUCTION AND SUMMARY

This alternative source demonstration (ASD) report has been prepared to address the potential statistically significant increases (SSIs) for calcium, chloride, and sulfate at the John E. Amos Plant Landfill (Landfill) following the second semiannual detection monitoring event of 2023.

The previously calculated upper prediction limits (UPLs) for the Landfill were recalculated for each Appendix III parameter to represent background values (Geosyntec 2022) after four detection monitoring events were completed. A lower prediction limit (LPL) was also recalculated for pH. The revised prediction limits were calculated based on a one-of-two retesting procedure in accordance with the *Unified Guidance* (United States Environmental Protection Agency [USEPA] 2009a) and the statistical analysis plan developed for the site (Geosyntec 2020). With this procedure, an SSI is concluded only if both samples in a series of two are above the UPL or, in the case of pH, are below the LPL.

The second semiannual detection monitoring event of 2023 was performed in October 2023 (initial sampling event) and January 2024 (verification sampling event), and the results were compared to the recalculated prediction limits. During this detection monitoring event, potential SSIs were identified for chloride at MW-1801 and for calcium and sulfate at MW-1802 based on intrawell comparisons. A summary of the detection monitoring analytical results for all constituents listed in the Code of Federal Regulations (CFR) Title 40, Part 257, Appendix III, and the calculated prediction limits to which they were compared is provided in **Table 1**.

1.1 CCR Rule Requirements

In accordance with the USEPA regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments, 40 CFR 257.94(e)(2) states the following:

> The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer . . . verifying the accuracy of the information in the report.

Pursuant to 40 CFR 257.94(e)(2), Geosyntec Consultants, Inc. (Geosyntec) has prepared this ASD report to identify whether the potential SSIs identified for calcium and sulfate at MW-1802 and for chloride at MW-1801 are from a source other than the Landfill.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which identified SSIs could be attributed. Alternative sources are classified into the following five types:

- 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 (i.e., anthropogenic impacts)

A demonstration was conducted to assess whether the increases in calcium and sulfate at monitoring well MW-1802 and chloride at monitoring well MW-1801 could be attributed to an alternative source and not a release from the Landfill.

2. SITE SUMMARY

A brief description of the site geology and hydrology are provided below.

2.1 Site Geology Summary

The Landfill site consists of a northern valley and a southern valley, both of which are surrounded on all sides by bedrock ridges (**Figure 1**). A topographic high point separates the two valleys (Arcadis 2020), as shown in **Figure 2**. MW-1802 is a downgradient well in the northern valley, and MW-1801 is a downgradient well in the southern valley. The groundwater flow patterns in the northern and southern valleys are hydrologically separated from each other.

Bedrock in the vicinity of MW-1801 and MW-1802 consists of a combination of gray siltstone, silty shale, and red claystone. The boring logs for MW-1801 and MW-1802 identified predominately shale interbedded with sandstone within the screened intervals (**Attachment A**). These lithologies make up part of the Pennsylvanian Monongahela and Conemaugh Formations, which were deposited by cyclic sequences of limestone, siltstone, sandstone, red and gray shale, and coal (United States Geological Survey [USGS] n.d.).

These formations contain a system of stress-relief fractures that are associated with a regional decline in stress and erosion (Arcadis 2020). Although not represented in boring logs associated with Landfill monitoring well network construction, the sedimentary deposits associated with the Monongahela and Conemaugh Formations contains occasional thin limestone and coal beds. The Pittsburgh Coal and Pittsburgh Limestone beds serve as marker beds indicating the contact between the Monongahela and Conemaugh formations. The Pittsburgh limestone bed has been observed in boring logs at the nearby fly ash pond (Arcadis 2020).

2.2 Site Hydrogeology Summary

Groundwater flows through the stress-relief fracture formations, as illustrated in a conceptual site model provided in the *Groundwater Monitoring Network Report* (Arcadis 2020) and included here as **Attachment B**. Bedrock groundwater flow generally follows surface topography, flowing downslope of ridges toward valley floors (Arcadis 2020).

The Landfill monitoring well network monitors groundwater flow within the Uppermost Aquifer, which was defined by Arcadis (2020) as the saturated portion of the stress-relief fracturing system. This Uppermost Aquifer unit is independent of any single lithologic unit; the stress-relief fracturing system occurs in both the Conemaugh and Monongahela Formations and spans multiple lithologies comprising these formations. According to the *Groundwater Monitoring Network Report*, the stress-relief fracture system "is hydraulically connected from ridges to valleys" (Arcadis 2020), as determined by a multiple-lines-of-evidence approach discussed in Section 3.2.3 of that report. These multiple lines of evidence include evaluation of boring logs, assessment of groundwater geochemistry, hydraulic testing consisting of borehole packer testing and pump-yield testing, and high-resolution water level monitoring using pressure transducers deployed in monitoring wells across the site.

Water level monitoring data from the October 2023 sampling event were used to calculate groundwater velocities for MW-1801 (0.2 feet per year [ft/yr]) and MW-1802 (0.5 ft/yr). Both high-resolution water level monitoring conducted by Arcadis and seasonal water level monitoring

have not identified seasonal flow-regime changes at or near the Landfill monitoring well network. The current Landfill monitoring well network consists of upgradient monitoring wells MW-6, MW-7R, MW-8, MW-9, and MW-10 and downgradient compliance wells MW-2, MW-4, MW-1801, and MW-1802. Previous Landfill monitoring network wells MW-1 and MW-5 were removed from the monitoring network after it was determined that groundwater from those locations was representative of shallow perched groundwater zones (Arcadis 2020) and not a part of the Uppermost Aquifer.

3. ALTERNATIVE SOURCE DEMONSTRATION

An initial review of site geochemistry, site historical data, and laboratory quality assurance and quality control data did not demonstrate alternative sources due to Type I (sampling) or Type II (laboratory) causes. A review of the statistical methods used did not identify any Type III (statistical) causes. A preliminary review of site geochemistry did not identify any Type V (anthropogenic) causes. Therefore, natural variation, which is a Type IV cause, was examined as a potential cause of the SSIs.

3.1 Landfill Leachate Data Analysis

The concentrations of boron and major cations and anions known to be indicative of CCR leachate were examined in Landfill leachate samples and compared to monitoring well network groundwater to evaluate whether Landfill leachate influenced downgradient groundwater chemistry. Piper diagrams, which represent the relative proportions of major cations and anions in aqueous samples, were created to visualize aqueous geochemistry for the Landfill leachate and at downgradient wells MW-1801 and MW-1802 (**Figure 3**). The data shown in these Piper diagrams capture the background and detection monitoring periods: 2018 through 2024 for MW-1801 and MW-1802, and 2020 through 2023 for leachate samples.

The groundwater geochemistry at downgradient wells MW-1801 and MW-1802 has remained nearly unchanged throughout the monitoring period, as illustrated by the tight clustering of sample results for each well on the Piper diagrams. Groundwater compositions are distinct from leachate, particularly for the relative anion percentages; leachate samples consist predominantly of sulfate, while groundwater anion compositions are dominated by carbonate alkalinity. These results illustrate stable geochemical composition of site groundwater and a lack of influence from leachate on the groundwater composition. Considering the distinct geochemical composition of the leachate samples, variation in relative percentages of major anions would be expected if downgradient monitoring wells were impacted by Landfill leachate. No such variation is observed in downgradient monitoring well groundwater samples (**Figure 3**).

Boron is typically considered a geochemically conservative parameter due to its minimal attenuation by chemical processes in groundwater flow. Boron therefore functions as an indicator for potential CCR unit releases due to its high relative concentration in CCR. Boron concentrations in Landfill leachate samples were 43.6 milligrams per liter (mg/L) and 113 mg/L for the samples collected from the northern valley and southern valley, respectively, in November 2023. Concentrations of boron at downgradient wells MW-1801 and MW-1802 are consistently less than 0.3 mg/L (**Figure 4**).

If Landfill leachate, which contains concentrations of boron several orders of magnitude higher than the wells of interest, were impacting groundwater quality at downgradient monitoring wells, an increase in boron concentrations at downgradient wells MW-1801 and MW-1802 would be expected. The recent boron concentrations at the downgradient monitoring wells of concern do not display increasing trends (**Figure 4**), which suggests that changes in calcium and sulfate in groundwater at MW-1802 and chloride in groundwater at MW-1801 are not due to a release from the Landfill.

3.2 Examination of Natural Variability

Calcium, chloride, and sulfate have been found to be common constituents in groundwater from the Pennsylvanian Group in West Virginia (Chambers, et al. 2012), which includes the Monongahela and Conemaugh formations in which MW-1801 and MW-1802 are screened. Long-term groundwater quality was monitored at 300 wells in West Virginia from 1999 to 2008 (Chambers et al. 2012). Samples grouped by geologic age of the aquifer unit indicated that the highest calcium concentration (286 mg/L) and four highest chloride concentrations (i.e., those greater than the secondary maximum contaminant level of 250 mg/L; USEPA 2009b) were measured in Pennsylvanian-aged aquifers. Pennsylvanian-aged aquifer formations were also observed to have the highest reported sulfate value (767 mg/L) as well as the largest degree of variation in sulfate concentrations across the aquifer groups.

Bar charts were prepared to compare maximum reported concentrations of calcium (**Figure 5**) and sulfate (**Figure 6**) in upgradient and downgradient wells in the North Valley to the median value of Pennsylvanian-aged aquifers in West Virginia. Calcium and sulfate concentrations at downgradient well MW-1802 were comparable to upgradient well MW-10 and less than upgradient wells MW-8 and MW-9. In Pennsylvanian-aged aquifers, the median calcium value observed was approximately 20 times greater than calcium concentrations in MW-1802, and the median sulfate value observed was comparable to sulfate concentrations in MW-1802. Sulfate concentrations measured in the North Valley were below the secondary maximum contaminant level of 250 mg/L.

A comparison of maximum reported chloride concentrations in groundwater at upgradient wells MW-6 and MW-7R and compliance well MW-1801 to the median value of Pennsylvanian-aged aquifers in West Virginia indicates that chloride concentrations at MW-1801 are similar to or less than chloride concentrations in groundwater measured in the Pennsylvanian aquifers (**Figure 7**).

MW-1801 and MW-1802 are screened within the Pennsylvanian Monongahela and Conemaugh Formations. These formations represent a cyclic depositional sequence which featured transgressive and regressive periods that caused the deposition of interbedded sequences of limestone, sandstone, shale, and coal (Martin 1998). In such depositional environments, fine grained siltstones and shales are deposited and cyclically exposed to marine waters which are often concentrated in major ions like calcium, chloride, and sulfate.

Transgression-regression cycling creates sequences in which saline marine waters saturate open pore spaces in freshly deposited sediment, which are then retained due to deposition of and burial by additional fine-grained sediment. This process results in trapping of marine water at the time of deposition. While the original water within the pore space is typically replaced by meteoric recharge soon after deposition, a component of the dissolved ions (e.g., calcium, chloride, sulfate) in the water are typically retained by membrane filtration as an effect of the clay mineralogy of the shale components in these sequences (Drever 1988). In addition to the retention of marine water within the pore space of fine-grained sedimentary rocks, deposited sediment in cyclic marine environments also may become impregnated with soluble evaporitic minerals like halite (crystalline sodium chloride, NaCl) and anhydrite/gypsum (crystalline calcium sulfate, $CaSO_4$), which contain chloride, calcium, and sulfate (Hem 1985). These evaporites are known to be highly soluble and subject to dissolution during pore fluid evolution. Dissolution of these minerals results

in further increases to the concentrations of aqueous major ions in pore fluid from rocks of coastal marine origin, regardless of whether these minerals are still present.

Formation water is expected to be diluted by meteoric recharge over time, but depositional and diagenetic processes discussed above would result in some component of major ions being retained in current groundwater at variable concentrations based on site topography, permeability of aquifer sediments, and pore fluid evolution.

The site-specific and regional-scale geochemical observations demonstrate that calcium, chloride, and sulfate concentrations at the downgradient locations are aligned with expected concentrations of these parameters in Pennsylvanian-aged strata within the region, and that observed concentrations at the wells of interest are not anomalous but rather are attributable to natural variations within groundwater as expected based on regional groundwater quality and the depositional environment associated with the screened lithologies of MW-1801 and MW-1802.

3.3 Solid Phase Sample Analysis

Aquifer solids samples were collected from geologic core recovered during the installation of monitoring wells MW-1801 and MW-1802 and were submitted for chemical analyses. Based on a review of the boring logs (**Attachment A**), two shale samples and one sandstone sample were collected from each core and analyzed for total chloride, fluoride, sulfate, and calcium. The laboratory analytical results are provided as **Attachment C** and summarized in **Table 2**. The sandstone sample collected from MW-1801 contained solid-phase chloride concentrations of 24.8 milligrams per kilogram (mg/kg). Calcium concentrations were identified in MW-1802 aquifer solids ranging from 1,120 mg/kg in a shale sample to 3,400 mg/kg in the sandstone sample. Sulfate was detected in all solid samples collected from MW-1802 at concentrations ranging from 8.45 to 17.9 mg/kg.

The reported presence of major ions such as calcium (1.14 – 1.16 mg/L), chloride (14.2 – 15.2 mg/L), and sulfate (29.4 – 32.8 mg/L) within MW-1801 and MW-1802 groundwater are both expected and unavoidable, as the depositional environment of these formations would trap a component of major ions within the formation water of these geologic units. The subsequent interaction of groundwater with aquifer solids containing these chemical components will result in some additional degree of mass transfer to the aqueous phase.

Calcium, chloride, and sulfate were detected in aquifer solids from MW-1801 and MW-1802, and greater aqueous concentrations of these parameters are commonly observed both at a regional scale and, in the cases of calcium and sulfate, within groundwater upgradient of the Landfill. These observations suggest that the SSIs in MW-1801 and MW-1802 groundwater are associated with natural variability (depositional environment and pore fluid evolution) and not due to a release from the Landfill.

3.4 Summary of Findings

A demonstration was conducted to assess whether the potential SSIs for chloride at MW-1801 and calcium and sulfate at MW-1802 were based on Type IV causes (natural variation) and not due to a release from the Amos Plant Landfill. The following is concluded:

- The SSIs could not be attributed to a Type I (sampling error), Type II (laboratory), Type III (statistical), or Type V (anthropogenic) cause.

- Groundwater chemistry at MW-1801 and MW-1802 is generally stable and does not show evidence of influence from Landfill leachate.
- Concentrations of boron, a primary indicator of CCR impacts to groundwater, at MW-1801 and MW-1802 do not show increasing trends. If impacts from Landfill leachate to downgradient locations were occurring, increasing boron groundwater concentrations would be expected.
- Pennsylvanian-aged aquifer data from USGS studies indicate that MW-1802 calcium and sulfate groundwater concentrations and MW-1801 chloride concentrations are lower than or comparable to typical values for wells screened within this geologic material across the state. Groundwater from monitoring wells upgradient of the Landfill contains greater concentrations of calcium and sulfate than MW-1802 groundwater, indicating the presence of these parameters in background groundwater at concentrations greater than those observed in compliance well groundwater.
- These parameters are expected to naturally exist in groundwater within these formations due to the depositional environment. Aquifer solids samples collected from MW-1801 and MW-1802 rock core contain detectable concentrations of calcium, chloride, and sulfate. The geologic material comprising the aquifer unit in which these wells are screened likely contributes additional mass to the aqueous phase at concentrations sufficient to result in SSIs.

3.5 Sampling Requirements

The conclusions of this ASD support the determination that the identified SSIs are from natural variation and not due to a release from the Landfill. Therefore, the unit will remain in the detection monitoring program. Groundwater at the unit will be sampled for Appendix III parameters on a semiannual basis.

4. CONCLUSIONS AND RECOMMENDATIONS

The preceding information serves as the ASD prepared in accordance with 40 CFR 257.94(e)(2) and supports the conclusion that the SSIs for calcium and sulfate at MW-1802 and chloride at MW-1801 are attributed to variation of natural groundwater quality (Type IV). Therefore, no further action is warranted, and the Amos Plant Landfill will remain in the detection monitoring program. Certification of this ASD by a qualified professional engineer is provided in **Attachment D**.

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TABLES

Table 1. Detection Monitoring Data Comparison
Alternative Source Demonstration Report
Amos Plant – Landfill

Analyte	Unit	Description	MW-2	MW-4	MW-1801		MW-1802	
			10/17/2023	10/17/2023	10/17/2023	1/26/2024	10/17/2023	1/26/2024
Boron	mg/L	Intrawell Background Value (UPL)	0.243	0.206	0.293		0.282	
		Analytical Result	0.217	0.165	0.239	--	0.247	--
Calcium	mg/L	Intrawell Background Value (UPL)	3.50	0.904	1.78		1.05	
		Analytical Result	2.20	0.90	1.76	--	**1.14**	**1.16**
Chloride	mg/L	Intrawell Background Value (UPL)	5.32	25.1	14.0		13.4	
		Analytical Result	3.39	23.3	**15.2**	**14.2**	12.9	--
Fluoride	mg/L	Intrawell Background Value (UPL)	1.74	1.55	5.58		5.32	
		Analytical Result	1.51	1.35	5.13	--	5.01	--
pH	SU	Intrawell Background Value (UPL)	8.9	9.8	9.3		9.4	
		Intrawell Background Value (LPL)	8.2	8.6	8.5		8.7	
		Analytical Result	8.5	9.4	8.7	8.8	9.2	9.0
Sulfate	mg/L	Intrawell Background Value (UPL)	12.1	11.5	9.05		24.2	
		Analytical Result	8.7	9.5	5.3	--	**32.8**	**29.4**
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	396	419	563		527	
		Analytical Result	360	370	510	--	480	--

Notes:
1. Bold values exceed the background value.
2. Background values are shaded gray.
LPL: Lower prediction limit
mg/L: milligrams per liter
SU: standard units
UPL: Upper prediction limit

Table 2. Key Solid Sample Analytical Results
Alternative Source Demonstration Report
Amos Plant – Landfill

Sample Location	Lithology	Depth (feet)	Parameter		
			Calcium	Chloride	Sulfate
MW-1801	Shale	55.9-56.6	1010	<10.4	9.59 J
	Shale	58.0-58.8	2910	<10.5	16.6
	Sandstone	59.8-60.5	25600	24.8	20.0
MW-1802	Shale	51.9-52.5	1120	<10.5	17.9
	Shale	55.3-55.8	1230	<10.4	14.6
	Sandstone	56.3-56.9	3400	<9.87	8.45 J

Notes:

1. All results are shown in units of milligrams per kilogram.
2. Non-detects are shown as less than (<) the reporting limit.

J: Result is less than the reporting limit but greater than or equal to the method detection limit and the concentrations is an approximate value.

FIGURES

Legend

- Upgradient Sampling Location
- Downgradient Sampling Location
- FGD Landfill Permitted Limits
- Northern Valley
- Southern Valley

Notes

- Monitoring well coordinates provided by AEP.
- Aerial imagery provided by ESRI and dated 12/07/2023.

700 350 0 700 Feet

Site Layout
Amos Landfill

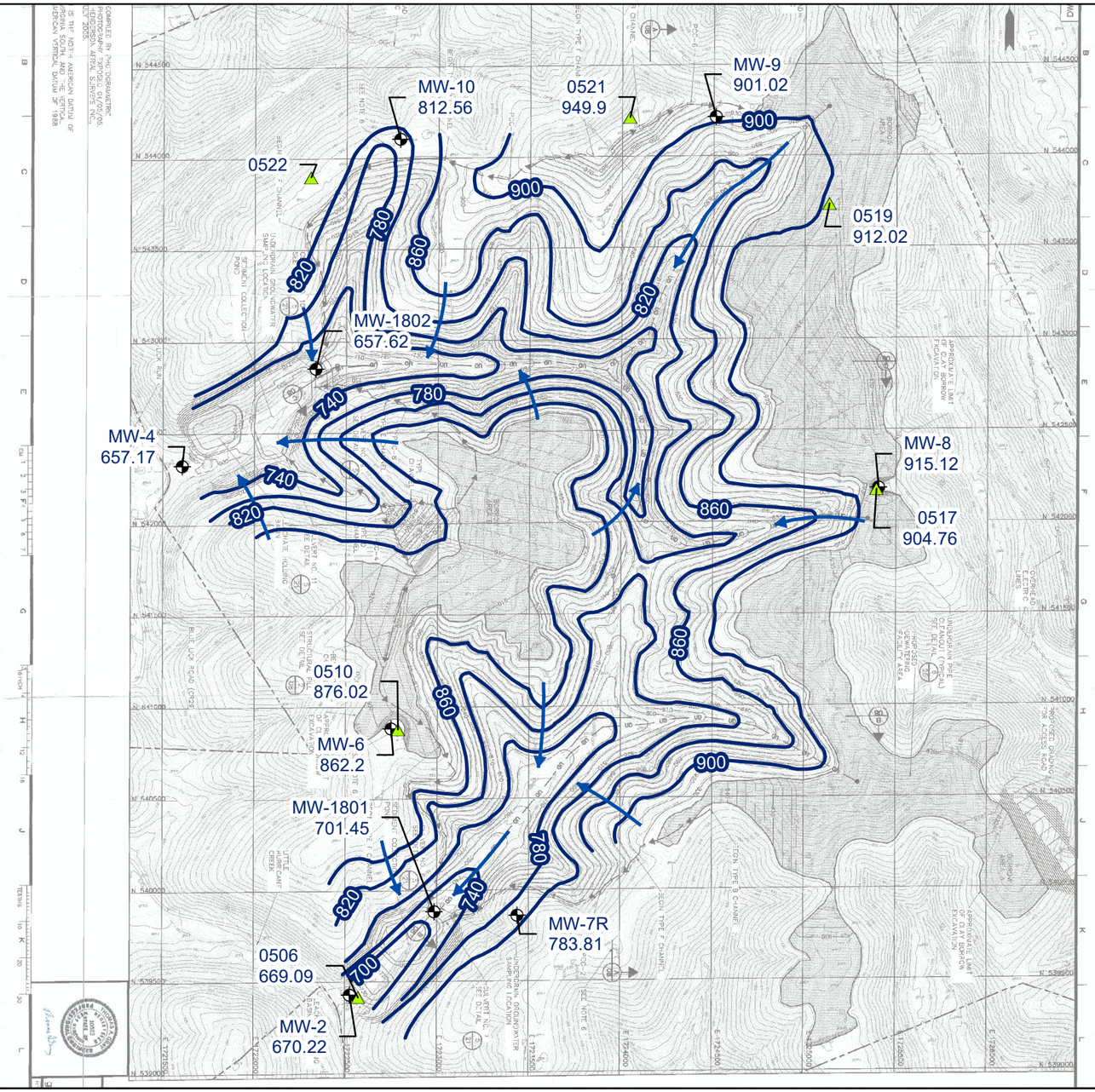
AEP Amos Generating Plant
Winfield, West Virginia

Geosyntec consultants

Columbus, Ohio | June 2024

Figure **1**

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Amos\AEP-Amos_Landfill_Site_Layout.mxd. ASoltero. 12/15/2023. CHA8423/04/08.



Legend

- Groundwater Monitoring Well
- Piezometer
- Groundwater Elevation Contour
- Groundwater Flow Direction

Notes

- Monitoring well coordinates and water level data (collected on October 16, 2023) provided by AEP.
- PZ-0522 was dry during the October 2023 sampling event.
- Potentiometric surface contour interval is 40 feet.
- As of 2023, a portion of the liner in Cell 4 was replaced with a riprap drainage blanket; re-lining construction is ongoing.
- Topography and drainage system basemap from AEP Drawing No. 13-30500-05-A (topographic contour interval: 10 feet).
- Groundwater elevation units are feet above mean sea level.

700 350 0 700 Feet

Potentiometric Surface Map - Uppermost Aquifer October 2023

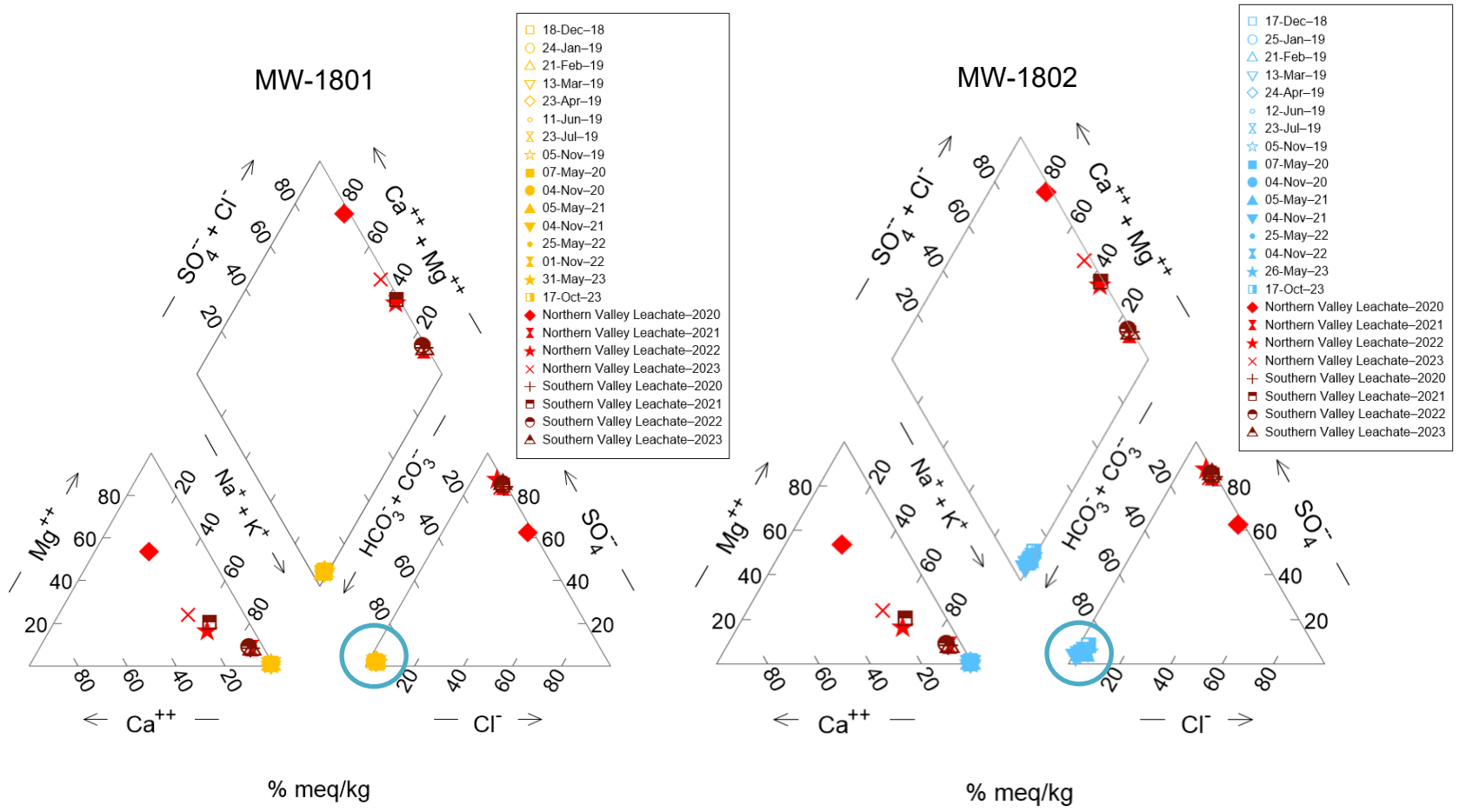
AEP Amos Generating Plant
Winfield, West Virginia

Geosyntec consultants

Columbus, Ohio | June 2024

Figure **2**

A:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Amos\2023\AEP-Amos_Landfill_GW_2023-10.mxd. Okiemute.Commander. 12/26/2023. CHA8423/04/08.



Notes: Landfill leachate samples were collected on August 25, 2020, October 7, 2021, September 13, 2022, and November 8, 2023. Leachate samples were not analyzed for potassium (K^+). All groundwater samples for each monitoring location are circled in blue on the anion distribution triangle.

% meq/kg: percent milliequivalents per kilogram

Piper Diagrams: Leachate Comparison

Amos Landfill

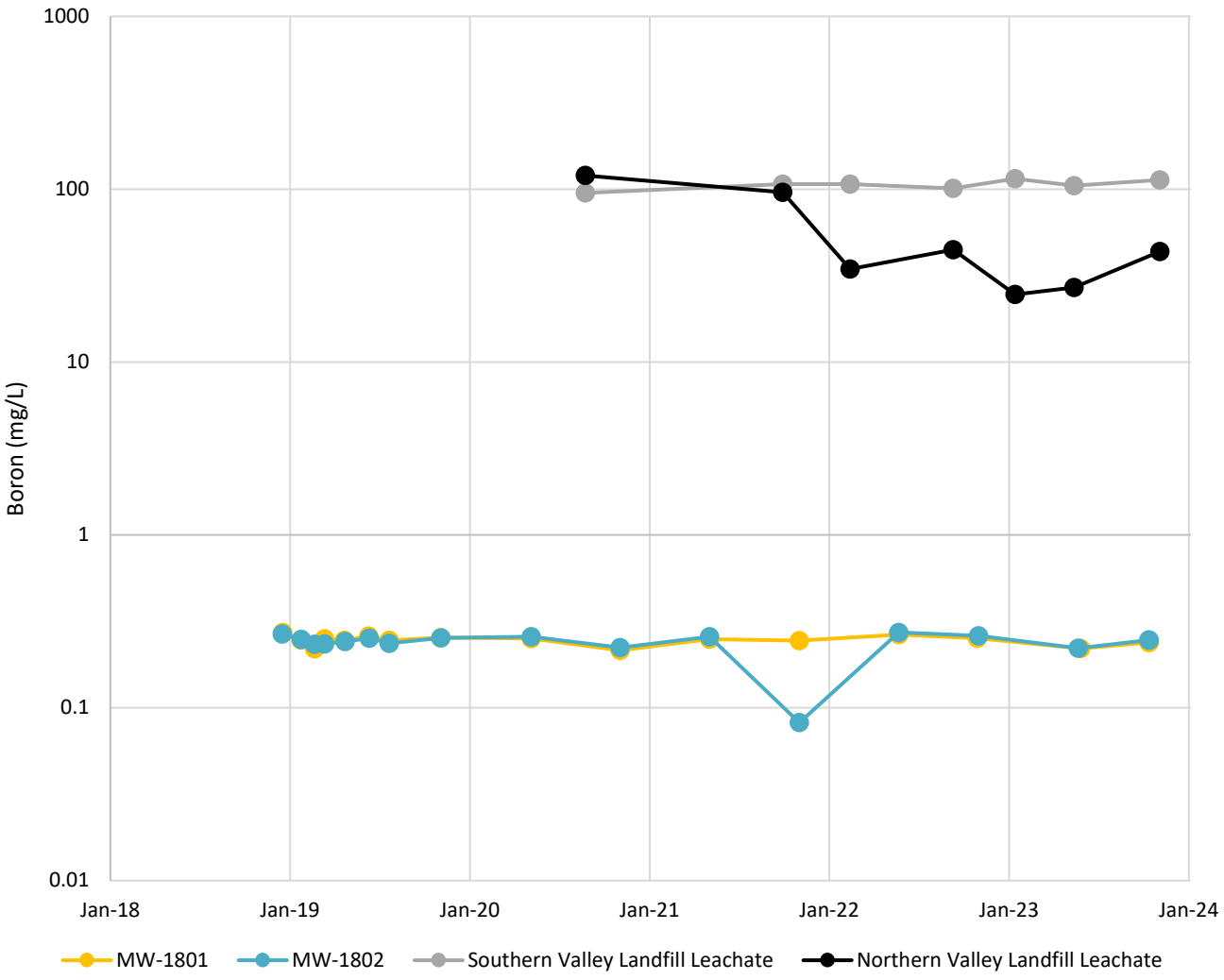
Geosyntec consultants

AMERICAN ELECTRIC POWER

Figure 3

Columbus, Ohio

June 2024



Notes: Data were collected under the federal coal combustion residual (CCR) rule requirements and represents total boron in groundwater.

mg/L: milligrams per liter

Boron Time Series Graph
Amos Landfill

Geosyntec consultants

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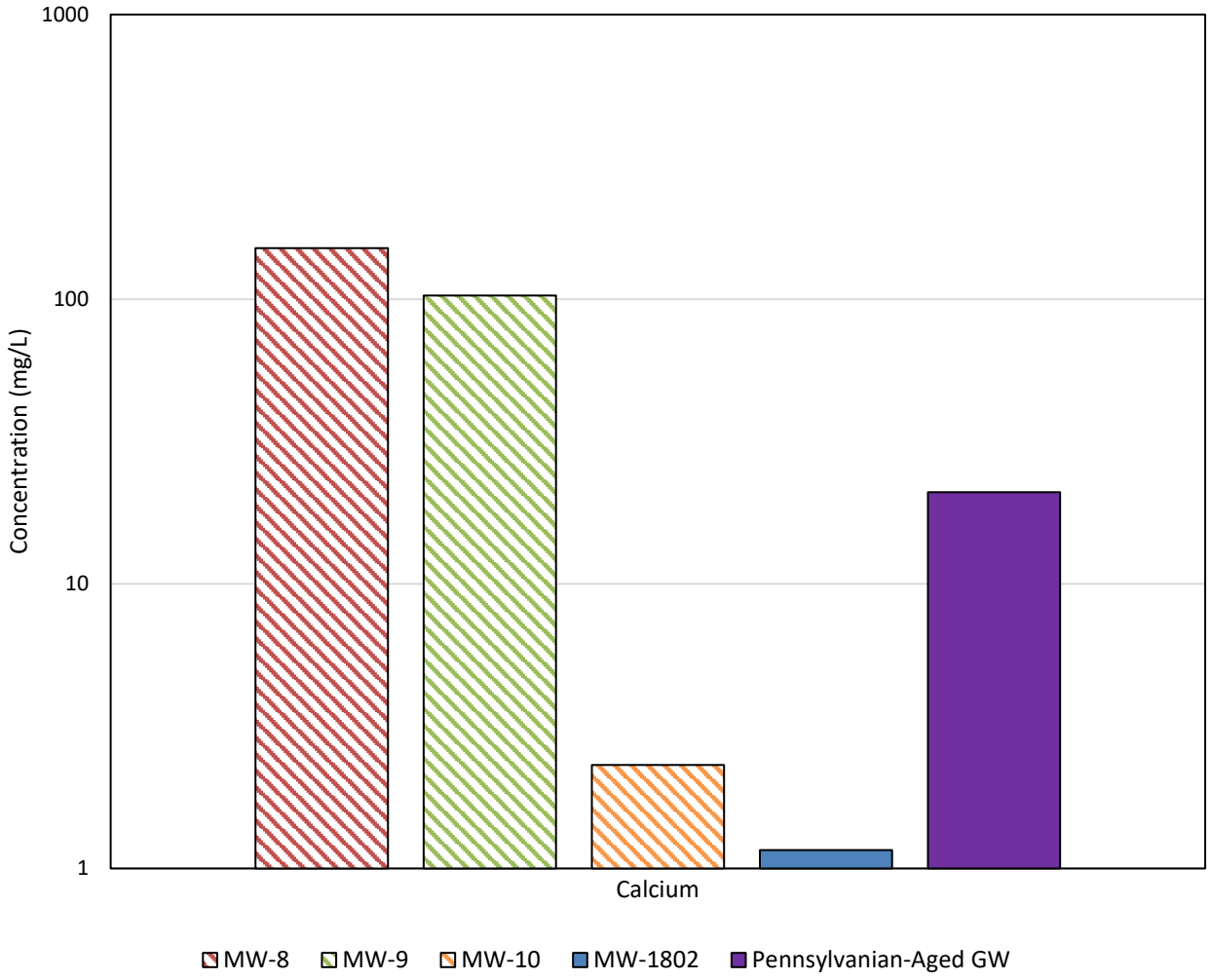
Columbus, Ohio

June 2024

Figure **4**



Notes: Upgradient wells MW-8, MW-9, and MW-10 and downgradient well MW-1802 show the maximum calcium concentration from all past collected data at each monitoring well. 'Pennsylvanian-Aged GW', shown in purple, represents median Pennsylvanian-aged aquifer data from Chambers et al., 2012. Data for Amos monitoring wells were collected under the federal CCR rule and represents total calcium in groundwater.
mg/L: milligrams per liter

Calcium Comparison
Amos Landfill

Geosyntec consultants

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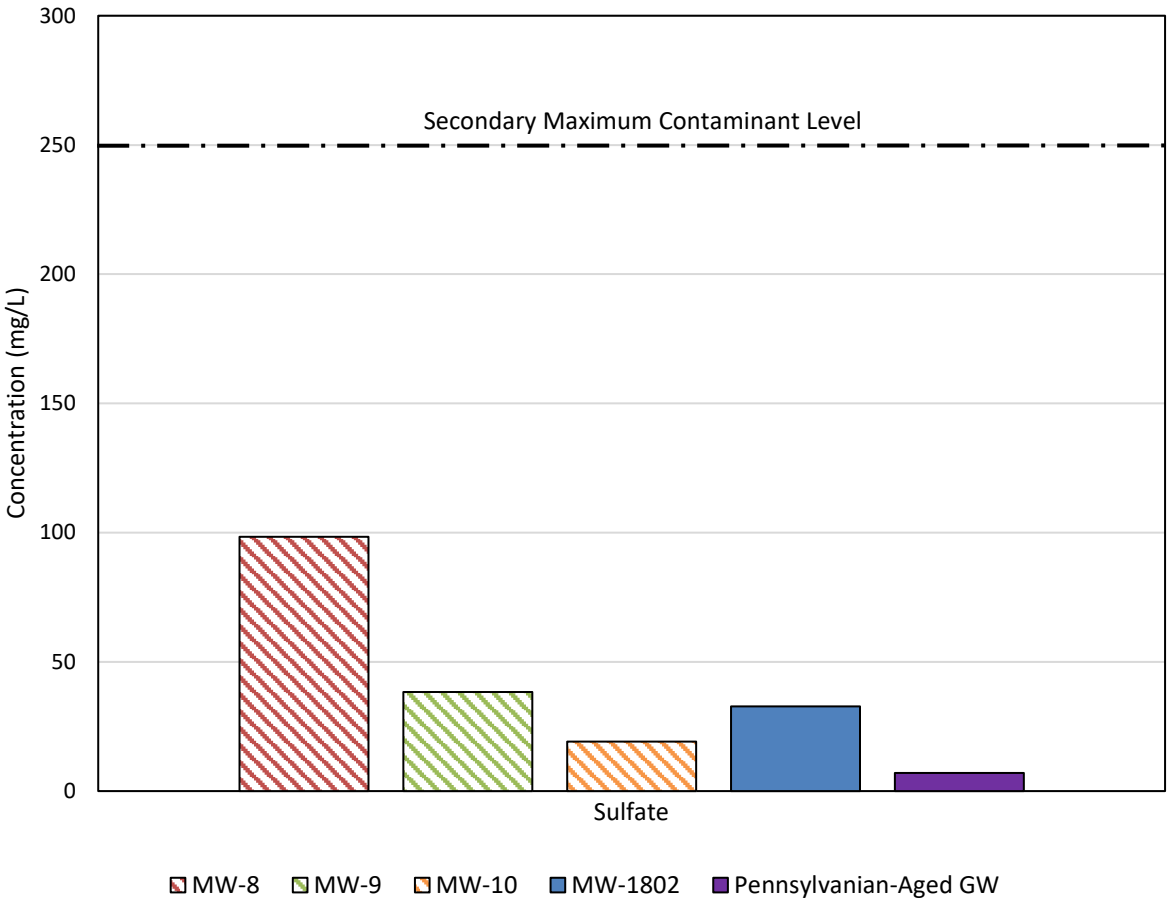
Columbus, Ohio

June 2024

Figure **5**



Notes: Upgradient wells MW-8, MW-9, and MW-10 and downgradient well MW-1802 show the maximum sulfate concentration from all past collected data at each monitoring well. 'Pennsylvanian-Aged GW', shown in purple, represents median Pennsylvanian-aged aquifer data from Chambers et al., 2012. Data for Amos monitoring wells were collected under the federal CCR rule and represents total sulfate in groundwater.
mg/L: milligrams per liter

Sulfate Comparison
Amos Landfill

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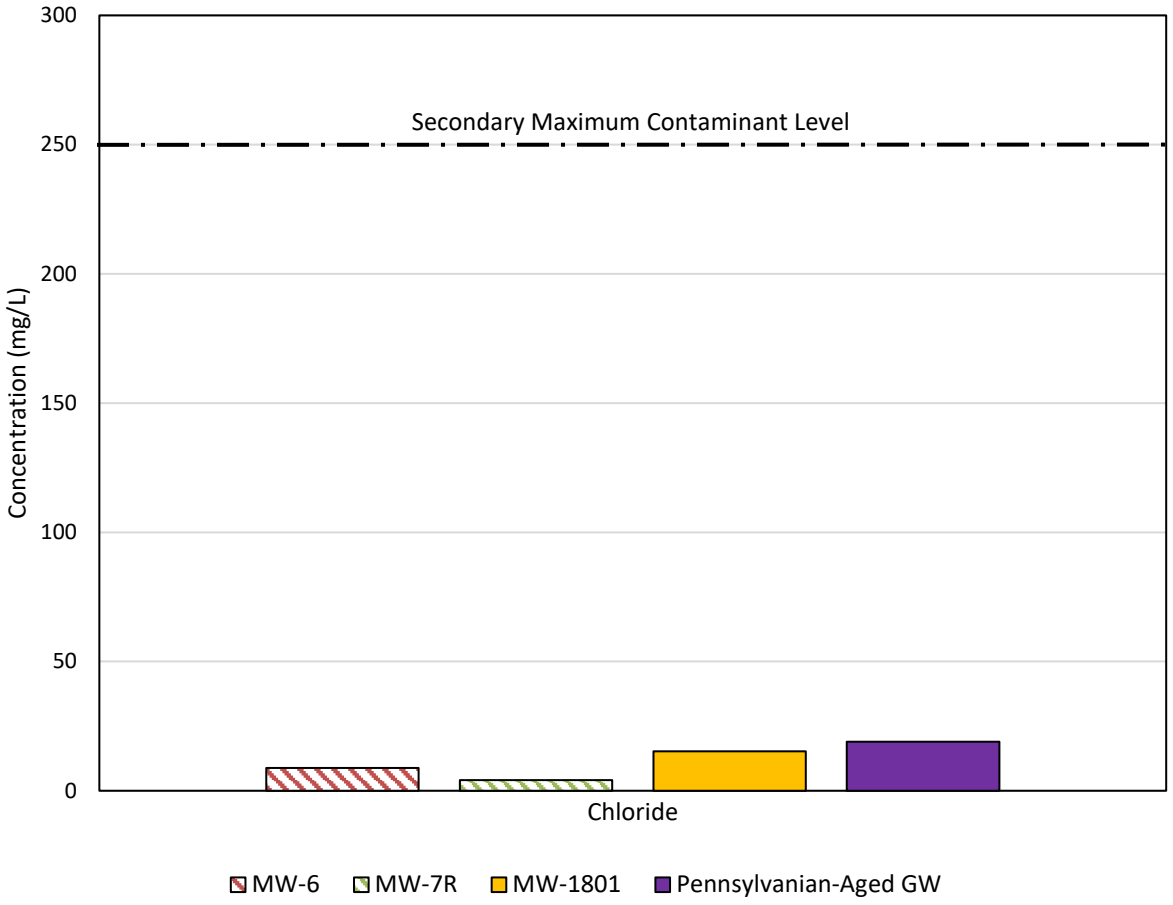
Columbus, Ohio

June 2024

Figure
6



Notes: Upgradient wells MW-6 and MW-7 and downgradient well MW-1801 show the maximum chloride concentration from all past collected data at each monitoring well. 'Pennsylvanian-Aged GW', shown in purple, represents median Pennsylvanian-aged aquifer data from Chambers et al., 2012. Data for Amos monitoring wells were collected under the federal CCR rule and represents total chloride in groundwater.
mg/L: milligrams per liter

Chloride Comparison
Amos Landfill

Geosyntec consultants

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Columbus, Ohio

June 2024

Figure
7

ATTACHMENT A

MW-1801 and MW-1802 Boring Logs and Well Construction Diagrams

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos - FGD Landfill**

COORDINATES **N 38.5 E 81.6**

GROUND ELEVATION **735.6** SYSTEM **NAVD88**

Water Level, ft	▽ 21.0	▼	▼
TIME			
DATE	8/15/2018		

BORING NO. **MW-1801** DATE **5/3/19** SHEET **1** OF **5**

BORING START **8/7/18** BORING FINISH **8/8/18**

PIEZOMETER TYPE **PVC** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.8** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **50.4** BOTTOM **114.4**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
									CL ML	0-5': SILTY CLAY; 2.5YR 5/6 (red); moist; backfill material.		0-49': Riser
		5.0	6.5	50/4	3.6		5			5-6': SANDSTONE.		
		6.5	8.0	48-23-15	3.6				CL ML	6-6.3': SHALE; GLEY1 5/N (gray); dry; thin bedded; hard.		
									ML	6.3-6.5': SILTY CLAY; red; moist; hard		
		8.0	9.5	11-3-5	7.2				MH	6.5-8': SILT; 10YR 6/2 (tan); with sandstone and shale fragments; compacted fill material. 8-9.5': CLAYEY SILT; 5YR 4/2 (brown); firm; moist; fill material.		
		9.5	11.0	4-4-7	10.8		10		CL ML	9.5-11': SILTY CLAY; 10YR 6/3 (brown) to brown clayey silt; dry; crumbly; fill material.		
		11.0	12.5	4-8-50/3	10.8				CL ML	11-12.5': SILTY CLAY; 5YR 4/2 (brown); moist; firm.		
		12.5	14.0	50/3					ML	Note: Sandstone at 12-12.3'. 12.5-14': SILT, compacted; 10YR 7/4 (tan); very hard; dry; fill material.		
		14.0	15.5	50/4						14-14.5': SILTY SHALE material, weathered; mottled tan and dark brown; dry; very hard.		
		14.9	19.9		51		15			14.5-14.9': SANDSTONE; strong field strength; 2.5Y 6/2; fine-grained texture; massive structure; slightly to moderately decomposed; moderately disintegrated with Fe staining; fracture at 14.3-14.5'. 14.9-19.9': SHALE; moderate field strength; GLEY1 5/GY; fine-grained texture; thinly bedded; moderately decomposed along bedding planes; moderately disintegrated along bedding planes and fracture; vertical fracture with Fe staining at 15.5-16.5'.		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **2** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		19.9	24.9	8-7-6	55					19.9-24.9': SHALE; moderate field strength; GLEY1 5/GY; fine-grained texture; thinly bedded; moderately decomposed along bedding planes; moderately disintegrated; moderately to intensely fractured. Transition to strong field strength, 2.5YR 4/4; fine-grained texture; massive structure to thinly bedded; slightly decomposed; slightly disintegrated; slightly to moderately fractured.		
		24.9	34.9	4-4-13	72		25			24.9-25.2': SHALE; strong field strength; fine-grained structure; massive structure to thinly bedded; slightly decomposed; slightly disintegrated; slightly to moderately fractured. 25.2-30.7': CLAYSTONE/MUDSTONE, highly weathered; very weak field strength; 10YR 5/3; very fine-grained texture with sandstone fragments; massive structure; highly decomposed; intensely disintegrated; unfractured.		
		34.9	38.3	4-5-8	36		30			30.7-32.5': SHALE; moderate field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; moderately decomposed; slightly to moderately disintegrated; slightly to moderately fractured. 32.5-34.9': CLAYSTONE/MUDSTONE; moderate field strength; GLEY1 4/104; fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; moderately to intensely fractured.		
		38.3	44.9	5-7-13-9-6-6	70		35			34.9-38.3': CLAYSTONE/MUDSTONE; moderate to weak field strength; 2.5YR 4/4 (red) mottled with tan, black, and gray; fine-grained texture; massive structure; moderately to highly decomposed; intensely disintegrated, mottling tan and gray; moderately to intensely fractured. 38.3-44.9': CLAYSTONE/MUDSTONE; moderate to weak field strength; 2.5YR 4/4 (red) mottled with tan, black, and gray; fine-grained texture; massive structure; highly decomposed; intensely disintegrated; intensely fractured.		
		44.9	50.0	4-4-7-8	50		40					
							45			44.9-50': CLAYSTONE/MUDSTONE; moderate to weak field strength; 2.5YR 4/4 (red) mottled with		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **3** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		44.9	50.0	4-4-7-8	50					tan, black, and gray; fine-grained texture; massive structure; highly decomposed; intensely disintegrated; intensely fractured.		49-52': Bentonite Pellets
		50.0	55.0	4-4-5-4	50		50			50-56.7': CLAYSTONE/MUDSTONE; moderate field strength; 2.5YR 4/4 (red) mottled with tan, black, and gray; fine-grained texture; massive structure; moderately to highly decomposed, becomes less weathered at 50.3'; highly disintegrated, highly mottled; moderately to intensely fractured.		52-53': Secondary Filter Pack 53-75': Primary Filter Pack
		55.0	59.8	5-7-5-36	52		55					55-75': Screen
		59.8	64.8	8-5-4-4-7-5-5-4	60		60			56.7-58': SANDSTONE, interbedded; strong field strength; GLEY1 6/N (gray-green); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture; moderately fractured at 56.7' and 57.1-57.5'. 58-58.8': SHALE, interbedded; strong field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture. 58.8-59.2': SANDSTONE, interbedded; strong field strength; GLEY1 6/N (gray-green); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture. 59.2-59.8': SHALE, interbedded; strong field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture.		
		64.8	74.8	4-5-4-6	76		65			59.8-60.7': SANDSTONE; strong field strength; GLEY1 6/N; fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated; unfractured. 60.7-63.9': SHALE; moderate field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; moderately decomposed along bedding planes; moderately disintigrated with silt filled fractures; moderately fractured. 63.9-64.3': SANDSTONE; strong field strength; GLEY1 6/N (gray-green); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated; unfractured.		
							70			64.3-64.8': SHALE; moderate field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; moderately decomposed; moderately		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **4** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		64.8	74.8	4-5-4-6	76					disintigrated; moderately fractured.		
										64.8-74.8': SHALE, highly weathered at base; moderate to weak field strength along some bedding planes; 2.5YR 3/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintigrated, becomes more limestone fragments last 1 ft, 3-5 cm; moderately to intensely fractured.		
		74.8	85.0				75			74.8-85': SHALE, highly weathered; weak field strength; 2.5YR 4/4 (red) with tan and gray mottling; fine-grained texture; massive structure; highly decomposed; highly disintigrated, mottled; intensely fractured.		75-105': Bentonite
		85.0	95.0	5-4-4	120		80			85-92.7': SANDSTONE; strong field strength; fine-grained texture; thinly bedded; fresh; slightly disintigrated, calcite in light colored beds/thin; slightly fractured.		
							85					
							90			92.7-94.6': SHALE; moderate field strength; fine-grained texture; massive structure; slightly decomposed; slightly disintigrated, some mottling; moderately fractured.		
		95.0	105.0	7-4-4	120		95			94.6-95': SANDSTONE; strong field strength; fine-grained texture; thinly bedded; fresh; slightly disintigrated, calcite in light colored beds/thin; slightly fractured at 94.6-95'.		
										95-100.1': SANDSTONE; strong field strength; fine-grained texture; thinly bedded; fresh; slightly disintigrated; slightly fractured at 95-95.2'.		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **5** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		95.0	105.0	7-4-4	120		100			100.1-101.5': SHALE and sandstone interbedded; moderate field strength; fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated; slightly fractured at 100.2-100.5'. 101.5-105': SHALE; moderate to weak field strength; fine-grained texture; massive structure; highly decomposed; moderately to highly disintigrated mottling with silt filled fractures; highly fractured.		
							105					
							110					
							115					
							120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos - FGD Landfill**

COORDINATES **N 38.5 E 81.9**

GROUND ELEVATION **709.8** SYSTEM **NAVD88**

Water Level, ft	▽ 35.0	▼	▼
TIME			
DATE	8/21/2019		

BORING NO. **MW-1802** DATE **5/3/19** SHEET **1** OF **5**

BORING START **8/20/18** BORING FINISH **8/21/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.91** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **50** BOTTOM **114.4**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
									GW	0-3.5': GRAVEL backfill; large rip-rap and smaller compacted gravels.		0-41': Bentonite Grout
									CL	3.5-4.5': SILTY CLAY; brown; moist; soft; backfill material.		
		4.5	6.0	6-4-5	0		5			4.5-6': NO RECOVERY, due to gravel blocking cutting shoe.		
		6.0	7.5	4-3-4	3.6				CL	6-17': SILTY CLAY; 7.5YR 4/3 (brown); moist; firm; compacted backfill material; becomes wet at 12.5'.		
		7.5	9.0	3-4-5	7.2							
		9.0	10.5	4-4-6	18		10					
		10.5	12.0	5-4-5	13.2							
		12.0	13.5	3-4-6	15.6							
		13.5	15.0	3-5-8	14.4							
		15.0	16.5	4-7-9	15.6		15					
		16.5	18.0	6-25-8	16.8					17-17.5': SANDSTONE, weathered; GLEY1 7/N (gray); dry.		
		18.0	19.5	7-23-15	14.4				CL	17.5-19.5': SILTY CLAY; GLEY1 6/N (gray) mottled with brown, red, tan; moist; soft; crumbles easily.		
		19.5	21.0	20->50/4	10.8				CL			

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

AEP - AEP.GDT - 5/3/19 11:49 - S:\KNOXVILLE-TN\FOR NICOLE AEP LOG EDIT FILES\GINT LOGS OUTPUT\AEP MOUNTAINEER\AEP MOUNTAINEER.GPJ

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **2** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		19.5	21.0	20->50/4	10.8					19.5-22.5': SILTY CLAY; GLEY1 6/N (gray) mottled with brown, tan; dry; soft; crumbles easily.		
		21.0	22.5	27-50/5	9.6							
		22.5	24.4	4	23					22.5-24': SILTSTONE; moderate to weak field strength; GLEY1 6/N; fine-grained texture; massive structure; highly decomposed; moderately to highly disintegrated with tan/brown mottling; moderately to intensely fractured.		
		24.4	29.4		22		25			24-24.4': SILTSTONE; weak field strength; 10R 4/4 (red) mottled; fine-grained texture; massive structure; highly decomposed; moderately to intensely fractured. 24.4-29.4': SILTSTONE; weak field strength; 10R 4/4 (red) mottled with tan, gray, and black; fine-grained texture; massive structure; highly decomposed; highly disintegrated, highly mottled; moderately fractured.		
		29.4	33.7	5-11-6	40		30			29.4-32.8': SHALE, weathered; moderate field strength; 10YR 4/4 (red) mottled; fine-grained texture; massive structure; moderately decomposed; moderately to intensely disintegrated; moderately fractured.		
		33.7	39.4	5-4-4-7-5	59		35			32.8-33.7': SHALE; moderate field strength; 5YR 5/4 (tan) mottled; fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated; moderately to intensely fractured. 33.7-39.4': SHALE; moderate field strength; 10YR 4/4 (red) with gray, tan, and black mottling; fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated; intensely fractured.		
		39.4	44.4	4-6-4-4	57		40			39.4-44.4': SHALE; moderate field strength; 10YR 4/4 (red) with gray, tan, and black mottling; fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated; intensely fractured.		41-44': Bentonite Pellets
		44.4	54.4	7-8-7-5-5-24-5	120		45			44.4-47.8': SHALE, highly weathered; weak field strength; 10YR 4/4 (red) with gray, tan, and black mottling; fine-grained texture; massive structure;		44-45': Secondary Filter Pack 45-71': Primary Filter Pack

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **3** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		44.4	54.4	7-8-7-5-5-24-5	120					highly decomposed; intensely disintegrated; intensely fractured.		
										47.8-49.9': SHALE, less weathered; moderate field strength; 10R 3/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; moderately fractured.		
							50			49.9-50.8': SHALE, interbedded with sandstone; moderate field strength; GLEY1 4/N; fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; moderately fractured.		50-70': Screen
										50.8-52.8': SHALE; moderate to strong field strength; 10R 4/3 (red); fine-grained texture; massive structure; slightly decomposed; moderately disintegrated; slightly fractured.		
										52.8-53.1': SHALE, interbedded with sandstone; strong field strength; GLEY1 4/5GY; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
		54.4	64.4	8-12-5-6-7-4-4-4	114		55			53.1-54.4': SHALE; moderate field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; moderately fractured.		
										54.4-55.4': SANDSTONE, interbedded with shale; moderate field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; slightly to moderately fractured.		
							60			55.4-57.1': SHALE, interbedded with sandstone; moderate field strength; GLEY1 4/3, 10R 4/3; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
										57.1-64.4': SHALE, weathered; moderate to weak field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated with intense gray mottling; intensely fractured.		
		64.4	74.4	4-6-8-6-4-5-4-4-5	117		65			64.4-70.5': SHALE, highly weathered; moderate to weak field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately to intensely disintegrated with gray mottling; intensely fractured.		
							70			70.5-74.4': SHALE, interbedded with sandstone; strong field strength; 10R 4/3 (red) interbedded with GLEY1 4/N (gray-green); fine-grained		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **4** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		64.4	74.4	4-6-8-6-4-5-4-4-5	117					texture; thinly bedded; slightly to moderately decomposed along some bedding planes; moderately disintegrated with silt filled fractures; moderately fractured.		
		74.4	84.4	8-7-5-5-14-8-7-22-12	120		75			74.4-77.1': SHALE, with some interbedded sandstone lenses; moderate field strength; 10R 4/3 (red); fine-grained texture; thinly bedded; slightly to moderately decomposed at some bedding planes; slightly disintegrated; moderately fractured.		
							80			77.1-82.7': SANDSTONE, with some red shale lenses; strong field strength; GLEY1 4/N; fine-grained texture; thinly bedded; fresh; moderately disintegrated, calcite reacts to HCl in light colored bands within 0.5' of surrounding contact lines, no HCl/calcite in fractures, no Fe staining; moderately fractured.		
										82.7-84.4': SHALE, with some interbedded sandstone lenses; moderate field strength; 10R 4/3 (red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
		84.4	94.4	10-11-6-7-7-8-9-8-7-6-6-7-10	120		85			84.4-86.7': SHALE, with sandstone lenses; moderate field strength; 10R 4/2 (red) with GLEY1 4/N lenses; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
										86.7-89.2': SANDSTONE, with shale lenses; moderate field strength; GLEY1 4/N with 10R 4/2 lenses; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
							90			89.2-94.4': SANDSTONE; strong field strength; GLEY1 6/N; fine-grained texture; thinly bedded, micaceous; fresh; slightly disintegrated, some calcite in light bands, no staining, no calcite in fractures; slightly to moderately fractured along bedding planes; fracture at 92.8'.		
		94.4	104.4	7-4-5-4-9-9-8-5-11-5-6-10-19	120		95			94.4-104.4': SANDSTONE; strong field strength; GLEY1 6/N; fine-grained texture; thinly bedded, micaceous, cross-bedding at 94.4-94.8; fresh; slightly disintegrated, calcite in some light bedded planes, no calcite or Fe staining noted in fractures; slightly to moderately fractured along bedding planes.		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **5** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		94.4	104.4	7-4-5-4-9-9-8-5-11-5-6-10-19	120		100					
		104.4	114.4	15-6-21-6-4-4-8-8-6-4-13-5-7	120		105			104.4-108': SANDSTONE; strong field strength; GLEY1 6/N; fine to medium-grained texture; thinly bedded, micaceous, shale fragments; fresh; moderately disintegrated, calcite along entire sandstone void and shale fragments at base, calcite in void; slightly fractured.		
										108-108.9': SHALE, with interbedded sandstone; moderate field strength; GLEY1 4/N, 10R 4/3 bands; thinly bedded; moderately decomposed between bedding planes; moderately disintegrated along bedding planes; moderately fractured.		
							110			108.9-114.4': SHALE; moderate field strength; 10R 4/3 (red) with GLEY1 4/N mottling; fine-grained texture; massive structure; moderately decomposed; moderately to intensely disintegrated, mottling; moderately fractured.		
							115					
							120					

AEP - AEP.GDT - 5/3/19 11:49 - S:\KNOXVILLE-TN\FOR NICOLE AEP LOG EDIT FILES\GINT LOGS OUTPUT\AEP MOUNTAINEER\AEP MOUNTAINEER.GPJ

ATTACHMENT B
Stress-Relief Fracture Conceptual Site Model

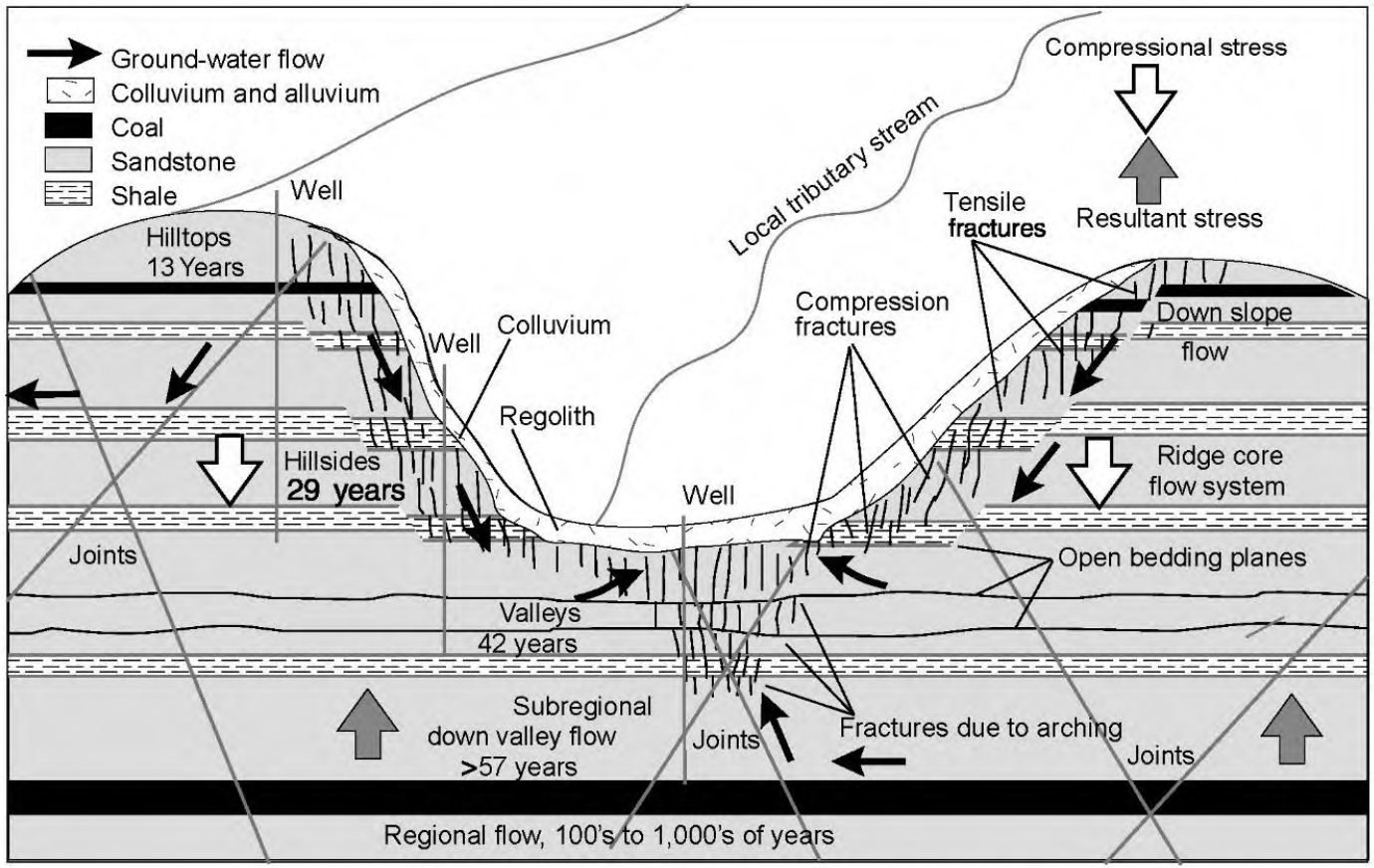

Figure 3. Revised conceptual model of ground-water flow in an Appalachian Plateaus fractured-bedrock aquifer including apparent age of ground water (Modified from Wyrick and Borchers, fig. 3.2-1, 1981 and Kozar, 1998).

References:

- United States Geological Survey (USGS), Wyrick, G.D. and J.W. Borchers, 1981. Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley. Water-Supply Paper 2177.

AEP AMOS GENERATING PLANT - FGD LANDFILL
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

STRESS RELIEF FRACTURE SYSTEM CONCEPTUAL SITE MODEL

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4

ATTACHMENT C
Solid Samples Analytical Report

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Allison Kreinberg
Geosyntec Consultants Inc
500 West Wilson Bridge Road
Suite 250
Worthington, Ohio 43085

Generated 5/1/2024 4:51:58 PM

JOB DESCRIPTION

AEP Amos Power Plant - ASD

JOB NUMBER

240-202469-1

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton OH 44203

See page two for job notes and contact information.

myEOL

Job Notes

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

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

Roxanne Cisneros

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5/1/2024 4:51:58 PM

Authorized for release by
Roxanne Cisneros, Senior Project Manager
roxanne.cisneros@et.eurofinsus.com
(615)301-5761

Table of Contents

Definitions/Glossary

Client: Geosyntec Consultants Inc
Job ID: 240-202469-1
Project/Site: AEP Amos Power Plant - ASD

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Job ID: 240-202469-1 Eurofins Cleveland

Job Narrative
240-202469-1

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

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

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

Receipt
The samples were received on 4/8/2024 12:30 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 24.3°C.

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

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

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

Method Summary

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Method	Method Description	Protocol	Laboratory
6010D	Metals (ICP)	SW846	EET CLE
9056A	Anions, Ion Chromatography	SW846	EET CLE
9081	Cation Exchange Capacity (CEC)	SW846	EET HOU
Moisture	Percent Moisture	EPA	EET CLE
Part Size Red	Particle Size Reduction Preparation	None	EET CLE
3050B	Preparation, Metals	SW846	EET CLE
9081	Cation Exchange Capacity (CEC)	SW846	EET HOU
DI Leach	Deionized Water Leaching Procedure	ASTM	EET CLE

Protocol References:

ASTM = ASTM International
EPA = US Environmental Protection Agency
None = None
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396
EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Sample Summary

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Solid	04/03/24 11:00	04/08/24 12:30
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Solid	04/03/24 11:05	04/08/24 12:30
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Solid	04/03/24 11:10	04/08/24 12:30
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Solid	04/03/24 11:15	04/08/24 12:30
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Solid	04/03/24 11:20	04/08/24 12:30
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Solid	04/03/24 11:25	04/08/24 12:30

Detection Summary

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SS-59.8-60.5-20240403 — Lab Sample ID: 240-202469-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	25600		422	30.8	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	2.46		0.502	0.502	meq/100gm	1	☼	9081	Total/NA
Chloride	24.8		10.2	2.04	mg/Kg	1	☼	9056A	Soluble
Fluoride	0.793		0.512	0.342	mg/Kg	1	☼	9056A	Soluble
Sulfate	20.0		10.2	3.98	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1802-SS-56.3-56.9-20240403 — Lab Sample ID: 240-202469-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	3400		480	35.0	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	4.25		0.504	0.504	meq/100gm	1	☼	9081	Total/NA
Fluoride	0.790		0.494	0.330	mg/Kg	1	☼	9056A	Soluble
Sulfate	8.45	J	9.87	3.84	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1801-SH-55.9-56.6-20240403 — Lab Sample ID: 240-202469-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	1010		423	30.8	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	18.0		0.512	0.512	meq/100gm	1	☼	9081	Total/NA
Fluoride	3.28		0.521	0.348	mg/Kg	1	☼	9056A	Soluble
Sulfate	9.59	J	10.4	4.05	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1801-SH-58.0-58.8-20240403 — Lab Sample ID: 240-202469-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	2910		470	34.3	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	18.8		0.512	0.512	meq/100gm	1	☼	9081	Total/NA
Fluoride	3.43		0.523	0.349	mg/Kg	1	☼	9056A	Soluble
Sulfate	16.6		10.5	4.07	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1802-SH-51.9-52.5-20240403 — Lab Sample ID: 240-202469-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	1120		408	29.7	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	35.7		0.514	0.514	meq/100gm	1	☼	9081	Total/NA
Fluoride	4.61		0.524	0.350	mg/Kg	1	☼	9056A	Soluble
Sulfate	17.9		10.5	4.08	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1802-SH-55.3-55.8-20240403 — Lab Sample ID: 240-202469-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	1230		357	26.0	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	14.5		0.511	0.511	meq/100gm	1	☼	9081	Total/NA
Fluoride	3.55		0.518	0.346	mg/Kg	1	☼	9056A	Soluble
Sulfate	14.6		10.4	4.03	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Date Collected: 04/03/24 11:00
Date Received: 04/08/24 12:30

Lab Sample ID: 240-202469-1
Matrix: Solid
Percent Solids: 99.5

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	25600		422	30.8	mg/Kg	☼	04/09/24 15:00	04/10/24 15:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	2.46		0.502	0.502	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	99.5		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	0.5		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	24.8		10.2	2.04	mg/Kg	☼		04/17/24 08:29	1
Fluoride (SW846 9056A)	0.793		0.512	0.342	mg/Kg	☼		04/17/24 08:29	1
Sulfate (SW846 9056A)	20.0		10.2	3.98	mg/Kg	☼		04/17/24 08:29	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1802-SS-56.3-56.9-20240403
Date Collected: 04/03/24 11:05
Date Received: 04/08/24 12:30

Lab Sample ID: 240-202469-2
Matrix: Solid
Percent Solids: 99.3

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	3400		480	35.0	mg/Kg	☼	04/09/24 15:00	04/10/24 15:42	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	4.25		0.504	0.504	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	99.3		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	0.7		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		9.87	1.97	mg/Kg	☼		04/17/24 09:34	1
Fluoride (SW846 9056A)	0.790		0.494	0.330	mg/Kg	☼		04/17/24 09:34	1
Sulfate (SW846 9056A)	8.45	J	9.87	3.84	mg/Kg	☼		04/17/24 09:34	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SH-55.9-56.6-20240403
Date Collected: 04/03/24 11:10
Date Received: 04/08/24 12:30

Lab Sample ID: 240-202469-3
Matrix: Solid
Percent Solids: 97.7

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	1010		423	30.8	mg/Kg	☼	04/09/24 15:00	04/10/24 15:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	18.0		0.512	0.512	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.7		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.3		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.4	2.08	mg/Kg	☼		04/17/24 09:56	1
Fluoride (SW846 9056A)	3.28		0.521	0.348	mg/Kg	☼		04/17/24 09:56	1
Sulfate (SW846 9056A)	9.59	J	10.4	4.05	mg/Kg	☼		04/17/24 09:56	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client Sample Results

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SH-58.0-58.8-20240403

Lab Sample ID: 240-202469-4

Date Collected: 04/03/24 11:15
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.6

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	2910		470	34.3	mg/Kg	☼	04/09/24 15:00	04/10/24 15:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	18.8		0.512	0.512	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.6		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.4		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.5	2.09	mg/Kg	☼		04/17/24 10:18	1
Fluoride (SW846 9056A)	3.43		0.523	0.349	mg/Kg	☼		04/17/24 10:18	1
Sulfate (SW846 9056A)	16.6		10.5	4.07	mg/Kg	☼		04/17/24 10:18	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1802-SH-51.9-52.5-20240403

Lab Sample ID: 240-202469-5

Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.3

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	1120		408	29.7	mg/Kg	☼	04/09/24 15:00	04/10/24 15:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	35.7		0.514	0.514	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.3		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.7		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.5	2.09	mg/Kg	☼		04/17/24 12:33	1
Fluoride (SW846 9056A)	4.61		0.524	0.350	mg/Kg	☼		04/17/24 12:33	1
Sulfate (SW846 9056A)	17.9		10.5	4.08	mg/Kg	☼		04/17/24 12:33	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1802-SH-55.3-55.8-20240403
Date Collected: 04/03/24 11:25
Date Received: 04/08/24 12:30

Lab Sample ID: 240-202469-6
Matrix: Solid
Percent Solids: 97.9

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	1230		357	26.0	mg/Kg	☼	04/09/24 15:00	04/10/24 16:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	14.5		0.511	0.511	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.9		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.1		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.4	2.06	mg/Kg	☼		04/17/24 12:54	1
Fluoride (SW846 9056A)	3.55		0.518	0.346	mg/Kg	☼		04/17/24 12:54	1
Sulfate (SW846 9056A)	14.6		10.4	4.03	mg/Kg	☼		04/17/24 12:54	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Method: 6010D - Metals (ICP)

Lab Sample ID: MB 240-608971/1-A
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 608971

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		500	36.5	mg/Kg		04/09/24 15:00	04/10/24 15:03	1

Lab Sample ID: LCS 240-608971/2-A
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 608971

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	5000	4663		mg/Kg		93	80 - 120
Sodium	5000	4870		mg/Kg		97	80 - 120

Lab Sample ID: 240-202469-1 MS
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Total/NA
Prep Batch: 608971

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	25600		4330	29520	4	mg/Kg	☼	89	75 - 125
Sodium	ND		4330	3941		mg/Kg	☼	91	75 - 125

Lab Sample ID: 240-202469-1 MSD
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Total/NA
Prep Batch: 608971

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Calcium	25600		4330	30400	4	mg/Kg	☼	110	75 - 125	3	20
Sodium	ND		4330	3943		mg/Kg	☼	91	75 - 125	0	20

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-609689/1-A
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: Method Blank
Prep Type: Soluble

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		9.95	1.98	mg/Kg			04/17/24 07:46	1
Fluoride	ND		0.498	0.332	mg/Kg			04/17/24 07:46	1
Sulfate	ND		9.95	3.87	mg/Kg			04/17/24 07:46	1

Lab Sample ID: LCS 240-609689/2-A
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: Lab Control Sample
Prep Type: Soluble

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	500	504.8		mg/Kg		101	90 - 110
Fluoride	25.0	26.00		mg/Kg		104	90 - 110
Sulfate	500	519.2		mg/Kg		104	90 - 110

Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: 240-202469-1 MS
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Chloride	24.8		512	576.6		mg/Kg	☼	108	80 - 120		
Fluoride	0.793		25.6	29.82		mg/Kg	☼	113	80 - 120		
Sulfate	20.0		512	580.7		mg/Kg	☼	110	80 - 120		

Lab Sample ID: 240-202469-1 MSD
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	24.8		512	580.0		mg/Kg	☼	109	80 - 120	1	15
Fluoride	0.793		25.6	30.05		mg/Kg	☼	114	80 - 120	1	15
Sulfate	20.0		512	583.9		mg/Kg	☼	110	80 - 120	1	15

Method: 9081 - Cation Exchange Capacity (CEC)

Lab Sample ID: MB 860-157253/1-A
Matrix: Solid
Analysis Batch: 157810

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 157253

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity	ND		0.500	0.500	meq/100gm		04/28/24 12:54	05/01/24 09:35	1

Metals

Prep Batch: 608971

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	3050B	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	3050B	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	3050B	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	3050B	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	3050B	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	3050B	
MB 240-608971/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 240-608971/2-A	Lab Control Sample	Total/NA	Solid	3050B	
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	3050B	
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	3050B	

Analysis Batch: 609193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	6010D	608971
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	6010D	608971
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	6010D	608971
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	6010D	608971
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	6010D	608971
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	6010D	608971
MB 240-608971/1-A	Method Blank	Total/NA	Solid	6010D	608971
LCS 240-608971/2-A	Lab Control Sample	Total/NA	Solid	6010D	608971
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	6010D	608971
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	6010D	608971

General Chemistry

Prep Batch: 157253

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	9081	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	9081	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	9081	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	9081	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	9081	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	9081	
MB 860-157253/1-A	Method Blank	Total/NA	Solid	9081	

Analysis Batch: 157810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	9081	157253
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	9081	157253
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	9081	157253
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	9081	157253
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	9081	157253
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	9081	157253
MB 860-157253/1-A	Method Blank	Total/NA	Solid	9081	157253

Analysis Batch: 609179

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	Moisture	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	Moisture	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	Moisture	

General Chemistry (Continued)

Analysis Batch: 609179 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	Moisture	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	Moisture	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	Moisture	

Leach Batch: 609689

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	DI Leach	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Soluble	Solid	DI Leach	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Soluble	Solid	DI Leach	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Soluble	Solid	DI Leach	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Soluble	Solid	DI Leach	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Soluble	Solid	DI Leach	
MB 240-609689/1-A	Method Blank	Soluble	Solid	DI Leach	
LCS 240-609689/2-A	Lab Control Sample	Soluble	Solid	DI Leach	
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	DI Leach	
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	DI Leach	

Analysis Batch: 609809

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	9056A	609689
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Soluble	Solid	9056A	609689
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Soluble	Solid	9056A	609689
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Soluble	Solid	9056A	609689
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Soluble	Solid	9056A	609689
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Soluble	Solid	9056A	609689
MB 240-609689/1-A	Method Blank	Soluble	Solid	9056A	609689
LCS 240-609689/2-A	Lab Control Sample	Soluble	Solid	9056A	609689
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	9056A	609689
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	9056A	609689

Organic Prep

Analysis Batch: 608940

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	Part Size Red	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	Part Size Red	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	Part Size Red	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	Part Size Red	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	Part Size Red	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	Part Size Red	

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Lab Sample ID: 240-202469-1

Date Collected: 04/03/24 11:00
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Lab Sample ID: 240-202469-1

Date Collected: 04/03/24 11:00
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 99.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:12
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 08:29
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1802-SS-56.3-56.9-20240403
Lab Sample ID: 240-202469-2

Date Collected: 04/03/24 11:05
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1802-SS-56.3-56.9-20240403
Lab Sample ID: 240-202469-2

Date Collected: 04/03/24 11:05
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 99.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:42
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 09:34
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1801-SH-55.9-56.6-20240403
Lab Sample ID: 240-202469-3

Date Collected: 04/03/24 11:10
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SH-55.9-56.6-20240403
Lab Sample ID: 240-202469-3
Date Collected: 04/03/24 11:10
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:46
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 09:56
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1801-SH-58.0-58.8-20240403
Lab Sample ID: 240-202469-4
Date Collected: 04/03/24 11:15
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1801-SH-58.0-58.8-20240403
Lab Sample ID: 240-202469-4
Date Collected: 04/03/24 11:15
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:51
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 10:18
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1802-SH-51.9-52.5-20240403
Lab Sample ID: 240-202469-5
Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1802-SH-51.9-52.5-20240403
Lab Sample ID: 240-202469-5
Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:55
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 12:33

Lab Chronicle

Client: Geosyntec Consultants Inc
Job ID: 240-202469-1
Project/Site: AEP Amos Power Plant - ASD

Client Sample ID: MW-1802-SH-51.9-52.5-20240403
Lab Sample ID: 240-202469-5

Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1802-SH-55.3-55.8-20240403
Lab Sample ID: 240-202469-6

Date Collected: 04/03/24 11:25
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1802-SH-55.3-55.8-20240403
Lab Sample ID: 240-202469-6

Date Collected: 04/03/24 11:25
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 16:00
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 12:54
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

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

Accreditation/Certification Summary

Client: Geosyntec Consultants Inc
Job ID: 240-202469-1
Project/Site: AEP Amos Power Plant - ASD

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	07-31-24
Iowa	State	421	06-01-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-24
New Jersey	NELAP	OH001	06-30-24
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-24
Texas	NELAP	T104704517-22-19	08-31-24
USDA	US Federal Programs	P330-18-00281	01-05-27
Virginia	NELAP	460175	09-14-24
West Virginia DEP	State	210	12-31-24

Laboratory: Eurofins Houston

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	88-00759	08-03-24
Florida	NELAP	E871002	06-30-24
Louisiana (All)	NELAP	03054	06-30-24
Oklahoma	NELAP	1306	08-31-24
Oklahoma	State	2023-139	08-31-24
Texas	NELAP	T104704215	06-30-24
Texas	TCEQ Water Supply	T104704215	12-28-25
USDA	US Federal Programs	525-23-79-79507	03-20-26

Eurofins Canton
180 S. Van Buren Ave

Barberton, OH 44203-3543
phone 330.497.9396 fax 330.497.0772

Chain of Custody Record

24.0 | 24.3

eurofins | Environment Testing America

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Eurofins Environment Testing America

Client Contact	Project Manager: Allison Krenzberg	Site Contact:	Date:	COC No:
Your Company Name here: GeoSyntec Consultants	Email: akrenberg@geosyntec.com	Lab Contact:	Carrier:	1 of 1 COCs
Address: 500 W Wilson Bridge Rd Ste 250	Tel/Fax: 216 544 5007			TALS Project #:
City/State/Zip: Worthington, OH 43085	**Analysis Turnaround Time**			Sampler:
(xxx) xxx-xxxx Phone	☒ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx FAX	TAT if different from Below _____			Walk-in Client:
Project Name: Amos Landfill ASD	☒ 2 weeks			Lab Sampling:
Site: Amos	☐ 1 week			Job / SDG No.:
P O #	☐ 2 days ☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	9056A	6010D	29B_CEC	Sample Specific Notes:
MW-1801-SS-59.8-60.5-20240403	4/3/24	1100	G	Solid	1			X	X	X	
MW-1802-SS-56.3-56.9-20240403		1105	G	Solid	1			X	X	X	
MW-1801-SH-55.9-56.6-20240403		1110	G	Solid	1			X	X	X	
MW-1801-SH-58.0-58.8-20240403		1115	G	Solid	1			X	X	X	
MW-1802-SH-51.9-52.5-20240403		1120	G	Solid	1			X	X	X	
MW-1802-SH-55.3-55.8-20240403	↓	1125	G	Solid	1			X	X	X	

240-202469 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temp. (°C): Obs'd: _____ Corr'd: _____	Therm ID No.: _____

	Company	Date/Time		Company	Date/Time
Relinquished by: Okiemute Commander	Geosyntec	4/5/24 14:00	Received by: Rochelle Harris	ECETNC	4-8-24 1230
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Eurofins – Cleveland Sample Receipt Form/Narrative **Login # :** _____
Barberton Facility

Client Geosyntec Site Name _____ Cooler unpacked by Rachelle Haidet

Cooler Received on 5 4 24 Opened on 5 4 24

FedEx: 1st (Grd) Exp UPS FAS Waypoint Client Drop Off Eurofins Courier Other _____

Receipt After-hours Drop-off Date/Time _____ Storage Location _____

Eurofins Cooler # _____ Foam Box Client Cooler (Box) Other _____

Packing material used Bubble Wrap Foam (Plastic Bag) None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water (None)

1 Cooler temperature upon receipt ☐ See Multiple Cooler Form

IR GUN # 20 (CF +0.3 °C) Observed Cooler Temp. 24.0 °C Corrected Cooler Temp. 24.3 °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	(Yes)	No
-Were the seals on the outside of the cooler(s) signed & dated?	(Yes)	No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	(No)
-Were tamper/custody seals intact and uncompromised?	(Yes)	No NA
3 Shippers' packing slip attached to the cooler(s)?	(Yes)	No
4 Did custody papers accompany the sample(s)?	(Yes)	No
5 Were the custody papers relinquished & signed in the appropriate place?	(Yes)	No
6 Was/were the person(s) who collected the samples clearly identified on the COC?	Yes	(No)
7 Did all bottles arrive in good condition (Unbroken)?	(Yes)	No
8 Could all bottle labels (ID/Date/Time) be reconciled with the COC?	(Yes)	No
9 For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)?		
10 Were correct bottle(s) used for the test(s) indicated?	(Yes)	No
11 Sufficient quantity received to perform indicated analyses?	(Yes)	No
12 Are these work share samples and all listed on the COC?	Yes	(No)
If yes, Questions 13-17 have been checked at the originating laboratory		
13 Were all preserved sample(s) at the correct pH upon receipt?	Yes	No (NA) pH Strip Lot# HC329089
14 Were VOAs on the COC?	Yes	(No)
15 Were air bubbles >6 mm in any VOA vials? ● ← Larger than this	Yes	No (NA)
16 Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____	Yes	(No)
17 Was a LL Hg or Me Hg trip blank present? _____	Yes	(No)

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by

_____

_____

_____

_____

19 SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired

Sample(s) _____ were received in a broken container

Sample(s) _____ were received with bubble >6 mm in diameter (Notify PM)

20 SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory

Time preserved _____ Preservative(s) added/Lot number(s) _____

VOA Sample Preservation Date/Time VOAs Frozen _____


FROM:
(309) 205-2434
Okiemute Commander
GEOSYNTEC CONSULTANTS
500 W Wilson Bridge Rd
Ste 250
WORTHINGTON OH 43085
US
SHIP DATE: 05APR24
ACTWGT: 3.35 LB
CAD: 6570118/ROSA2510
DIMMED: 12 X 11 X 11 IN
BILL 3rd PARTY
TO Eurofins Cleveland
180 S VAN BUREN AVE
BARBERTON OH 44203
(330) 497-9396
(US)
INV:
PO:
REF:
DEPT:
FedEx
Ground
TRK# 7758 4249 6140
9622 0417 3 (000 448 0300) 0 00 77
240-202469 Waybill
Custody
Okiemute

Eurofins Cleveland
180 S Van Buren Avenue
Barberton OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler	Lab PM: Cisneros, Roxanne	Carrier Tracking No(s):	COC No: 240-182880.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: roxanne.cisneros@et.eurofinsus.com	State of Origin: Ohio	Page: Page 1 of 1
Company: Eurofins Environment Testing South Centr		Accreditations Required (See note):		Job #: 240-202469-1
Address: 4145 Greenbriar Dr	Due Date Requested: 4/22/2024			
City: Stafford	TAT Requested (days):			
State, Zip: TX, 77477				
Phone: 281-240-4200(Tel)	PO #:			
Email:	WO #:			
Project Name: AEP Amos Power Plant ASD	Project #: 24033054			
Site:	SSOW#:			

Analysis Requested

Preservation Codes.

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

Other:

Sample Identification Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	299_CEC/299_Prep_Solid Cation Exchange Capacity(CEC)	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-1801-SS-59.8-60.5-20240403 (240-202469-1)	4/3/24	11:00 Eastern		Solid			X	1	
MW-1802-SS-56.3-56.9-20240403 (240-202469-2)	4/3/24	11:05 Eastern		Solid			X	1	
MW-1801-SH-55.9-56.6-20240403 (240-202469-3)	4/3/24	11:10 Eastern		Solid			X	1	Hcl368
MW-1801-SH-58.0-58.8-20240403 (240-202469-4)	4/3/24	11:15 Eastern		Solid			X	1	2.6
MW-1802-SH-51.9-52.5-20240403 (240-202469-5)	4/3/24	11:20 Eastern		Solid			X	1	2.6
MW-1802-SH-55.3-55.8-20240403 (240-202469-6)	4/3/24	11:25 Eastern		Solid			X	1	

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

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I II III, IV Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

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

Relinquished by: Rachelle Nance	Date/Time: 4/9/24 1254	Company: EESNC	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by: Jeremiah Baker	Date/Time: 4/10/2024 9 52	Company EX
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

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

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: Geosyntec Consultants Inc

Job Number: 240-202469-1

Login Number: 202469
List Number: 2
Creator: Baker, Jeremiah

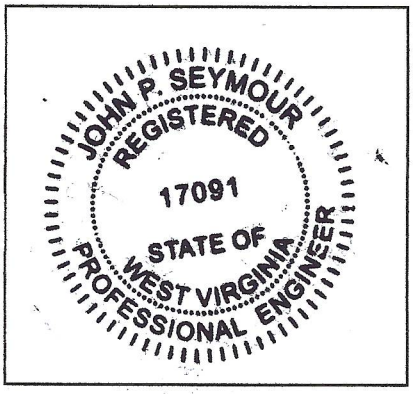
List Source: Eurofins Houston
List Creation: 04/10/24 11:38 AM

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

ATTACHMENT D
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 Amos Plant Landfill CCR management area and that the requirements of 40 CFR 257.94(e)(2) have been met.



John Seymour
Printed Name of Licensed Professional Engineer

Signature

017091	West Virginia	June 20, 2024
License Number	Licensing State	Date

Geosyntec consultants

engineers | scientists | innovators

ALTERNATIVE SOURCE DEMONSTRATION REPORT

2024 FIRST SEMIANNUAL EVENT FEDERAL CCR RULE

Amos Power Plant
Landfill
Winfield, West Virginia

Prepared for

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

Prepared by

Geosyntec Consultants, Inc.
500 West Wilson Bridge Road, Suite 250
Worthington, Ohio 43085

Project CHA8495

January 2025

Geosyntec consultants

TABLE OF CONTENTS

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ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
CCR	coal combustion residuals
CFR	Code of Federal Regulations
ft/yr	feet per year
LPL	lower prediction limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
SMCL	secondary maximum contaminant level
SSI	statistically significant increase
UPL	upper prediction limit
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1. INTRODUCTION AND SUMMARY

This alternative source demonstration (ASD) report has been prepared to address the statistically significant increases (SSIs) for calcium, chloride, and sulfate at the John E. Amos Plant Landfill (Landfill) following the first semiannual detection monitoring event of 2024.

The previously calculated upper prediction limits (UPLs) for the Landfill were recalculated for each Appendix III parameter to represent background values after four detection monitoring events were completed (Geosyntec 2022). A lower prediction limit (LPL) was also recalculated for pH. The revised prediction limits were calculated based on a one-of-two retesting procedure in accordance with the *Unified Guidance* (United States Environmental Protection Agency [USEPA] 2009a) and the statistical analysis plan developed for the site (Geosyntec 2020). With this procedure, an SSI is concluded only if both samples in a series of two are above the UPL or, in the case of pH, are below the LPL.

The first semiannual detection monitoring event of 2024 was performed in May 2024 (initial sampling event) and July 2024 (verification sampling event), and the results were compared to the prediction limits. During this detection monitoring event, SSIs were identified for chloride at MW-1801 and for calcium and sulfate at MW-1802 based on intrawell comparisons. A summary of the detection monitoring analytical results for all constituents listed in the Code of Federal Regulations (CFR) Title 40, Part 257, Appendix III, and the calculated prediction limits to which they were compared is provided in **Table 1**.

1.1 CCR Rule Requirements

In accordance with the USEPA regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments, 40 CFR 257.94(e)(2) states the following:

> The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer . . . verifying the accuracy of the information in the report.

Pursuant to 40 CFR 257.94(e)(2), Geosyntec Consultants, Inc. (Geosyntec) has prepared this ASD report to identify whether the SSIs identified for calcium and sulfate at MW-1802 and for chloride at MW-1801 are from a source other than the Landfill.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which identified SSIs could be attributed. Alternative sources are classified into the following five types:

- ASD Type I: Sampling Causes
- ASD Type II: Laboratory Causes
- ASD Type III: Statistical Evaluation Causes

- ASD Type IV: Natural Variation
- ASD Type V: Anthropogenic Sources

A demonstration was conducted to assess whether the increases in chloride at monitoring well MW-1801 and calcium and sulfate at monitoring well MW-1802 were based on an alternative source and not a release from the Landfill.

2. SITE SUMMARY

A brief description of the site geology and hydrology are provided below.

2.1 Site Geology Summary

The Landfill site consists of a northern valley and a southern valley, both of which are surrounded on all sides by bedrock ridges (**Figure 1**). A topographic high point separates the two valleys (Arcadis 2020), as shown in **Figure 2**. MW-1802 is a downgradient well in the northern valley, and MW-1801 is a downgradient well in the southern valley. The groundwater flow patterns in the northern and southern valleys are hydrologically separated from each other (**Figure 2**).

Bedrock in the vicinity of MW-1801 and MW-1802 consists of a combination of gray siltstone, silty shale, and red claystone. The boring logs for MW-1801 and MW-1802 identified predominately shale interbedded with sandstone within the screened intervals of both wells (**Attachment A**). These lithologies make up part of the Pennsylvanian Monongahela and Conemaugh Formations, which were deposited by cyclic sequences of limestone, siltstone, sandstone, red and gray shale, and coal (United States Geological Survey [USGS] n.d.).

These formations contain a system of stress-relief fractures that are associated with a regional decline in stress and erosion (Arcadis 2020). Although not represented in boring logs associated with Landfill monitoring well network construction, the sedimentary deposits associated with the Monongahela and Conemaugh Formations contains occasional thin limestone and coal beds. The Pittsburgh Coal and Pittsburgh Limestone beds serve as marker beds indicating the contact between the Monongahela and Conemaugh formations. The Pittsburgh limestone bed has been observed in boring logs at the nearby fly ash pond (Arcadis 2020).

2.2 Site Hydrogeology Summary

Groundwater flows through the stress-relief fracture formations, as illustrated in a conceptual site model provided in the *Groundwater Monitoring Network Report* (Arcadis 2020) and included here as **Attachment B**. Bedrock groundwater flow generally follows surface topography, flowing downslope of ridges toward valley floors (Arcadis 2020).

The Landfill monitoring well network, designed and certified by Arcadis (2020), monitors groundwater flow within the Uppermost Aquifer, which was defined by Arcadis (2020) as the saturated portion of the stress-relief fracturing system. This Uppermost Aquifer unit is independent of any single lithologic unit; the stress-relief fracturing system occurs in both the Conemaugh and Monongahela Formations and spans multiple lithologies comprising these formations. According to the *Groundwater Monitoring Network Report*, the stress-relief fracture system "is hydraulically connected from ridges to valleys" (Arcadis 2020), based on a multiple-lines-of-evidence approach discussed in Section 3.2.3 of that report. These multiple lines of evidence include evaluation of boring logs, assessment of groundwater geochemistry, hydraulic testing consisting of borehole packer testing and pump-yield testing, and high-resolution water level monitoring using pressure transducers deployed in monitoring wells across the site.

Water level monitoring data from the May 2024 sampling event were used to calculate groundwater velocities for MW-1801 (2.5 feet per year [ft/yr]) and MW-1802 (3.0 ft/yr). Both high-resolution water level monitoring conducted by Arcadis and seasonal water level monitoring

have not identified seasonal flow-regime changes at or near the Landfill monitoring well network. The current Landfill monitoring well network consists of upgradient monitoring wells MW-6, MW-7R, MW-8, MW-9, and MW-10 and downgradient compliance wells MW-2, MW-4, MW-1801, and MW-1802. Well locations are shown in **Figure 1**. Previous Landfill monitoring network wells MW-1 and MW-5 were removed from the monitoring network after it was determined that groundwater from those locations was representative of shallow perched groundwater zones (Arcadis 2020) and not a part of the Uppermost Aquifer.

3. ALTERNATIVE SOURCE DEMONSTRATION

A review of site geochemistry, site historical data, and laboratory quality assurance and quality control data did not demonstrate alternative sources due to Type I (sampling) or Type II (laboratory) causes. A review of the statistical methods used did not identify any Type III (statistical) causes. A review of site geochemistry did not identify any Type V (anthropogenic) causes. As described below, the SSIs for chloride, calcium, and sulfate have been attributed to natural variation, which is a Type IV cause.

3.1 Landfill Leachate Data Analysis

The concentrations of boron and major cations and anions known to be indicative of CCR leachate were examined in Landfill leachate samples and compared to monitoring well network groundwater to evaluate whether Landfill leachate influenced downgradient groundwater chemistry. Piper diagrams, which represent the relative proportions of major cations and anions in aqueous samples, were created to visualize aqueous geochemistry for the Landfill leachate and at downgradient wells MW-1801 and MW-1802 (**Figure 3**). The data shown in these Piper diagrams capture the background and detection monitoring periods: 2018 through 2024 for MW-1801 and MW-1802, and 2020 through 2024 for leachate samples.

Groundwater major ion geochemistry at downgradient wells MW-1801 and MW-1802 has remained nearly unchanged throughout the monitoring period, as illustrated by the tight clustering of sample results for each well on the Piper diagrams. Groundwater compositions for both wells are distinct from leachate, particularly for the relative anion percentages circled in blue on the anion distribution triangle in **Figure 3**; leachate samples consist predominantly of sulfate, while groundwater anion compositions are dominated by carbonate alkalinity. These results illustrate stable geochemical composition of site groundwater and a lack of influence from leachate on the groundwater composition. Considering the distinct geochemical composition of the leachate samples, variation in relative percentages of major anions would be expected if downgradient monitoring wells were impacted by Landfill leachate. No such variation is observed in downgradient monitoring well groundwater samples (**Figure 3**).

Boron is typically considered a geochemically conservative parameter due to its minimal attenuation by chemical processes in groundwater flow. Boron therefore functions as an indicator for potential CCR unit releases due to its high relative concentration in CCR materials. Boron concentrations in Landfill leachate samples were 55.2 milligrams per liter (mg/L) and 114 mg/L for the samples collected from the northern valley and southern valley, respectively, in July 2024. Concentrations of boron at downgradient wells MW-1801 and MW-1802, including in May 2024, have consistently been less than 0.3 mg/L (**Figure 4**).

If Landfill leachate, which contains concentrations of boron several orders of magnitude higher than the wells of interest, were impacting groundwater quality at downgradient monitoring wells, an increase in boron concentrations at downgradient wells MW-1801 and MW-1802 would be expected. The recent boron concentrations at the downgradient monitoring wells MW-1801 and MW-1802 do not display increasing trends (**Figure 4**), which indicates that changes in calcium and sulfate in groundwater at MW-1802 and chloride in groundwater at MW-1801 are not due to a release from the Landfill.

3.2 Examination of Natural Variability

Calcium, chloride, and sulfate have been found to be common constituents in groundwater from the Pennsylvanian Group in West Virginia (Chambers, et al. 2012), which includes the Monongahela and Conemaugh formations in which MW-1801 and MW-1802 are screened. Long-term groundwater quality, including in the Pennsylvanian Group, was monitored at 300 wells in West Virginia from 1999 to 2008 (Chambers et al. 2012). Samples grouped by geologic age of the aquifer unit indicated that the highest calcium concentration (286 mg/L) and four highest chloride concentrations (i.e., those greater than the secondary maximum contaminant level [SMCL] of 250 mg/L; USEPA 2009b) were measured in Pennsylvanian-aged aquifers. Pennsylvanian-aged aquifer formations were also observed to have the highest reported sulfate value (767 mg/L) as well as the largest degree of variation in sulfate concentrations across the West Virginia aquifer groups.

Bar charts were prepared to compare maximum reported concentrations of calcium (**Figure 5**) and sulfate (**Figure 6**) in upgradient and downgradient wells in the North Valley to the median value of Pennsylvanian-aged aquifers in West Virginia. Calcium and sulfate concentrations at downgradient well MW-1802 were comparable to upgradient well MW-10 and less than upgradient wells MW-8 and MW-9. In Pennsylvanian-aged aquifers across West Virginia, the median calcium value (21 mg/L) observed was nearly 20 times greater than the maximum calcium concentrations in MW-1802 (1.16 mg/L). Although the median sulfate value (7.0 mg/L) in Pennsylvanian-aged aquifers across West Virginia was less than the maximum sulfate concentration observed at MW-1802 (36.2 mg/L; **Figure 6**), Pennsylvanian-aged aquifers in West Virginia were found to contain highly variable sulfate concentrations, with the maximum reported value of 767 mg/L sulfate far exceeding the maximum at MW-1802. Further, sulfate concentrations measured in all North Valley monitoring wells were consistently below the secondary maximum contaminant level of 250 mg/L.

A comparison of maximum reported chloride concentrations in groundwater at upgradient wells MW-6 (9.3 mg/L) and MW-7R (4.15 mg/L) and compliance well MW-1801 (16.3 mg/L) to the median value of Pennsylvanian-aged aquifers in West Virginia (19 mg/L) indicates that chloride concentrations at MW-1801 are similar to or less than chloride concentrations in groundwater measured in the Pennsylvanian aquifers (**Figure 7**). The chloride concentration distribution across Amos LF monitoring wells aligns with regional groundwater trends, as chloride concentrations both upgradient and downgradient of the LF are lower than the median regional value.

MW-1801 and MW-1802 are screened within the Pennsylvanian Monongahela and Conemaugh Formations. These formations represent a cyclic depositional sequence which featured transgressive and regressive periods that caused the deposition of interbedded sequences of limestone, sandstone, shale, and coal (Martin 1998). In such depositional environments, fine grained siltstones and shales are deposited and cyclically exposed to marine waters which are often concentrated in major ions like calcium, chloride, and sulfate.

Transgression-regression cycling creates sequences in which saline marine waters saturate open pore spaces in freshly deposited sediment, which are then retained due to deposition of and burial by additional fine-grained sediment. This process results in trapping of marine water at the time of deposition. While the original water within the pore space is typically replaced by meteoric recharge soon after deposition, a component of the dissolved ions (e.g., calcium, chloride, sulfate)

in the water are typically retained by membrane filtration as an effect of the clay mineralogy of the shale components in these sequences (Drever 1988). In addition to the retention of marine water within the pore space of fine-grained sedimentary rocks, deposited sediment in cyclic marine environments also may become impregnated with soluble evaporitic minerals like halite (crystalline sodium chloride, NaCl) and anhydrite/gypsum (crystalline calcium sulfate, $CaSO_4$), which contain chloride, calcium, and sulfate (Hem 1985). These evaporites are known to be highly soluble and subject to dissolution during pore fluid evolution. Dissolution of these minerals results in further increases to the concentrations of aqueous major ions in pore fluid from rocks of coastal marine origin, regardless of whether these minerals are still present.

Formation water is expected to be diluted by meteoric recharge over time, but depositional and diagenetic processes discussed above would result in some component of major ions being retained in current groundwater at variable concentrations based on site topography, permeability of aquifer sediments, and pore fluid evolution.

The site-specific and regional-scale geochemical observations demonstrate that calcium, chloride, and sulfate concentrations at the downgradient locations are aligned with expected concentrations of these parameters in Pennsylvanian-aged strata within the region, and that observed concentrations at the wells of interest are not anomalous but rather are attributable to natural variations within groundwater as expected based on regional groundwater quality and the depositional environment associated with the screened lithologies of MW-1801 and MW-1802 (**Attachment A**).

3.3 Solid Phase Sample Analysis

Aquifer solids samples were collected from geologic core recovered during the installation of monitoring wells MW-1801 and MW-1802 and were submitted for chemical analyses. Based on a review of the boring logs (**Attachment A**), two shale samples and one sandstone sample were collected from each core and analyzed for total chloride, sulfate, and calcium. The laboratory analytical results are provided as **Attachment C** and summarized in **Table 2**. The sandstone sample collected from MW-1801 contained solid-phase chloride concentrations of 24.8 milligrams per kilogram (mg/kg). Calcium concentrations were identified in MW-1802 aquifer solids ranging from 1,120 mg/kg in a shale sample to 3,400 mg/kg in the sandstone sample. Sulfate was detected in all solid samples collected from MW-1802 at concentrations ranging from 8.45 to 17.9 mg/kg.

The depositional environment of these formations would trap a component of major ions within the formation water of these units. The subsequent interaction of groundwater with aquifer solids containing these chemical components will result in additional increases to aqueous concentrations from dissolution and/or ion exchange. Therefore, the presence of some component of major ions (including calcium, chloride, and sulfate) within MW-1801 and MW-1802 groundwater is both expected and unavoidable

Calcium, chloride, and sulfate were detected in aquifer solids from MW-1801 and MW-1802. These laboratory analytical results suggest that the SSIs in MW-1801 and MW-1802 groundwater are associated with natural variability (depositional environment and pore fluid evolution) and not due to a release from the Landfill.

3.4 Summary of Findings

A demonstration was conducted to assess whether the SSIs for chloride at MW-1801 and calcium and sulfate at MW-1802 were based on Type IV causes (natural variation) and not due to a release from the Amos Plant Landfill. The following is concluded:

- The SSIs could not be attributed to a Type I (sampling error), Type II (laboratory), Type III (statistical), or Type V (anthropogenic) cause.
- Groundwater chemistry at MW-1801 and MW-1802 is generally stable and does not show evidence of influence from Landfill leachate.
- Concentrations of boron, a primary indicator of CCR impacts to groundwater, at MW-1801 and MW-1802 are very low and do not show increasing trends. If impacts from Landfill leachate, which has elevated levels of boron, to downgradient locations were occurring, increasing boron groundwater concentrations would be expected at MW-1801 and MW-1802.
- Pennsylvanian-aged aquifer data from USGS studies indicate that MW-1802 calcium and sulfate groundwater concentrations and MW-1801 chloride concentrations are lower than or comparable to typical values for wells screened within the same geologic formation across the state. Groundwater from monitoring wells upgradient of the Landfill contains greater concentrations of calcium and sulfate than MW-1802 groundwater, indicating the presence of these parameters in background groundwater at concentrations greater than those observed in compliance well groundwater.
- These parameters are expected to naturally exist in groundwater within these formations due to the depositional environment. Aquifer solid samples collected from MW-1801 and MW-1802 rock cores contain detectable concentrations of calcium, chloride, and sulfate. The geologic material comprising the aquifer unit in which these wells are screened likely contributes to aqueous concentrations via dissolution or ion exchange.

3.5 Sampling Requirements

The conclusions of this ASD support the determination that the identified SSIs are from natural variation and not due to a release from the Landfill. Therefore, the unit will remain in the detection monitoring program. Groundwater at the unit will be sampled for Appendix III parameters on a semiannual basis.

4. CONCLUSIONS AND RECOMMENDATIONS

The preceding information serves as the ASD prepared in accordance with 40 CFR 257.94(e)(2) and supports the conclusion that the SSIs for calcium and sulfate at MW-1802 and chloride at MW-1801 are attributed to variation of natural groundwater quality (Type IV). Therefore, no further action is warranted, and the Amos Plant Landfill will remain in the detection monitoring program. Certification of this ASD by a qualified professional engineer is provided in **Attachment D**.

5. REFERENCES

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TABLES

Table 1. Detection Monitoring Data Comparison
Alternative Source Demonstration Report
Amos Plant – Landfill

Analyte	Unit	Description	MW-2	MW-4	MW-1801		MW-1802	
			5/9/2024	5/9/2024	5/9/2024	7/16/2024	5/9/2024	7/17/2024
Boron	mg/L	Intrawell Background Value (UPL)	0.243	0.206	0.293		0.282	
		Analytical Result	0.185	0.151	0.225	--	0.226	--
Calcium	mg/L	Intrawell Background Value (UPL)	3.50	0.904	1.78		1.05	
		Analytical Result	1.66	0.85	1.68	--	**1.10**	**1.12**
Chloride	mg/L	Intrawell Background Value (UPL)	5.32	25.1	14.0		13.4	
		Analytical Result	4.25	23.7	**16.2**	**16.3**	12.6	--
Fluoride	mg/L	Intrawell Background Value (UPL)	1.74	1.55	5.58		5.32	
		Analytical Result	1.39	1.34	5.28	--	**5.33**	5.13
pH	SU	Intrawell Background Value (UPL)	8.9	9.8	9.3		9.4	
		Intrawell Background Value (LPL)	8.2	8.6	8.5		8.7	
		Analytical Result	8.6	9.1	8.7	--	9.0	--
Sulfate	mg/L	Intrawell Background Value (UPL)	12.1	11.5	9.05		24.2	
		Analytical Result	8.1	9.3	4.6	--	**36.2**	**24.9**
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	396	419	563		527	
		Analytical Result	370	390	510	--	500	--

Notes:
1. Bold values exceed the background value.
2. Background values are shaded gray.
--: not sampled
LPL: lower prediction limit
mg/L: milligrams per liter
SU: standard units
UPL: upper prediction limit

Table 2. Key Solid Sample Analytical Results
Alternative Source Demonstration Report
Amos Plant – Landfill

Sample Location	Identified SSI	Lithology	Depth (feet)	Parameter		
				Calcium	Chloride	Sulfate
MW-1801	Chloride	Shale	55.9-56.6	1010	<10.4	9.59 J
		Shale	58.0-58.8	2910	<10.5	16.6
		Sandstone	59.8-60.5	25600	24.8	20.0
MW-1802	Calcium, Sulfate	Shale	51.9-52.5	1120	<10.5	17.9
		Shale	55.3-55.8	1230	<10.4	14.6
		Sandstone	56.3-56.9	3400	<9.87	8.45 J

Notes:
1. All results are shown in units of milligrams per kilogram.
2. Non-detects are shown as less than (<) the reporting limit.

SSI: Statistically significant increase(s)
J: Result is less than the reporting limit but greater than or equal to the method detection limit and the concentrations is an approximate value.

FIGURES

Legend

- Upgradient Sampling Location
- Downgradient Sampling Location
- FGD Landfill Permitted Limits
- Northern Valley
- Southern Valley

Notes

- Monitoring well coordinates provided by AEP.
- Aerial imagery provided by ESRI and dated 12/07/2023.

700 350 0 700 Feet

Site Layout
FGD Landfill

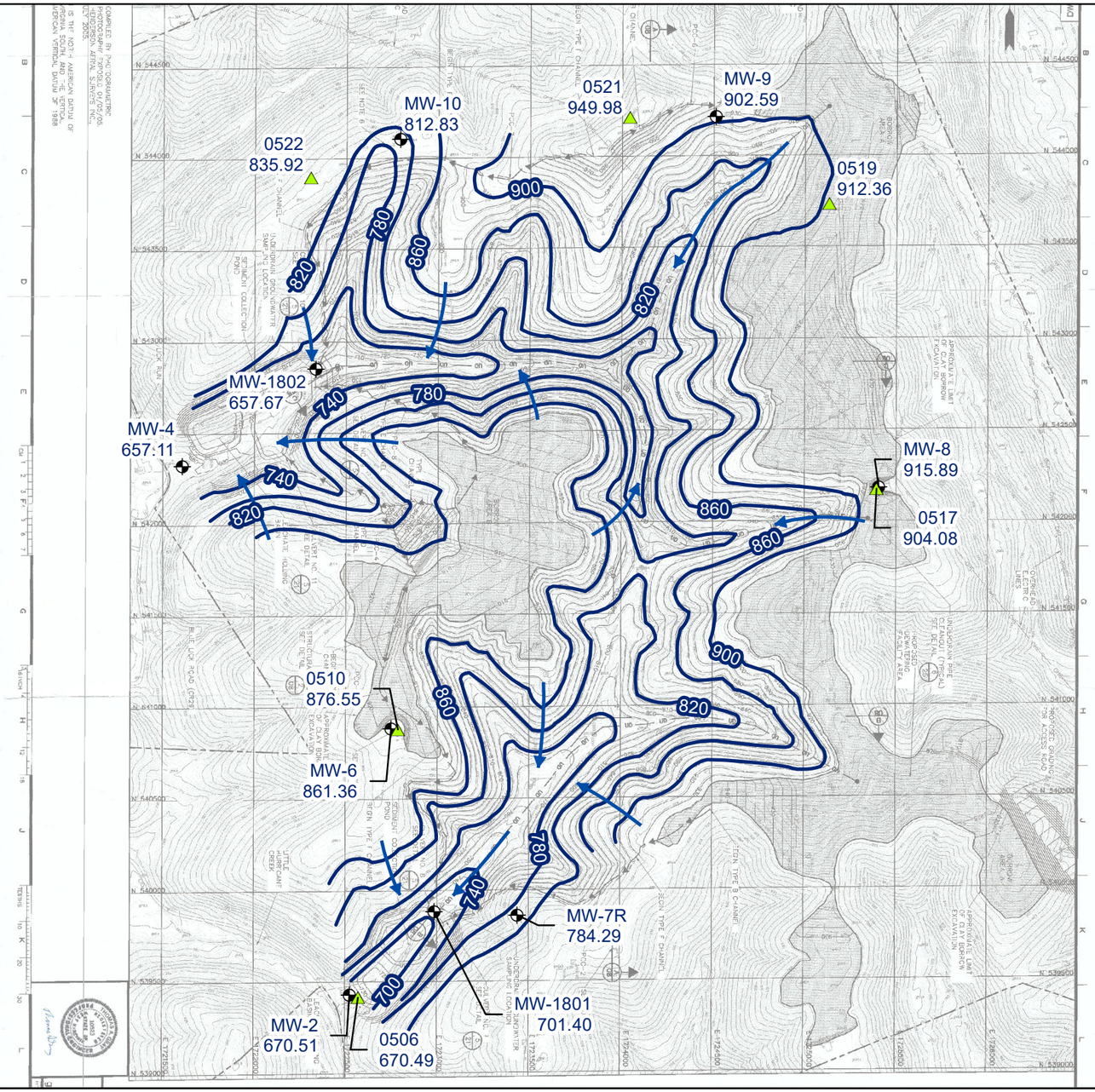
AEP Amos Generating Plant
Winfield, West Virginia

Geosyntec consultants

Columbus, Ohio | January 2025

Figure **1**

\\annarbor-01\Data\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Amos\AEP-Amos_Landfill_Site_Layout.mxd. ASoltero. 12/15/2023. CHA8423/04/08.



Legend

- Groundwater Monitoring Well
- Piezometer
- Groundwater Elevation Contour
- Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on July 16, 2024) provided by AEP.
2. As of 2023, a portion of the liner in Cell 4 was replaced with a riprap drainage blanket; re-lining construction is ongoing.
3. Topography and drainage system basemap from AEP Drawing No. 13-30500-05-A (topographic contour interval: 10 feet).
4. Groundwater elevation units are feet above mean sea level (ft amsl).

1,000 500 0 1,000 Feet

Potentiometric Surface Map - Uppermost Aquifer
July 2024

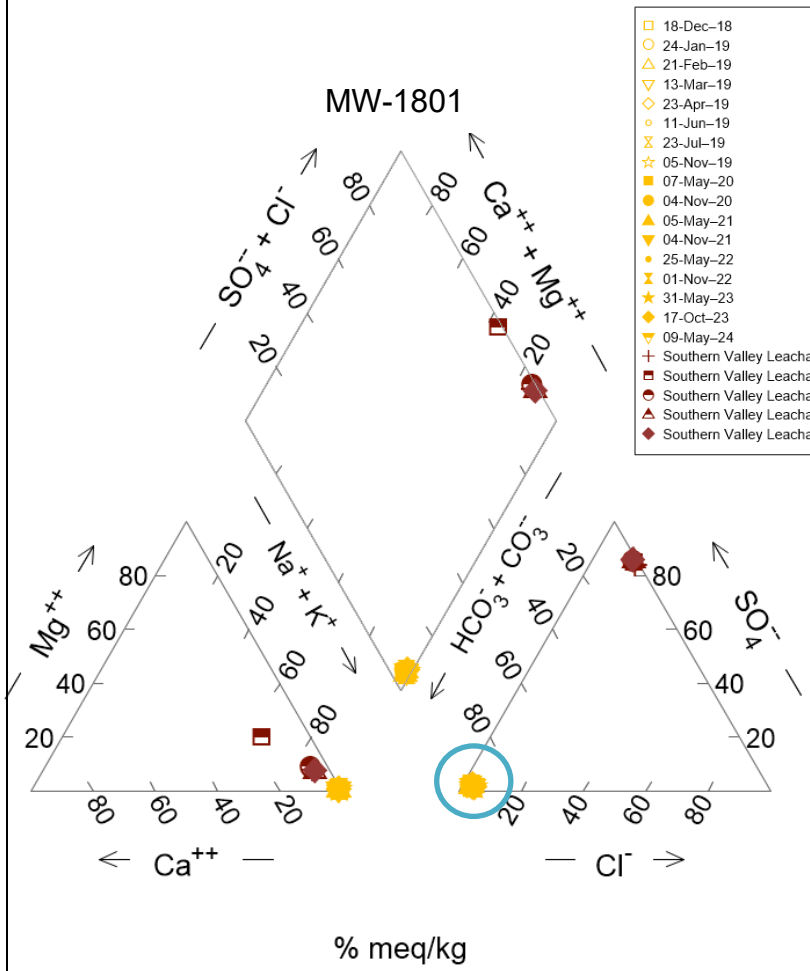
AEP Amos Generating Plant
Winfield, West Virginia

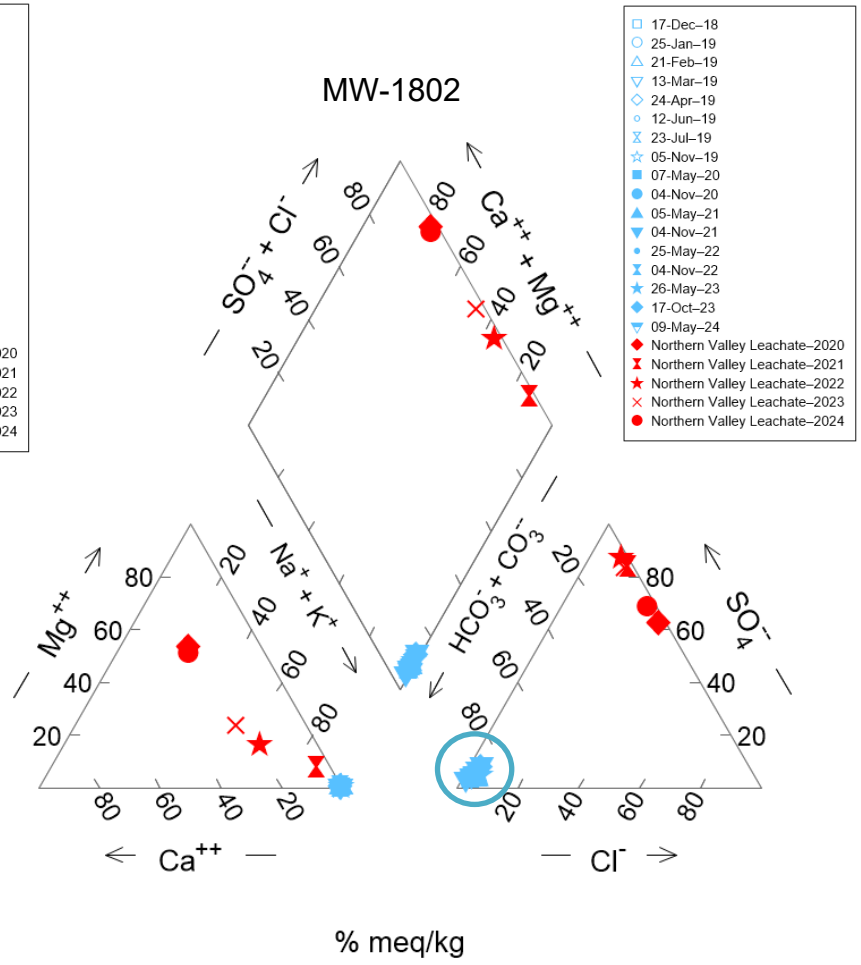
Geosyntec consultants

Columbus, Ohio | January 2025

Figure **2**

A:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Amos\2024\AEP-Amos_Landfill_GW_2024-07July_ver.mxd. Okiemute.Commander. 7/26/2024. CHA8423/04/08.





Notes: Landfill leachate samples were collected on August 25, 2020, October 7, 2021, September 13, 2022, November 8, 2023, and July 29, 2024. Leachate samples were not analyzed for potassium (K^+), and potassium values were assumed to be zero. All groundwater samples for each monitoring location are circled in blue on the anion distribution triangle.

% meq/kg: percent milliequivalents per kilogram

Piper Diagrams: Leachate Comparison
Amos Landfill

Geosyntec consultants

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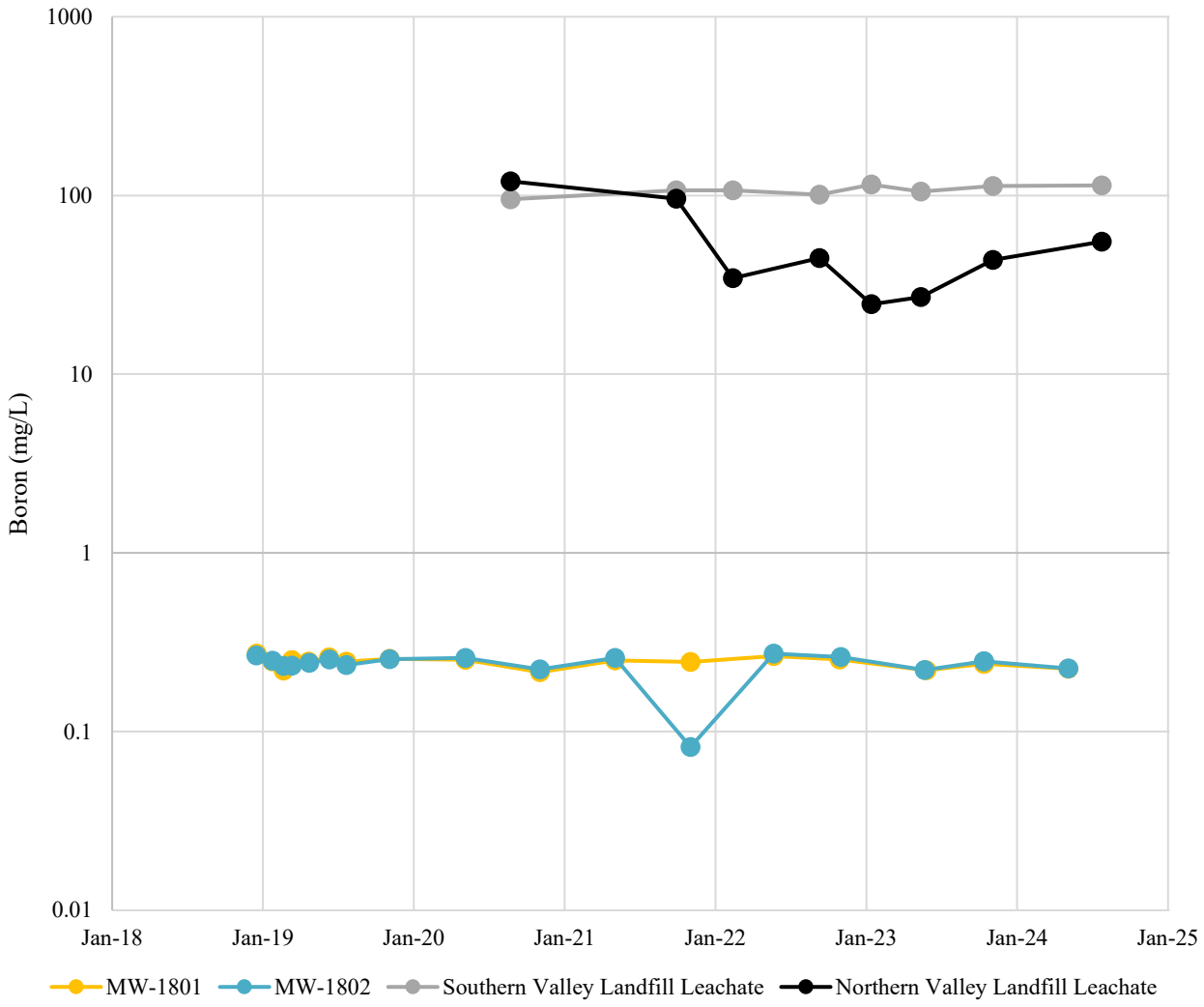
Columbus, Ohio

January 2025

Figure 3



Notes: Data were collected under the federal coal combustion residual (CCR) rule requirements and represents total boron in groundwater.

mg/L: milligrams per liter

Boron Time Series Graph
Amos Landfill

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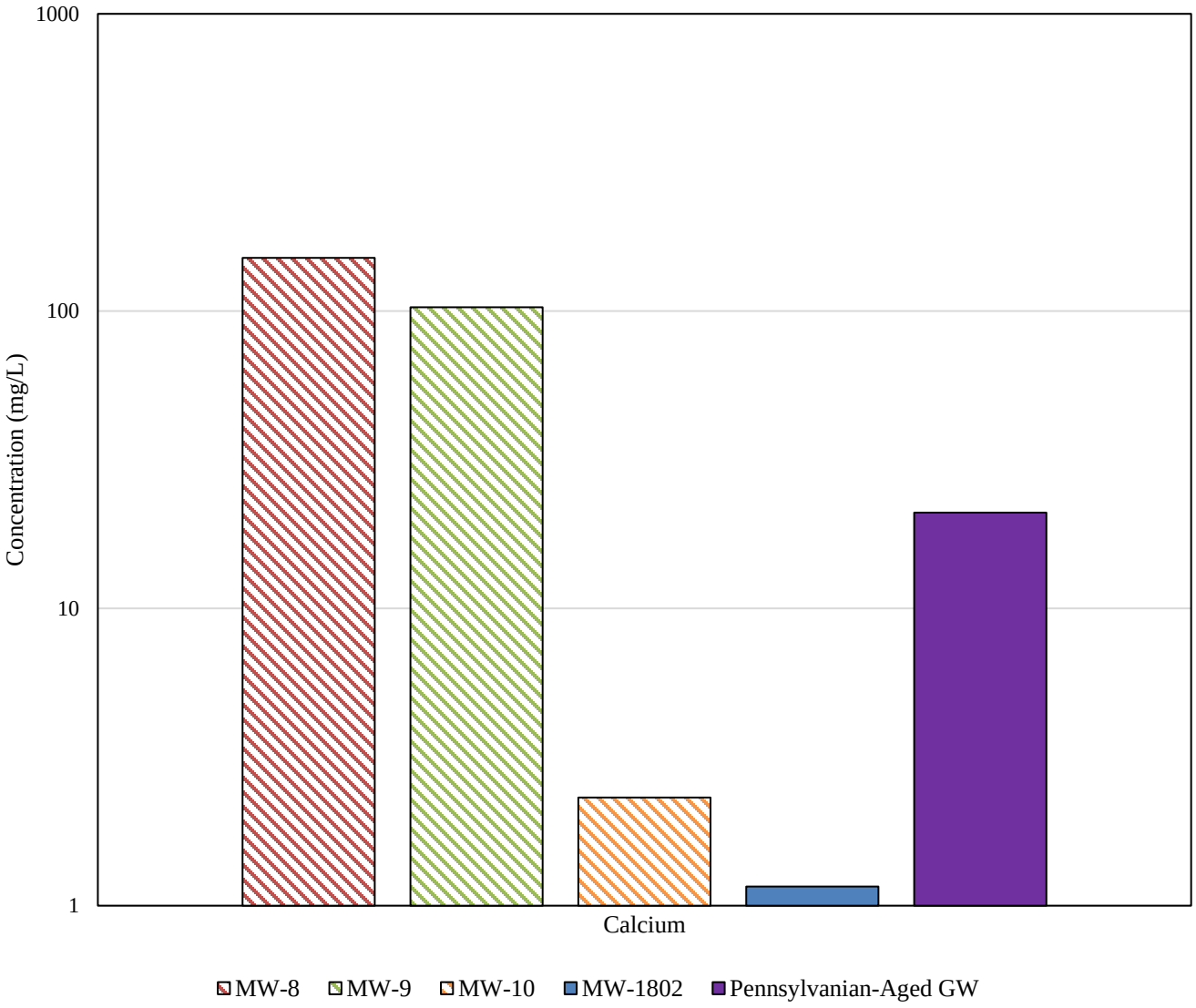
Columbus, Ohio

January 2025

Figure **4**



Notes: Upgradient wells MW-8, MW-9, and MW-10 and downgradient well MW-1802 show the maximum calcium concentration from all past collected data at each monitoring well. 'Pennsylvanian-Aged GW', shown in purple, represents median Pennsylvanian-aged aquifer data from Chambers et al., 2012. Data for Amos monitoring wells were collected under the federal CCR rule and represents total calcium in groundwater.
mg/L: milligrams per liter

Calcium Comparison
Amos Landfill

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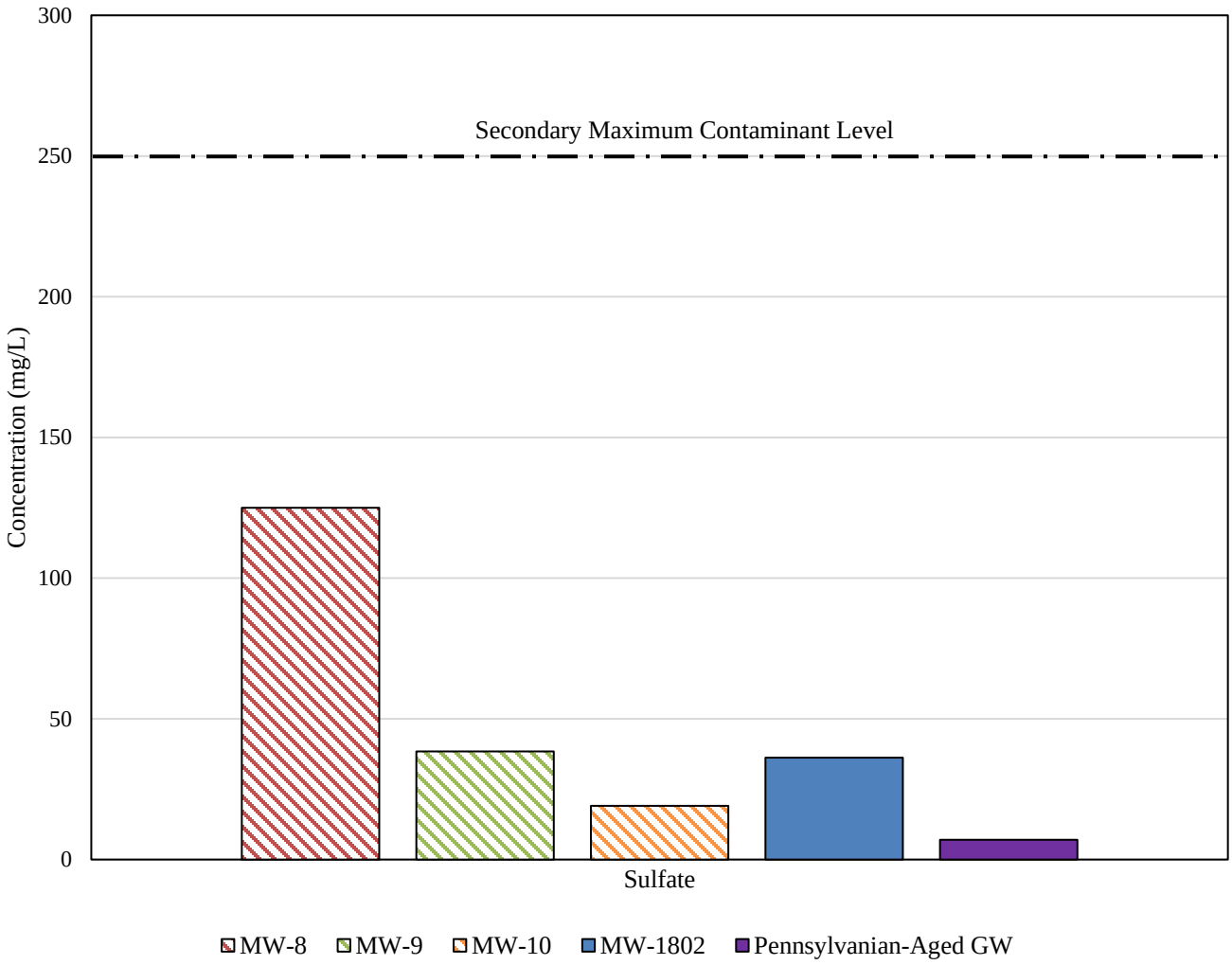
January 2025

Figure **5**



Notes: Upgradient wells MW-8, MW-9, and MW-10 and downgradient well MW-1802 show the maximum sulfate concentration from all past collected data at each monitoring well. 'Pennsylvanian-Aged GW', shown in purple, represents median Pennsylvanian-aged aquifer data from Chambers et al., 2012. Data for Amos monitoring wells were collected under the federal CCR rule and represents total sulfate in groundwater.
mg/L: milligrams per liter

Sulfate Comparison
Amos Landfill

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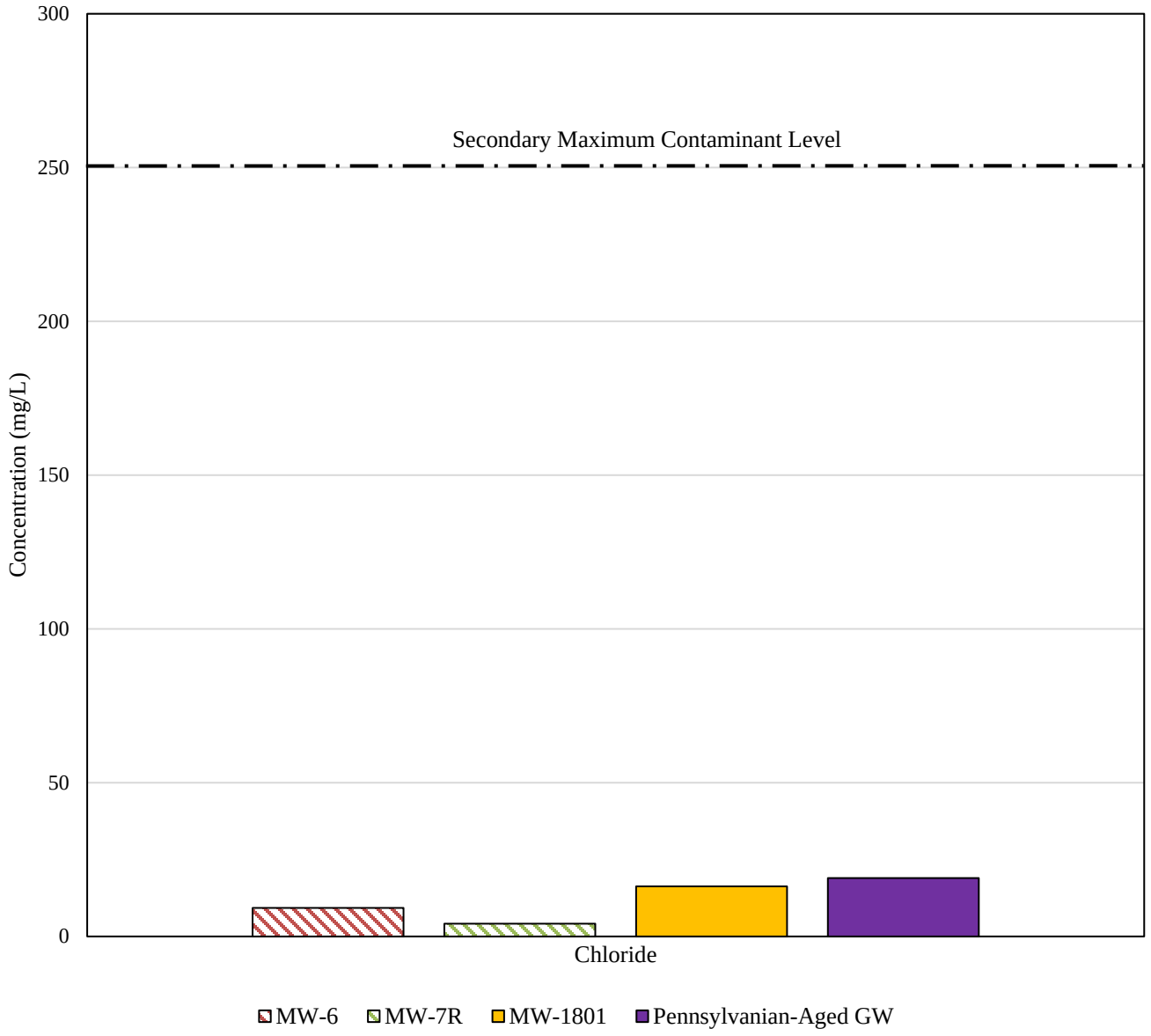
January 2025

Figure **6**



Notes: Upgradient wells MW-6 and MW-7R and downgradient well MW-1801 show the maximum chloride concentration from all past collected data at each monitoring well. 'Pennsylvanian-Aged GW', shown in purple, represents median Pennsylvanian-aged aquifer data from Chambers et al., 2012. Data for Amos monitoring wells were collected under the federal CCR rule and represents total chloride in groundwater.
mg/L: milligrams per liter

Chloride Comparison
Amos Landfill

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Figure **7**

ATTACHMENT A

MW-1801 and MW-1802 Boring Logs and Well Construction Diagrams

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos - FGD Landfill**

COORDINATES **N 38.5 E 81.6**

GROUND ELEVATION **735.6** SYSTEM **NAVD88**

Water Level, ft	▽ 21.0	▼	▼
TIME			
DATE	8/15/2018		

BORING NO. **MW-1801** DATE **5/3/19** SHEET **1** OF **5**

BORING START **8/7/18** BORING FINISH **8/8/18**

PIEZOMETER TYPE **PVC** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.8** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **50.4** BOTTOM **114.4**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
									CL ML	0-5': SILTY CLAY; 2.5YR 5/6 (red); moist; backfill material.		0-49': Riser
		5.0	6.5	50/4	3.6		5			5-6': SANDSTONE.		
		6.5	8.0	48-23-15	3.6				CL ML	6-6.3': SHALE; GLEY1 5/N (gray); dry; thin bedded; hard.		
									ML	6.3-6.5': SILTY CLAY; red; moist; hard		
		8.0	9.5	11-3-5	7.2				MH	6.5-8': SILT; 10YR 6/2 (tan); with sandstone and shale fragments; compacted fill material. 8-9.5': CLAYEY SILT; 5YR 4/2 (brown); firm; moist; fill material.		
		9.5	11.0	4-4-7	10.8		10		CL ML	9.5-11': SILTY CLAY; 10YR 6/3 (brown) to brown clayey silt; dry; crumbly; fill material.		
		11.0	12.5	4-8-50/3	10.8				CL ML	11-12.5': SILTY CLAY; 5YR 4/2 (brown); moist; firm.		
		12.5	14.0	50/3					ML	Note: Sandstone at 12-12.3'. 12.5-14': SILT, compacted; 10YR 7/4 (tan); very hard; dry; fill material.		
		14.0	15.5	50/4						14-14.5': SILTY SHALE material, weathered; mottled tan and dark brown; dry; very hard.		
		14.9	19.9		51		15			14.5-14.9': SANDSTONE; strong field strength; 2.5Y 6/2; fine-grained texture; massive structure; slightly to moderately decomposed; moderately disintegrated with Fe staining; fracture at 14.3-14.5'. 14.9-19.9': SHALE; moderate field strength; GLEY1 5/GY; fine-grained texture; thinly bedded; moderately decomposed along bedding planes; moderately disintegrated along bedding planes and fracture; vertical fracture with Fe staining at 15.5-16.5'.		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **2** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		19.9	24.9	8-7-6	55					19.9-24.9': SHALE; moderate field strength; GLEY1 5/GY; fine-grained texture; thinly bedded; moderately decomposed along bedding planes; moderately disintegrated; moderately to intensely fractured. Transition to strong field strength, 2.5YR 4/4; fine-grained texture; massive structure to thinly bedded; slightly decomposed; slightly disintegrated; slightly to moderately fractured.		
		24.9	34.9	4-4-13	72		25			24.9-25.2': SHALE; strong field strength; fine-grained structure; massive structure to thinly bedded; slightly decomposed; slightly disintegrated; slightly to moderately fractured. 25.2-30.7': CLAYSTONE/MUDSTONE, highly weathered; very weak field strength; 10YR 5/3; very fine-grained texture with sandstone fragments; massive structure; highly decomposed; intensely disintegrated; unfractured.		
		34.9	38.3	4-5-8	36		30			30.7-32.5': SHALE; moderate field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; moderately decomposed; slightly to moderately disintegrated; slightly to moderately fractured. 32.5-34.9': CLAYSTONE/MUDSTONE; moderate field strength; GLEY1 4/104; fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; moderately to intensely fractured.		
		38.3	44.9	5-7-13-9-6-6	70		35			34.9-38.3': CLAYSTONE/MUDSTONE; moderate to weak field strength; 2.5YR 4/4 (red) mottled with tan, black, and gray; fine-grained texture; massive structure; moderately to highly decomposed; intensely disintegrated, mottling tan and gray; moderately to intensely fractured. 38.3-44.9': CLAYSTONE/MUDSTONE; moderate to weak field strength; 2.5YR 4/4 (red) mottled with tan, black, and gray; fine-grained texture; massive structure; highly decomposed; intensely disintegrated; intensely fractured.		
		44.9	50.0	4-4-7-8	50		40					
							45			44.9-50': CLAYSTONE/MUDSTONE; moderate to weak field strength; 2.5YR 4/4 (red) mottled with		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **3** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		44.9	50.0	4-4-7-8	50					tan, black, and gray; fine-grained texture; massive structure; highly decomposed; intensely disintegrated; intensely fractured.		49-52': Bentonite Pellets
		50.0	55.0	4-4-5-4	50		50			50-56.7': CLAYSTONE/MUDSTONE; moderate field strength; 2.5YR 4/4 (red) mottled with tan, black, and gray; fine-grained texture; massive structure; moderately to highly decomposed, becomes less weathered at 50.3'; highly disintegrated, highly mottled; moderately to intensely fractured.		52-53': Secondary Filter Pack 53-75': Primary Filter Pack
		55.0	59.8	5-7-5-36	52		55					55-75': Screen
		59.8	64.8	8-5-4-4-7-5-5-4	60		60			56.7-58': SANDSTONE, interbedded; strong field strength; GLEY1 6/N (gray-green); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture; moderately fractured at 56.7' and 57.1-57.5'. 58-58.8': SHALE, interbedded; strong field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture. 58.8-59.2': SANDSTONE, interbedded; strong field strength; GLEY1 6/N (gray-green); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture. 59.2-59.8': SHALE, interbedded; strong field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated along fracture.		
		64.8	74.8	4-5-4-6	76		65			59.8-60.7': SANDSTONE; strong field strength; GLEY1 6/N; fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated; unfractured. 60.7-63.9': SHALE; moderate field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; moderately decomposed along bedding planes; moderately disintigrated with silt filled fractures; moderately fractured. 63.9-64.3': SANDSTONE; strong field strength; GLEY1 6/N (gray-green); fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated; unfractured.		
							70			64.3-64.8': SHALE; moderate field strength; 2.5YR 4/4 (red); fine-grained texture; thinly bedded; moderately decomposed; moderately		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **4** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		64.8	74.8	4-5-4-6	76					disintigrated; moderately fractured.		
										64.8-74.8': SHALE, highly weathered at base; moderate to weak field strength along some bedding planes; 2.5YR 3/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintigrated, becomes more limestone fragments last 1 ft, 3-5 cm; moderately to intensely fractured.		
		74.8	85.0				75			74.8-85': SHALE, highly weathered; weak field strength; 2.5YR 4/4 (red) with tan and gray mottling; fine-grained texture; massive structure; highly decomposed; highly disintigrated, mottled; intensely fractured.		75-105': Bentonite
		85.0	95.0	5-4-4	120		80			85-92.7': SANDSTONE; strong field strength; fine-grained texture; thinly bedded; fresh; slightly disintigrated, calcite in light colored beds/thin; slightly fractured.		
							85					
							90			92.7-94.6': SHALE; moderate field strength; fine-grained texture; massive structure; slightly decomposed; slightly disintigrated, some mottling; moderately fractured.		
		95.0	105.0	7-4-4	120		95			94.6-95': SANDSTONE; strong field strength; fine-grained texture; thinly bedded; fresh; slightly disintigrated, calcite in light colored beds/thin; slightly fractured at 94.6-95'.		
										95-100.1': SANDSTONE; strong field strength; fine-grained texture; thinly bedded; fresh; slightly disintigrated; slightly fractured at 95-95.2'.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801** DATE **5/3/19** SHEET **5** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/7/18** BORING FINISH **8/8/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		95.0	105.0	7-4-4	120		100			100.1-101.5': SHALE and sandstone interbedded; moderate field strength; fine-grained texture; thinly bedded; slightly decomposed; slightly disintigrated; slightly fractured at 100.2-100.5'. 101.5-105': SHALE; moderate to weak field strength; fine-grained texture; massive structure; highly decomposed; moderately to highly disintigrated mottling with silt filled fractures; highly fractured.		
							105					
							110					
							115					
							120					

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos - FGD Landfill**

COORDINATES **N 38.5 E 81.9**

GROUND ELEVATION **709.8** SYSTEM **NAVD88**

Water Level, ft	▽ 35.0	▼	▼
TIME			
DATE	8/21/2019		

BORING NO. **MW-1802** DATE **5/3/19** SHEET **1** OF **5**

BORING START **8/20/18** BORING FINISH **8/21/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.91** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **50** BOTTOM **114.4**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
									GW	0-3.5': GRAVEL backfill; large rip-rap and smaller compacted gravels.		0-41': Bentonite Grout
									CL	3.5-4.5': SILTY CLAY; brown; moist; soft; backfill material.		
		4.5	6.0	6-4-5	0		5			4.5-6': NO RECOVERY, due to gravel blocking cutting shoe.		
		6.0	7.5	4-3-4	3.6				CL	6-17': SILTY CLAY; 7.5YR 4/3 (brown); moist; firm; compacted backfill material; becomes wet at 12.5'.		
		7.5	9.0	3-4-5	7.2							
		9.0	10.5	4-4-6	18		10					
		10.5	12.0	5-4-5	13.2							
		12.0	13.5	3-4-6	15.6							
		13.5	15.0	3-5-8	14.4							
		15.0	16.5	4-7-9	15.6		15					
		16.5	18.0	6-25-8	16.8					17-17.5': SANDSTONE, weathered; GLEY1 7/N (gray); dry.		
		18.0	19.5	7-23-15	14.4				CL	17.5-19.5': SILTY CLAY; GLEY1 6/N (gray) mottled with brown, red, tan; moist; soft; crumbles easily.		
		19.5	21.0	20->50/4	10.8				CL			

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **2** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		19.5	21.0	20->50/4	10.8					19.5-22.5': SILTY CLAY; GLEY1 6/N (gray) mottled with brown, tan; dry; soft; crumbles easily.		
		21.0	22.5	27-50/5	9.6							
		22.5	24.4	4	23					22.5-24': SILTSTONE; moderate to weak field strength; GLEY1 6/N; fine-grained texture; massive structure; highly decomposed; moderately to highly disintegrated with tan/brown mottling; moderately to intensely fractured.		
		24.4	29.4		22		25			24-24.4': SILTSTONE; weak field strength; 10R 4/4 (red) mottled; fine-grained texture; massive structure; highly decomposed; moderately to intensely fractured.		
										24.4-29.4': SILTSTONE; weak field strength; 10R 4/4 (red) mottled with tan, gray, and black; fine-grained texture; massive structure; highly decomposed; highly disintegrated, highly mottled; moderately fractured.		
		29.4	33.7	5-11-6	40		30			29.4-32.8': SHALE, weathered; moderate field strength; 10YR 4/4 (red) mottled; fine-grained texture; massive structure; moderately decomposed; moderately to intensely disintegrated; moderately fractured.		
		33.7	39.4	5-4-4-7-5	59		35			32.8-33.7': SHALE; moderate field strength; 5YR 5/4 (tan) mottled; fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated; moderately to intensely fractured.		
										33.7-39.4': SHALE; moderate field strength; 10YR 4/4 (red) with gray, tan, and black mottling; fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated; intensely fractured.		
		39.4	44.4	4-6-4-4	57		40			39.4-44.4': SHALE; moderate field strength; 10YR 4/4 (red) with gray, tan, and black mottling; fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated; intensely fractured.		41-44': Bentonite Pellets
		44.4	54.4	7-8-7-5-5-24-5	120		45			44.4-47.8': SHALE, highly weathered; weak field strength; 10YR 4/4 (red) with gray, tan, and black mottling; fine-grained texture; massive structure;		44-45': Secondary Filter Pack 45-71': Primary Filter Pack

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **3** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		44.4	54.4	7-8-7-5-5-24-5	120					highly decomposed; intensely disintegrated; intensely fractured.		
										47.8-49.9': SHALE, less weathered; moderate field strength; 10R 3/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; moderately fractured.		
							50			49.9-50.8': SHALE, interbedded with sandstone; moderate field strength; GLEY1 4/N; fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; moderately fractured.		50-70': Screen
										50.8-52.8': SHALE; moderate to strong field strength; 10R 4/3 (red); fine-grained texture; massive structure; slightly decomposed; moderately disintegrated; slightly fractured.		
										52.8-53.1': SHALE, interbedded with sandstone; strong field strength; GLEY1 4/5GY; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
		54.4	64.4	8-12-5-6-7-4-4-4	114		55			53.1-54.4': SHALE; moderate field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; moderately fractured.		
										54.4-55.4': SANDSTONE, interbedded with shale; moderate field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; slightly to moderately fractured.		
							60			55.4-57.1': SHALE, interbedded with sandstone; moderate field strength; GLEY1 4/3, 10R 4/3; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
										57.1-64.4': SHALE, weathered; moderate to weak field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated with intense gray mottling; intensely fractured.		
		64.4	74.4	4-6-8-6-4-5-4-4-5	117		65			64.4-70.5': SHALE, highly weathered; moderate to weak field strength; 10R 4/3 (red); fine-grained texture; massive structure; moderately to intensely disintegrated with gray mottling; intensely fractured.		
							70			70.5-74.4': SHALE, interbedded with sandstone; strong field strength; 10R 4/3 (red) interbedded with GLEY1 4/N (gray-green); fine-grained		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **4** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		64.4	74.4	4-6-8-6-4-5-4-4-5	117					texture; thinly bedded; slightly to moderately decomposed along some bedding planes; moderately disintegrated with silt filled fractures; moderately fractured.		
		74.4	84.4	8-7-5-5-14-8-7-22-12	120		75			74.4-77.1': SHALE, with some interbedded sandstone lenses; moderate field strength; 10R 4/3 (red); fine-grained texture; thinly bedded; slightly to moderately decomposed at some bedding planes; slightly disintegrated; moderately fractured.		
							80			77.1-82.7': SANDSTONE, with some red shale lenses; strong field strength; GLEY1 4/N; fine-grained texture; thinly bedded; fresh; moderately disintegrated, calcite reacts to HCl in light colored bands within 0.5' of surrounding contact lines, no HCl/calcite in fractures, no Fe staining; moderately fractured.		
										82.7-84.4': SHALE, with some interbedded sandstone lenses; moderate field strength; 10R 4/3 (red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
		84.4	94.4	10-11-6-7-7-8-9-8-7-6-6-7-10	120		85			84.4-86.7': SHALE, with sandstone lenses; moderate field strength; 10R 4/2 (red) with GLEY1 4/N lenses; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
										86.7-89.2': SANDSTONE, with shale lenses; moderate field strength; GLEY1 4/N with 10R 4/2 lenses; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; moderately fractured.		
							90			89.2-94.4': SANDSTONE; strong field strength; GLEY1 6/N; fine-grained texture; thinly bedded, micaceous; fresh; slightly disintegrated, some calcite in light bands, no staining, no calcite in fractures; slightly to moderately fractured along bedding planes; fracture at 92.8'.		
		94.4	104.4	7-4-5-4-9-9-8-5-11-5-6-10-19	120		95			94.4-104.4': SANDSTONE; strong field strength; GLEY1 6/N; fine-grained texture; thinly bedded, micaceous, cross-bedding at 94.4-94.8; fresh; slightly disintegrated, calcite in some light bedded planes, no calcite or Fe staining noted in fractures; slightly to moderately fractured along bedding planes.		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802** DATE **5/3/19** SHEET **5** OF **5**

PROJECT **Amos - FGD Landfill** BORING START **8/20/18** BORING FINISH **8/21/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		94.4	104.4	7-4-5-4-9-9-8-5-11-5-6-10-19	120		100					
		104.4	114.4	15-6-21-6-4-4-8-8-6-4-13-5-7	120		105			104.4-108': SANDSTONE; strong field strength; GLEY1 6/N; fine to medium-grained texture; thinly bedded, micaceous, shale fragments; fresh; moderately disintegrated, calcite along entire sandstone void and shale fragments at base, calcite in void; slightly fractured.		
										108-108.9': SHALE, with interbedded sandstone; moderate field strength; GLEY1 4/N, 10R 4/3 bands; thinly bedded; moderately decomposed between bedding planes; moderately disintegrated along bedding planes; moderately fractured.		
							110			108.9-114.4': SHALE; moderate field strength; 10R 4/3 (red) with GLEY1 4/N mottling; fine-grained texture; massive structure; moderately decomposed; moderately to intensely disintegrated, mottling; moderately fractured.		
							115					
							120					

AEP - AEP.GDT - 5/3/19 11:49 - S:\KNOXVILLE-TN\FOR NICOLE AEP LOG EDIT FILES\GINT LOGS OUTPUT\AEP MOUNTAINEER\AEP MOUNTAINEER.GPJ

ATTACHMENT B
Stress-Relief Fracture Conceptual Site Model

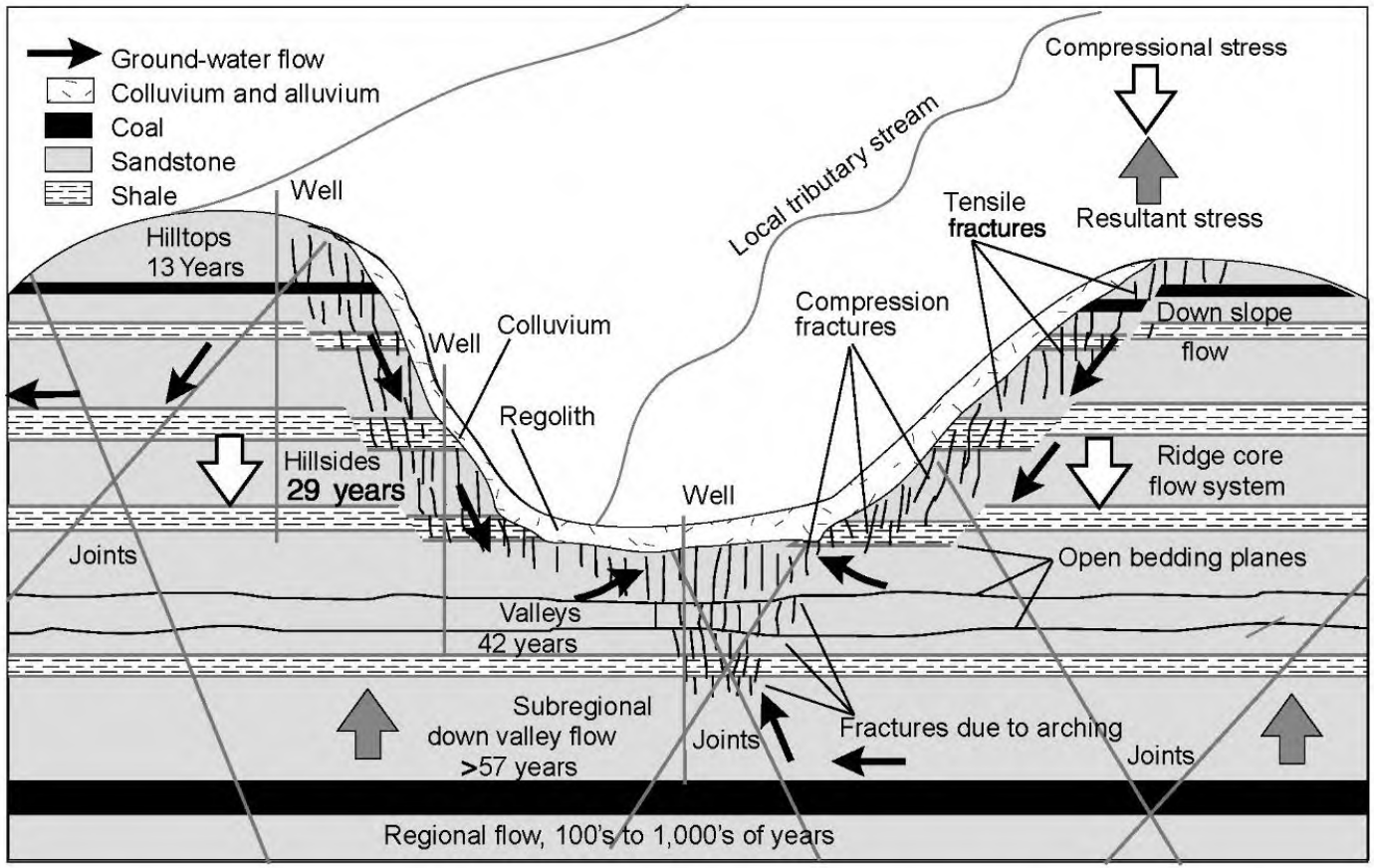

Figure 3. Revised conceptual model of ground-water flow in an Appalachian Plateaus fractured-bedrock aquifer including apparent age of ground water (Modified from Wyrick and Borchers, fig. 3.2-1, 1981 and Kozar, 1998).

References:

- United States Geological Survey (USGS), Wyrick, G.D. and J.W. Borchers, 1981. Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley. Water-Supply Paper 2177.

AEP AMOS GENERATING PLANT - FGD LANDFILL
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

STRESS RELIEF FRACTURE SYSTEM CONCEPTUAL SITE MODEL

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4

ATTACHMENT C
Solid Samples Analytical Report

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Allison Kreinberg
Geosyntec Consultants Inc
500 West Wilson Bridge Road
Suite 250
Worthington, Ohio 43085

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JOB DESCRIPTION

AEP Amos Power Plant - ASD

JOB NUMBER

240-202469-1

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton OH 44203

See page two for job notes and contact information.

myEOL

Job Notes

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

Roxanne Cisneros

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Authorized for release by
Roxanne Cisneros, Senior Project Manager
roxanne.cisneros@et.eurofinsus.com
(615)301-5761

Table of Contents

Definitions/Glossary

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Job ID: 240-202469-1 — Eurofins Cleveland

Job Narrative
240-202469-1

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

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

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

Receipt
The samples were received on 4/8/2024 12:30 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 24.3°C.

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

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

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

Method Summary

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Method	Method Description	Protocol	Laboratory
6010D	Metals (ICP)	SW846	EET CLE
9056A	Anions, Ion Chromatography	SW846	EET CLE
9081	Cation Exchange Capacity (CEC)	SW846	EET HOU
Moisture	Percent Moisture	EPA	EET CLE
Part Size Red	Particle Size Reduction Preparation	None	EET CLE
3050B	Preparation, Metals	SW846	EET CLE
9081	Cation Exchange Capacity (CEC)	SW846	EET HOU
DI Leach	Deionized Water Leaching Procedure	ASTM	EET CLE

Protocol References:

ASTM = ASTM International
EPA = US Environmental Protection Agency
None = None
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396
EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Sample Summary

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Solid	04/03/24 11:00	04/08/24 12:30
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Solid	04/03/24 11:05	04/08/24 12:30
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Solid	04/03/24 11:10	04/08/24 12:30
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Solid	04/03/24 11:15	04/08/24 12:30
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Solid	04/03/24 11:20	04/08/24 12:30
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Solid	04/03/24 11:25	04/08/24 12:30

Detection Summary

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SS-59.8-60.5-20240403 — Lab Sample ID: 240-202469-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	25600		422	30.8	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	2.46		0.502	0.502	meq/100gm	1	☼	9081	Total/NA
Chloride	24.8		10.2	2.04	mg/Kg	1	☼	9056A	Soluble
Fluoride	0.793		0.512	0.342	mg/Kg	1	☼	9056A	Soluble
Sulfate	20.0		10.2	3.98	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1802-SS-56.3-56.9-20240403 — Lab Sample ID: 240-202469-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	3400		480	35.0	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	4.25		0.504	0.504	meq/100gm	1	☼	9081	Total/NA
Fluoride	0.790		0.494	0.330	mg/Kg	1	☼	9056A	Soluble
Sulfate	8.45	J	9.87	3.84	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1801-SH-55.9-56.6-20240403 — Lab Sample ID: 240-202469-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	1010		423	30.8	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	18.0		0.512	0.512	meq/100gm	1	☼	9081	Total/NA
Fluoride	3.28		0.521	0.348	mg/Kg	1	☼	9056A	Soluble
Sulfate	9.59	J	10.4	4.05	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1801-SH-58.0-58.8-20240403 — Lab Sample ID: 240-202469-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	2910		470	34.3	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	18.8		0.512	0.512	meq/100gm	1	☼	9081	Total/NA
Fluoride	3.43		0.523	0.349	mg/Kg	1	☼	9056A	Soluble
Sulfate	16.6		10.5	4.07	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1802-SH-51.9-52.5-20240403 — Lab Sample ID: 240-202469-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	1120		408	29.7	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	35.7		0.514	0.514	meq/100gm	1	☼	9081	Total/NA
Fluoride	4.61		0.524	0.350	mg/Kg	1	☼	9056A	Soluble
Sulfate	17.9		10.5	4.08	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

Client Sample ID: MW-1802-SH-55.3-55.8-20240403 — Lab Sample ID: 240-202469-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	1230		357	26.0	mg/Kg	1	☼	6010D	Total/NA
Cation Exchange Capacity	14.5		0.511	0.511	meq/100gm	1	☼	9081	Total/NA
Fluoride	3.55		0.518	0.346	mg/Kg	1	☼	9056A	Soluble
Sulfate	14.6		10.4	4.03	mg/Kg	1	☼	9056A	Soluble
PSR sample generated	DONE				NONE	1		Part Size Red	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SS-59.8-60.5-20240403

Lab Sample ID: 240-202469-1

Date Collected: 04/03/24 11:00
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 99.5

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	25600		422	30.8	mg/Kg	☼	04/09/24 15:00	04/10/24 15:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	2.46		0.502	0.502	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	99.5		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	0.5		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	24.8		10.2	2.04	mg/Kg	☼		04/17/24 08:29	1
Fluoride (SW846 9056A)	0.793		0.512	0.342	mg/Kg	☼		04/17/24 08:29	1
Sulfate (SW846 9056A)	20.0		10.2	3.98	mg/Kg	☼		04/17/24 08:29	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1802-SS-56.3-56.9-20240403
Date Collected: 04/03/24 11:05
Date Received: 04/08/24 12:30

Lab Sample ID: 240-202469-2
Matrix: Solid
Percent Solids: 99.3

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	3400		480	35.0	mg/Kg	☼	04/09/24 15:00	04/10/24 15:42	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	4.25		0.504	0.504	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	99.3		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	0.7		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		9.87	1.97	mg/Kg	☼		04/17/24 09:34	1
Fluoride (SW846 9056A)	0.790		0.494	0.330	mg/Kg	☼		04/17/24 09:34	1
Sulfate (SW846 9056A)	8.45	J	9.87	3.84	mg/Kg	☼		04/17/24 09:34	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SH-55.9-56.6-20240403
Date Collected: 04/03/24 11:10
Date Received: 04/08/24 12:30

Lab Sample ID: 240-202469-3
Matrix: Solid
Percent Solids: 97.7

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	1010		423	30.8	mg/Kg	☼	04/09/24 15:00	04/10/24 15:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	18.0		0.512	0.512	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.7		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.3		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.4	2.08	mg/Kg	☼		04/17/24 09:56	1
Fluoride (SW846 9056A)	3.28		0.521	0.348	mg/Kg	☼		04/17/24 09:56	1
Sulfate (SW846 9056A)	9.59	J	10.4	4.05	mg/Kg	☼		04/17/24 09:56	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client Sample Results

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SH-58.0-58.8-20240403

Lab Sample ID: 240-202469-4

Date Collected: 04/03/24 11:15
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.6

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	2910		470	34.3	mg/Kg	☼	04/09/24 15:00	04/10/24 15:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	18.8		0.512	0.512	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.6		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.4		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.5	2.09	mg/Kg	☼		04/17/24 10:18	1
Fluoride (SW846 9056A)	3.43		0.523	0.349	mg/Kg	☼		04/17/24 10:18	1
Sulfate (SW846 9056A)	16.6		10.5	4.07	mg/Kg	☼		04/17/24 10:18	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client Sample Results

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1802-SH-51.9-52.5-20240403

Lab Sample ID: 240-202469-5

Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.3

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	1120		408	29.7	mg/Kg	☼	04/09/24 15:00	04/10/24 15:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	35.7		0.514	0.514	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.3		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.7		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.5	2.09	mg/Kg	☼		04/17/24 12:33	1
Fluoride (SW846 9056A)	4.61		0.524	0.350	mg/Kg	☼		04/17/24 12:33	1
Sulfate (SW846 9056A)	17.9		10.5	4.08	mg/Kg	☼		04/17/24 12:33	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1802-SH-55.3-55.8-20240403
Date Collected: 04/03/24 11:25
Date Received: 04/08/24 12:30

Lab Sample ID: 240-202469-6
Matrix: Solid
Percent Solids: 97.9

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	1230		357	26.0	mg/Kg	☼	04/09/24 15:00	04/10/24 16:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity (SW846 9081)	14.5		0.511	0.511	meq/100gm	☼	04/28/24 12:55	05/01/24 09:35	1
Percent Solids (EPA Moisture)	97.9		0.1	0.1	%			04/10/24 17:00	1
Percent Moisture (EPA Moisture)	2.1		0.1	0.1	%			04/10/24 17:00	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride (SW846 9056A)	ND		10.4	2.06	mg/Kg	☼		04/17/24 12:54	1
Fluoride (SW846 9056A)	3.55		0.518	0.346	mg/Kg	☼		04/17/24 12:54	1
Sulfate (SW846 9056A)	14.6		10.4	4.03	mg/Kg	☼		04/17/24 12:54	1

Method: Part Size Red - Particle Size Reduction Preparation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PSR sample generated	DONE				NONE			04/09/24 12:36	1

Method: 6010D - Metals (ICP)

Lab Sample ID: MB 240-608971/1-A
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 608971

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		500	36.5	mg/Kg		04/09/24 15:00	04/10/24 15:03	1

Lab Sample ID: LCS 240-608971/2-A
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 608971

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	5000	4663		mg/Kg		93	80 - 120
Sodium	5000	4870		mg/Kg		97	80 - 120

Lab Sample ID: 240-202469-1 MS
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Total/NA
Prep Batch: 608971

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Calcium	25600		4330	29520	4	mg/Kg	☼	89	75 - 125
Sodium	ND		4330	3941		mg/Kg	☼	91	75 - 125

Lab Sample ID: 240-202469-1 MSD
Matrix: Solid
Analysis Batch: 609193

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Total/NA
Prep Batch: 608971

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Calcium	25600		4330	30400	4	mg/Kg	☼	110	75 - 125	3	20
Sodium	ND		4330	3943		mg/Kg	☼	91	75 - 125	0	20

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-609689/1-A
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: Method Blank
Prep Type: Soluble

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		9.95	1.98	mg/Kg			04/17/24 07:46	1
Fluoride	ND		0.498	0.332	mg/Kg			04/17/24 07:46	1
Sulfate	ND		9.95	3.87	mg/Kg			04/17/24 07:46	1

Lab Sample ID: LCS 240-609689/2-A
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: Lab Control Sample
Prep Type: Soluble

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	500	504.8		mg/Kg		101	90 - 110
Fluoride	25.0	26.00		mg/Kg		104	90 - 110
Sulfate	500	519.2		mg/Kg		104	90 - 110

Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: 240-202469-1 MS
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Chloride	24.8		512	576.6		mg/Kg	☼	108	80 - 120		
Fluoride	0.793		25.6	29.82		mg/Kg	☼	113	80 - 120		
Sulfate	20.0		512	580.7		mg/Kg	☼	110	80 - 120		

Lab Sample ID: 240-202469-1 MSD
Matrix: Solid
Analysis Batch: 609809

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	24.8		512	580.0		mg/Kg	☼	109	80 - 120	1	15
Fluoride	0.793		25.6	30.05		mg/Kg	☼	114	80 - 120	1	15
Sulfate	20.0		512	583.9		mg/Kg	☼	110	80 - 120	1	15

Method: 9081 - Cation Exchange Capacity (CEC)

Lab Sample ID: MB 860-157253/1-A
Matrix: Solid
Analysis Batch: 157810

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 157253

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cation Exchange Capacity	ND		0.500	0.500	meq/100gm		04/28/24 12:54	05/01/24 09:35	1

Metals

Prep Batch: 608971

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	3050B	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	3050B	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	3050B	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	3050B	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	3050B	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	3050B	
MB 240-608971/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 240-608971/2-A	Lab Control Sample	Total/NA	Solid	3050B	
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	3050B	
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	3050B	

Analysis Batch: 609193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	6010D	608971
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	6010D	608971
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	6010D	608971
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	6010D	608971
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	6010D	608971
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	6010D	608971
MB 240-608971/1-A	Method Blank	Total/NA	Solid	6010D	608971
LCS 240-608971/2-A	Lab Control Sample	Total/NA	Solid	6010D	608971
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	6010D	608971
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	6010D	608971

General Chemistry

Prep Batch: 157253

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	9081	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	9081	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	9081	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	9081	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	9081	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	9081	
MB 860-157253/1-A	Method Blank	Total/NA	Solid	9081	

Analysis Batch: 157810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	9081	157253
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	9081	157253
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	9081	157253
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	9081	157253
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	9081	157253
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	9081	157253
MB 860-157253/1-A	Method Blank	Total/NA	Solid	9081	157253

Analysis Batch: 609179

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	Moisture	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	Moisture	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	Moisture	

General Chemistry (Continued)

Analysis Batch: 609179 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	Moisture	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	Moisture	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	Moisture	

Leach Batch: 609689

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	DI Leach	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Soluble	Solid	DI Leach	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Soluble	Solid	DI Leach	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Soluble	Solid	DI Leach	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Soluble	Solid	DI Leach	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Soluble	Solid	DI Leach	
MB 240-609689/1-A	Method Blank	Soluble	Solid	DI Leach	
LCS 240-609689/2-A	Lab Control Sample	Soluble	Solid	DI Leach	
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	DI Leach	
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	DI Leach	

Analysis Batch: 609809

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	9056A	609689
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Soluble	Solid	9056A	609689
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Soluble	Solid	9056A	609689
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Soluble	Solid	9056A	609689
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Soluble	Solid	9056A	609689
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Soluble	Solid	9056A	609689
MB 240-609689/1-A	Method Blank	Soluble	Solid	9056A	609689
LCS 240-609689/2-A	Lab Control Sample	Soluble	Solid	9056A	609689
240-202469-1 MS	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	9056A	609689
240-202469-1 MSD	MW-1801-SS-59.8-60.5-20240403	Soluble	Solid	9056A	609689

Organic Prep

Analysis Batch: 608940

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-202469-1	MW-1801-SS-59.8-60.5-20240403	Total/NA	Solid	Part Size Red	
240-202469-2	MW-1802-SS-56.3-56.9-20240403	Total/NA	Solid	Part Size Red	
240-202469-3	MW-1801-SH-55.9-56.6-20240403	Total/NA	Solid	Part Size Red	
240-202469-4	MW-1801-SH-58.0-58.8-20240403	Total/NA	Solid	Part Size Red	
240-202469-5	MW-1802-SH-51.9-52.5-20240403	Total/NA	Solid	Part Size Red	
240-202469-6	MW-1802-SH-55.3-55.8-20240403	Total/NA	Solid	Part Size Red	

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Lab Sample ID: 240-202469-1

Date Collected: 04/03/24 11:00
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1801-SS-59.8-60.5-20240403
Lab Sample ID: 240-202469-1

Date Collected: 04/03/24 11:00
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 99.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:12
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 08:29
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1802-SS-56.3-56.9-20240403
Lab Sample ID: 240-202469-2

Date Collected: 04/03/24 11:05
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1802-SS-56.3-56.9-20240403
Lab Sample ID: 240-202469-2

Date Collected: 04/03/24 11:05
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 99.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:42
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 09:34
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1801-SH-55.9-56.6-20240403
Lab Sample ID: 240-202469-3

Date Collected: 04/03/24 11:10
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1801-SH-55.9-56.6-20240403
Lab Sample ID: 240-202469-3

Date Collected: 04/03/24 11:10
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:46
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 09:56
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1801-SH-58.0-58.8-20240403
Lab Sample ID: 240-202469-4

Date Collected: 04/03/24 11:15
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1801-SH-58.0-58.8-20240403
Lab Sample ID: 240-202469-4

Date Collected: 04/03/24 11:15
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:51
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 10:18
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1802-SH-51.9-52.5-20240403
Lab Sample ID: 240-202469-5

Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1802-SH-51.9-52.5-20240403
Lab Sample ID: 240-202469-5

Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 15:55
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 12:33

Lab Chronicle

Client: Geosyntec Consultants Inc
Project/Site: AEP Amos Power Plant - ASD

Job ID: 240-202469-1

Client Sample ID: MW-1802-SH-51.9-52.5-20240403
Lab Sample ID: 240-202469-5

Date Collected: 04/03/24 11:20
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Client Sample ID: MW-1802-SH-55.3-55.8-20240403
Lab Sample ID: 240-202469-6

Date Collected: 04/03/24 11:25
Matrix: Solid
Date Received: 04/08/24 12:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	609179	QUY8	EET CLE	04/10/24 17:00
Total/NA	Analysis	Part Size Red		1	608940	POP	EET CLE	04/09/24 12:36

Client Sample ID: MW-1802-SH-55.3-55.8-20240403
Lab Sample ID: 240-202469-6

Date Collected: 04/03/24 11:25
Matrix: Solid
Date Received: 04/08/24 12:30
Percent Solids: 97.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3050B			608971	DEE	EET CLE	04/09/24 15:00
Total/NA	Analysis	6010D		1	609193	KLC	EET CLE	04/10/24 16:00
Soluble	Leach	DI Leach			609689	JWW	EET CLE	04/15/24 16:00
Soluble	Analysis	9056A		1	609809	JWW	EET CLE	04/17/24 12:54
Total/NA	Prep	9081			157253	PB	EET HOU	04/28/24 12:55
Total/NA	Analysis	9081		1	157810	JDM	EET HOU	05/01/24 09:35

Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

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

Accreditation/Certification Summary

Client: Geosyntec Consultants Inc
Job ID: 240-202469-1
Project/Site: AEP Amos Power Plant - ASD

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	07-31-24
Iowa	State	421	06-01-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-24
New Jersey	NELAP	OH001	06-30-24
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-24
Texas	NELAP	T104704517-22-19	08-31-24
USDA	US Federal Programs	P330-18-00281	01-05-27
Virginia	NELAP	460175	09-14-24
West Virginia DEP	State	210	12-31-24

Laboratory: Eurofins Houston

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	88-00759	08-03-24
Florida	NELAP	E871002	06-30-24
Louisiana (All)	NELAP	03054	06-30-24
Oklahoma	NELAP	1306	08-31-24
Oklahoma	State	2023-139	08-31-24
Texas	NELAP	T104704215	06-30-24
Texas	TCEQ Water Supply	T104704215	12-28-25
USDA	US Federal Programs	525-23-79-79507	03-20-26

Eurofins Canton
180 S. Van Buren Ave

Barberton, OH 44203-3543
phone 330.497.9396 fax 330.497.0772

Chain of Custody Record

24.0 | 24.3

eurofins | Environment Testing America

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Eurofins Environment Testing America

Client Contact	Project Manager: Allison Krenzberg	Site Contact:	Date:	COC No:
Your Company Name here: GeoSyntec Consultants	Email: akrenberg@geosyntec.com	Lab Contact:	Carrier:	1 of 1 COCs
Address: 500 W Wilson Bridge Rd Ste 250	Tel/Fax: 216 544 5007			TALS Project #:
City/State/Zip: Worthington, OH 43085	**Analysis Turnaround Time**			Sampler:
(xxx) xxx-xxxx Phone	☒ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx FAX	TAT if different from Below _____			Walk-in Client:
Project Name: Amos Landfill ASD	☒ 2 weeks			Lab Sampling:
Site: Amos	☐ 1 week			Job / SDG No.:
P O #	☐ 2 days ☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	9056A	6010D	29B_CEC	Sample Specific Notes:
MW-1801-SS-59.8-60.5-20240403	4/3/24	1100	G	Solid	1			X	X	X	
MW-1802-SS-56.3-56.9-20240403		1105	G	Solid	1			X	X	X	
MW-1801-SH-55.9-56.6-20240403		1110	G	Solid	1			X	X	X	
MW-1801-SH-58.0-58.8-20240403		1115	G	Solid	1			X	X	X	
MW-1802-SH-51.9-52.5-20240403		1120	G	Solid	1			X	X	X	
MW-1802-SH-55.3-55.8-20240403	↓	1125	G	Solid	1			X	X	X	

240-202469 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temp. (°C): Obs'd: _____ Corr'd: _____	Therm ID No.: _____

	Company	Date/Time		Company	Date/Time
Relinquished by: Okiemute Commander	Geosyntec	4/5/24 14:00	Received by: Rochelle Harris	ECETNC	4-8-24 1230
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Eurofins – Cleveland Sample Receipt Form/Narrative **Login # :** _____
Barberton Facility

Client Geosyntec Site Name _____ Cooler unpacked by Rachelle Haidet

Cooler Received on 5 4 24 Opened on 5 4 24

FedEx: 1st (Grd) Exp UPS FAS Waypoint Client Drop Off Eurofins Courier Other _____

Receipt After-hours Drop-off Date/Time _____ Storage Location _____

Eurofins Cooler # _____ Foam Box Client Cooler (Box) Other _____

Packing material used Bubble Wrap Foam (Plastic Bag) None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water (None)

1 Cooler temperature upon receipt ☐ See Multiple Cooler Form

IR GUN # 20 (CF +0.3 °C) Observed Cooler Temp. 24.0 °C Corrected Cooler Temp. 24.3 °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	(Yes)	No
-Were the seals on the outside of the cooler(s) signed & dated?	(Yes)	No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	(No)
-Were tamper/custody seals intact and uncompromised?	(Yes)	No NA
3 Shippers' packing slip attached to the cooler(s)?	(Yes)	No
4 Did custody papers accompany the sample(s)?	(Yes)	No
5 Were the custody papers relinquished & signed in the appropriate place?	(Yes)	No
6 Was/were the person(s) who collected the samples clearly identified on the COC?	Yes	(No)
7 Did all bottles arrive in good condition (Unbroken)?	(Yes)	No
8 Could all bottle labels (ID/Date/Time) be reconciled with the COC?	(Yes)	No
9 For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)?		
10 Were correct bottle(s) used for the test(s) indicated?	(Yes)	No
11 Sufficient quantity received to perform indicated analyses?	(Yes)	No
12 Are these work share samples and all listed on the COC?	Yes	(No)
If yes, Questions 13-17 have been checked at the originating laboratory		
13 Were all preserved sample(s) at the correct pH upon receipt?	Yes	No (NA) pH Strip Lot# HC329089
14 Were VOAs on the COC?	Yes	(No)
15 Were air bubbles >6 mm in any VOA vials? ● ← Larger than this	Yes	No (NA)
16 Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____	Yes	(No)
17 Was a LL Hg or Me Hg trip blank present? _____	Yes	(No)

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by

_____

_____

_____

_____

19 SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired

Sample(s) _____ were received in a broken container

Sample(s) _____ were received with bubble >6 mm in diameter (Notify PM)

20 SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory

Time preserved _____ Preservative(s) added/Lot number(s) _____

VOA Sample Preservation Date/Time VOAs Frozen _____


FROM:
(309) 205-2434
Okiemute Commander
GEOSYNTEC CONSULTANTS
500 W Wilson Bridge Rd
Ste 250
WORTHINGTON OH 43085
US
SHIP DATE: 05APR24
ACTWGT: 3.35 LB
CAD: 6570118/ROSA2510
DIMMED: 12 X 11 X 11 IN
BILL 3rd PARTY
TO Eurofins Cleveland
180 S VAN BUREN AVE
BARBERTON OH 44203
(330) 497-9396
(US)
INV:
PO:
REF:
DEPT:
FedEx
Ground
TRK# 7758 4249 6140
9622 0417 3 (000 448 0300) 0 00 77
240-202469 Waybill
Custody
Okiemute

Eurofins Cleveland
180 S Van Buren Avenue
Barberton OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler	Lab PM: Cisneros, Roxanne	Carrier Tracking No(s):	COC No: 240-182880.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: roxanne.cisneros@et.eurofinsus.com	State of Origin: Ohio	Page: Page 1 of 1
Company: Eurofins Environment Testing South Centr		Accreditations Required (See note):		Job #: 240-202469-1
Address: 4145 Greenbriar Dr	Due Date Requested: 4/22/2024			
City: Stafford	TAT Requested (days):			
State, Zip: TX, 77477				
Phone: 281-240-4200(Tel)	PO #:			
Email:	WO #:			
Project Name: AEP Amos Power Plant ASD	Project #: 24033054			
Site:	SSOW#:			

Analysis Requested

Preservation Codes.

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

Other:

Sample Identification Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	299_CEC/299_Prep_Solid Cation Exchange Capacity(CEC)	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-1801-SS-59.8-60.5-20240403 (240-202469-1)	4/3/24	11:00 Eastern		Solid			X	1	
MW-1802-SS-56.3-56.9-20240403 (240-202469-2)	4/3/24	11:05 Eastern		Solid			X	1	
MW-1801-SH-55.9-56.6-20240403 (240-202469-3)	4/3/24	11:10 Eastern		Solid			X	1	Hcl368
MW-1801-SH-58.0-58.8-20240403 (240-202469-4)	4/3/24	11:15 Eastern		Solid			X	1	2.6
MW-1802-SH-51.9-52.5-20240403 (240-202469-5)	4/3/24	11:20 Eastern		Solid			X	1	2.6
MW-1802-SH-55.3-55.8-20240403 (240-202469-6)	4/3/24	11:25 Eastern		Solid			X	1	

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

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I II III, IV Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

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

Relinquished by: Rachelle Nance	Date/Time: 4/9/24 1254	Company: EESNC	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by: Jeremiah Baker	Date/Time: 4/10/2024 9 52	Company EX
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

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

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: Geosyntec Consultants Inc

Job Number: 240-202469-1

Login Number: 202469
List Number: 2
Creator: Baker, Jeremiah

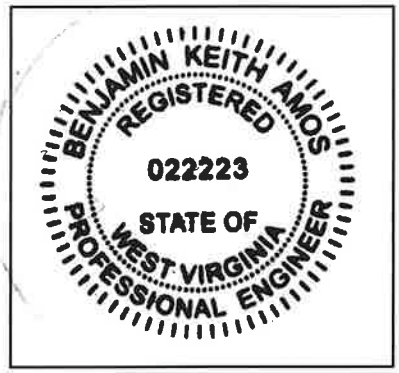
List Source: Eurofins Houston
List Creation: 04/10/24 11:38 AM

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

ATTACHMENT D
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 Amos Plant Landfill CCR management area and that the requirements of 40 CFR 257.94(e)(2) have been met.



Ben Amos
Printed Name of Licensed Professional Engineer

Ben Amos
Signature

022223	West Virginia	1/14/2025
License Number	Licensing State	Date

APPENDIX 4

Not applicable.

APPENDIX 5

Not applicable.