

**2023 ANNUAL GROUNDWATER MONITORING
AND CORRECTIVE ACTION REPORT
COAL COMBUSTION RESIDUALS (CCR) RULE**

**SAMMIS POWER STATION
JEFFERSON COUNTY, OHIO**

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ABBREVIATIONS/ACRONYMS

ACM	Assessment of Corrective Measures
ASD	Alternative Source Demonstration
CCR	Coal Combustion Residuals
cm/s	Centimeters per Second
ETEM	ETEM Remediation One, LLC
FTS	Field & Technical Services LLC
ft/yr	Feet per Year
GWPS	Groundwater Protection Standard
Impoundments	North and South Surface Impoundments
MCL	Maximum contaminant level
mg/L	Milligrams per Liter
pCi/L	PicoCurie per Liter
Site	Sammis Power Station, Jefferson County, Ohio
SSI	Statistical Significant Increase
SSL	Statistical Significant Level
TDS	Total Dissolved Solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This report summarizes groundwater monitoring activities completed between January 1 and December 31, 2023, at the Coal Combustion Residuals (CCR) North and South Surface Impoundments (Impoundments) at the ETEM Remediation One, LLC (ETEM) Sammis Power Station (Site) as required by 40 CFR 257.90(e) of the United States Environmental Protection Agency (USEPA) CCR Rule. Illustrations presenting the Site location and Site layout are presented as Figures 1 and 2, respectively.

Detection of Appendix III constituents at concentrations representing statistically significant increases (SSIs) over background levels required the shift of groundwater monitoring from detection to assessment monitoring in 2018 and a notification was posted to the publicly accessible website as required by 40 CFR 259.94(e)(3). Assessment monitoring of groundwater at the Impoundments unit was initiated in March 2018 because SSIs of the Appendix III constituents boron, calcium, chloride, sulfate, and total dissolved solids (TDS) were reported in downgradient monitoring wells MW-4, MW-5, and MW-6.

Assessment monitoring was ongoing at the start and the end of the current annual reporting period (2023).

Assessment groundwater monitoring data have reported the detection of the Appendix IV constituent cobalt in downgradient well MW-6. Per CCR rule requirements, a groundwater protection standard (GWPS) for this constituent was established by the July 2018 revision to 40 CFR 257.95 of the CCR Rule. This revision set the GWPS for cobalt to 0.006 milligrams per liter (mg/L). Semiannual assessment monitoring data were tested for whether detected concentrations represented statistically significant levels (SSLs) above the GWPS. SSLs identified in the 2023 annual reporting period are as follows:

Appendix IV Constituent	Downgradient Well with SSL over GWPS
Cobalt	MW-6

Cobalt was first identified at an SSL in MW-6 in 2019 and an alternative source demonstration (ASD) was completed which demonstrated that an alternative source was responsible for the SSL. An ASD update has been prepared for each subsequent monitoring event in which this SSL persisted. The original ASD and subsequent updates were posted to the facility operating record as required by 40 CFR 257.95(g)(3).

Other activities and conditions for the 2023 annual reporting period include:

- Semiannual groundwater assessment monitoring events were conducted April 17 and 18, 2023 and October 9 through 11, 2023. Monitoring involved sampling of two upgradient monitoring wells and 5 downgradient monitoring wells;
- No program transitions (detection to assessment or vice versa) were triggered;
- No programmatic problems were encountered, so no remedies were required.

Anticipated activities for the next annual reporting period include:

- Completion of two semiannual assessment mode groundwater monitoring events;
- The USEPA notified ETEM in October 2023 that, based on the USEPA's review of previous reports, the previous ASDs were not thorough enough and that it was necessary to collect additional groundwater characterization data. Based on communications with the USEPA, ETEM plans to complete additional ASD and groundwater characterization investigations in 2024.

1.0 INTRODUCTION

On behalf of ETEM Remediation One, LLC (ETEM), Field & Technical Services, LLC (FTS) has prepared this Annual Groundwater Monitoring and Corrective Action Report for the Sammis Power Station (Site), located in Stratton, Ohio. Ownership of the Site was transferred from Energy Harbor Generation LLC to ETEM in September 2023. Energy Harbor, or its predecessors, completed compliance activities prior to ETEM's acquisition of the Site. This report was prepared as required by CFR 40 CFR 257.90(e) of the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Rule, which requires annual groundwater monitoring and corrective action reports to include the information listed below:

- 1) A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;
- 2) Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken (no monitoring wells were installed or decommissioned in 2023);
- 3) In addition to all the monitoring data obtained under 40 CFR 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs (referenced in Section 2.3 and presented in full in Appendix A);
- 4) A narrative discussion of any transition between monitoring programs (no program transitions took place in 2023 as reported in Section 2.0); and
- 5) Other information required to be included in the annual report as specified in 40 CFR 257.90 through 257.98 (i.e., groundwater monitoring results, alternative sources, and extension of schedules) (ASD investigation updates are provided in Section 4.0).

2.0 SITE BACKGROUND

The Site is situated on the western shoreline of the Ohio River in Jefferson County, Ohio, immediately north of the town of Stratton. The United States Army Corps of Engineers (USACE) New Cumberland Lock and Dam structure is located adjacent to the east. A general location map of the site is provided as Figure 1.

The Sammis Power Station is a coal-fired power plant that began operations in 1959. The plant ceased energy production in 2023 and decommissioning activities are currently ongoing. There are two settlement ponds on site that have been identified as surface impoundments subject to the CCR Rule because they were used for temporary storage of a CCR, namely sluiced bottom ash. The Impoundments are adjacent to each other, separated by a berm. For the purposes of the CCR Rule, a single multi-unit groundwater system monitors both ponds. CCR material that was placed in the North and South Impoundments when the plant was operating has been removed. The North Impoundment was retrofitted with an engineered liner system in accordance with the provisions of 40 CFR 257.102(k) in 2021. The South Impoundment was initially planned to be retrofitted; however, due to changes in plant operations, the South Pond was clean closed in 2023.

3.0 2023 ACTIVITIES SUMMARY

Assessment monitoring was ongoing at the start and the end of the current annual reporting period (2023). The first semiannual 2023 assessment monitoring sampling event was performed on April 17 and 18, 2023. The second semiannual 2023 assessment monitoring sampling event was performed on October 9 through 11, 2023. All seven CCR program wells were sampled during the April and October 2023 events. In addition, two piezometers (P-1 and P-2) and seven additional characterization monitoring wells (MW-10D, MW- 11S, MW-11D, MW-12S, MW-13S, MW-13BR, and MW-14S) were sampled in April and October 2023 as part of ongoing ASD evaluations. These locations have not been formally added to the CCR groundwater monitoring network.

The CCR groundwater monitoring system consists of two upgradient monitoring wells (MW-1 and MW-9) and five downgradient monitoring wells (MW-2, MW-3, MW-4, MW-5, and MW-6). Monitoring well locations are shown on Figure 2. Table 1 contains information regarding well locations, pump depths, and construction details. Each well in the CCR groundwater monitoring well network was installed into the upper portion of the uppermost usable aquifer underlying the Site. At the Site, the uppermost aquifer is encountered in unconsolidated sand and gravel of the Ohio River buried valley aquifer.

Piezometers P-1 and P-2 were sampled in 2023 as part of ASD evaluations but have not been added to the CCR groundwater monitoring well network. Monitoring wells installed in 2019 and 2020 (MW-10D, MW- 11S, MW-11D, MW-12S, MW-13S, MW-13BR, and MW-14S) were also sampled as part of ASD evaluations in accordance with 40 CFR 257.95(g)(1) but have not been added to the CCR groundwater monitoring well network. Details regarding the establishment of the monitoring well system are presented in the *Hydrogeologic Investigation Report* and *Groundwater Monitoring System Certification* document both dated October 2017.

A comprehensive round of groundwater elevations was measured within a 24-hour time period to avoid temporal variations in groundwater flow in accordance with 40 CFR 257.93(c). Monitoring wells were sampled using low-flow sampling methods in accordance with the *Groundwater Evaluation Work Plan* dated April 2016 (AECOM, 2016). All wells were sampled for Appendix III and Appendix IV parameters in accordance with 40 CFR 257.95(d)(1).

4.0 MONITORING RESULTS

The following sections present details about the CCR monitoring system review, groundwater flow evaluations, groundwater sampling results, and ASD results for the April and October 2023 events.

4.1 GROUNDWATER FLOW

Water level data and calculated groundwater elevations for 2023 are presented in Table 2 and groundwater flow maps for the 2023 monitoring period are included as Figures 4A and 4B. All wells were measured during the April and October 2023 events.

The direction of groundwater flow beneath the Site impoundments is south-southeast. Groundwater flow direction is subparallel with the Ohio River, flowing from the upstream to downstream side of the New Cumberland Lock and Dam located to the east of the impoundments. Groundwater flow velocity ranged from approximately 1,127 feet per year (ft/yr) to 12,464 ft/yr during the first 2023 assessment monitoring event and 1,583 ft/yr to 17,509 ft/yr during the second 2023 assessment monitoring event. Groundwater flow velocities were calculated using an aquifer porosity value and hydraulic conductivity values based on sand and gravel aquifer materials and pumping test results from production wells in the same aquifer¹. Hydraulic gradient was calculated using potentiometric data over a horizontal distance of 855 feet. Groundwater flow conditions observed in 2023 were consistent with those observed during previous monitoring events. The aquifer is characterized by high groundwater flow rates in the vicinity of the impoundments.

4.2 SAMPLING RESULTS

Analytical results from April and October 2023 assessment monitoring events are summarized on Table 3 with the full laboratory reports available in Appendix A. The data were generally consistent with previous analytical results. MW-6 cobalt data was the only SSL identified at the Site; however, this SSL has been attributed to an alternative source based on previous ASD investigations.

Cobalt concentrations at MW-5 indicate an approximate stable to decreasing trend and were reported at concentrations of 0.0066 mg/L (April 2023) and 0.0032 J mg/L (October 2023). Cobalt concentrations at MW-5 have not been verified as an SSL in the statistical evaluations because the lower confidence limit is less than the GWPS of 0.006 mg/L. Cobalt concentrations at MW-6 indicate an approximate stable to decreasing trend and were reported at concentrations of 0.0160 mg/L (April 2023) and 0.01 mg/L (October 2023), the October 2023 result was the lowest reported

¹ Zorbini, J., Zorbini D., 2006. Drinking Water Source Protection Plan for Village Stratton 4102612.

concentration since July 2017. Cobalt concentrations at MW-6 have remained above the established GWPS since Baseline Monitoring began in July 2016.

Thallium concentrations were above the maximum contaminant level (MCL) of 0.002 mg/L at monitoring well MW-5 (0.0054 mg/L) during the October 2023 event and at monitoring well MW-6 (0.0021 J mg/L) during the April 2023 event. However, the April 2023 result for monitoring well MW-6 was below the background monitoring well MW-9 concentration of 0.0022 J mg/L. Thallium concentrations at MW-5 have not been verified as an SSL in the statistical evaluations because the lower confidence limit is less than the MCL of 0.002 mg/L. Furthermore, only two of the 21 samples collected from MW-5 indicated a thallium detection, thus the 0.0054 mg/L result at MW-5 is considered an outlier. Verification sampling was conducted at monitoring well MW-5 on December 15, 2023 to further evaluate the thallium outlier result. The December 2023 verification sampling results for monitoring well MW-5 were non-detect (<0.00015 mg/L) for thallium and could not confirm the original result.

Radium concentrations at monitoring wells MW-4 (5.56 picoCurie per liter [pCi/L]) and MW-5 (5.16 pCi/L) were slightly above the MCL of 5 pCi/L during the April 2023 event. However, radium concentrations at MW-4 and MW-5 have not been verified as an SSL in the statistical evaluations because the lower confidence limit is less than the MCL of 5 pCi/L. Furthermore, the MW-4 and MW-5 radium concentrations are less than the background well upper prediction limits of 5.962 pCi/L.

4.3 ALTERNATIVE SOURCE DEMONSTRATION UPDATE

During the April and October 2023 assessment monitoring events, groundwater samples were also collected from supplemental ASD monitoring wells MW-10D, MW-11S, MW-11D, MW-12S, MW-13S, MW-13BR, and MW-14S, as presented in Table 3. Cobalt was detected in all ASD wells. Cobalt concentrations exceed the applicable GWPS of 0.006 mg/L in MW-11S, MW-11D, and MW-12S. The results of laboratory analysis of these samples are presented in Appendix A. The ASD monitoring well data is consistent with previous findings that groundwater west of the impoundments serves as an alternative source of cobalt in MW-6 samples. The area west of the impoundments is upgradient of MW-6, which is the only downgradient monitoring well with cobalt SSLs.

The USEPA notified ETEM in October 2023 that, based on the USEPA's review of previous reports, the previous ASDs were not thorough enough and that it was necessary to collect additional groundwater characterization data. Based on communications with the USEPA, ETEM plans to complete additional ASD and groundwater characterization investigations in 2024 as discussed in Section 5.

5.0 GENERAL INFORMATION

The following sections summarize any problems encountered in the CCR program through 2023, any resolutions to those problems, if needed, and upcoming actions planned for 2024.

5.1 PROBLEMS ENCOUNTERED AND RESOLUTIONS

The USEPA notified ETEM in October 2023 that, based on the USEPA's review of previous reports, the previous ASDs were not thorough enough and that it was necessary to collect additional groundwater characterization data. In order to resolve this issue, ETEM provided an investigation work plan to USEPA in December 2023 and is proceeding to complete additional ASD and groundwater characterization investigations in 2024. Additional investigation data will provide enhanced temporal and spatial data resolution for groundwater flow evaluations. Aquifer characteristics will be determined with greater certainty. The alternative source investigation area to the west and northwest of the ponds will be investigated in greater detail.

5.2 ACTIONS PLANNED FOR 2024

The following CCR groundwater compliance activities are planned for 2024:

- Continue with groundwater semiannual assessment monitoring events [per 40 CFR 257.95(b) and (d)(1)] inclusive of non-CCR program wells for use in ASD efforts.
- Evaluate groundwater sample data and identify any new SSLs.
- Complete additional ASD and groundwater characterization investigations, as appropriate.

6.0 REFERENCES

- AECOM, *April 2016. Groundwater Evaluation Work Plan Coal Combustion Residuals (CCR) Rule (Work Plan)*, W.H. Sammis Power Station, April 7, 2016.
- AECOM, *October 2017. Coal Combustion Residuals Rule Groundwater Monitoring System Certification*. W.H. Sammis Power Station, October 17, 2017.
- AECOM, *October 2017. Coal Combustion Residuals Rule Statistical Methods Certification*, W.H. Sammis Power Station, North and South Impoundments, October 17, 2017.
- AECOM, *October 2017. Hydrogeologic Investigation Report Coal Combustion Residuals (CCR) Rule*, W.H. Sammis Power Station, October 13, 2017.
- Geosyntec Consultants, *Closure Plan - W.H. Sammis Coal Plant North and South Ponds*, Stratton Ohio, October 17, 2016.
- United States Environmental Protection Agency, 2015. Part 257 Coal Combustion Residuals Rule, last amended December 29, 2023

TABLES

Table 1
Monitoring Well Construction Summary
2023 Annual Groundwater Monitoring and Corrective Action Report
Coal Combustion Residuals (CCR) Rule
Sammis Power Station
Jefferson County, Ohio

Well ID		Easting	Northing	Well Installation Date	TOC Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Total Depth (ft BTOC)	Bottom Elevation (Ft MSL)	Screen Length (ft)	Top of Screen (ft BTOC)	Bottom of Screen (ft BTOC)	Top of Screen Elevation (ft MSL)	Bottom of Screen Elevation (ft MSL)	Pump Depth (ft BTOC)	Well Casing Material	Well Screen Material and Slot Size	Groundwater Flow Location	Program Use
MW-1	CCR Monitoring Network	319594.250	2488142.815	Apr-16	690.99	691.54	56.73	634.26	10	46.73	56.73	644.26	634.26	51.73	2-inch schedule 40 PVC	2-inch Schedule 40 PVC and 0.01 inch slot	Upgradient /Background	Assessment
MW-2		319386.798	2488309.959	May-16	693.91	694.21	59.71	634.20	10	49.71	59.71	644.20	634.20	54.71			Downgradient	
MW-3		318989.431	2488433.617	May-16	696.87	697.27	64.63	632.24	10	54.63	64.63	642.24	632.24	59.63			Downgradient	
MW-4		318785.151	2488456.104	May-16	687.83	688.17	58.03	629.80	10	48.03	58.03	639.80	629.80	53.03			Downgradient	
MW-5		318662.448	2488233.321	May-16	688.07	688.44	60.06	628.01	10	50.06	60.06	638.01	628.01	55.06			Downgradient	
MW-6		318625.768	2488029.139	May-16	690.70	691.04	65.02	625.68	10	55.02	65.02	635.68	625.68	60.02			Downgradient	
MW-9		320097.571	2487659.078	May-16	690.14	690.51	59.98	630.16	10	49.98	59.98	640.16	630.16	54.98			Upgradient/Background	
MW-7*	Potentiometry	319133.390	2488114.800	Apr-16	695.98	696.25	59.94	636.04	10	49.94	59.94	646.04	636.04	54.94			Downgradient	Water Level/Flow Evaluation
MW-8*		317926.770	2488076.330	May-16	687.46	687.77	64.82	622.64	10	54.82	64.82	632.64	622.64	59.82			Downgradient	
P-1		318880.198	2487810.501	May-16	694.11	694.32	63.99	630.12	10	53.99	63.99	640.12	630.12	58.99			Downgradient	
P-2		319385.796	2487827.158	Apr-16	692.33	692.58	59.84	632.49	10	49.84	59.84	642.49	632.49	54.84			Upgradient	
MW-10D	ASD Expansion Wells	319025.808	2487636.845	Sep-19	697.14	697.42	89.72	607.42	10	75.72	85.72	621.42	611.42	NA			Downgradient	ASD Evaluation
MW-11S		318962.459	2487742.386	Sep-19	693.98	694.39	69.59	624.39	10	54.59	64.59	639.39	629.39	NA			Downgradient	
MW-11D		318957.768	2487744.410	Sep-19	694.22	694.60	94.62	599.60	10	78.62	88.62	615.60	605.60	NA			Downgradient	
MW-12S		319477.005	2487485.068	Jan-20	692.09	692.43	80.00	612.09	10	55.00	65.00	637.09	627.09	NA			Upgradient	
MW-13S		319648.511	2487420.558	Jul-20	690.99	691.26	65.72	625.27	10	54.74	64.74	636.25	626.25	NA			Upgradient	
MW-13BR		318875.334	2487489.809	Jan-20	702.24	702.66	98.17	603.92	10	80.67	90.67	621.42	611.42	NA			Upgradient	
MW-14S		319750.026	2487594.223	Jul-20	688.69	689.25	68.74	619.95	10	54.74	64.74	633.95	623.95	NA			Upgradient	

Notes:
TOC - Top of Casing
ft MSL - feet above Mean Sea Level
ft BTOC - feet below top of casing
PVC - Polyvinyl Chloride
NA Dedicated bladder pump not installed
* Excluded from the CCR Network after Baseline Sampling (to be used for water levels only)

Table 2
Monitoring Well Groundwater Elevations
2023 Annual Groundwater Monitoring and Corrective Action Report
Coal Combustion Residuals (CCR) Rule
Sammis Power Station
Jefferson County, Ohio

Well ID			Assessment Monitoring Event		Assessment Monitoring Event	
		Date	4/17/2023		10/9/2023	
		TOC Elevation	DTW (feet)	Elevation (feet, msl)	DTW (feet)	Elevation (feet, msl)
MW-1	CCR Monitoring Network	691.82	36.91	654.91	33.81	658.01
MW-2		693.91	40.78	653.13	38.34	655.57
MW-3		696.87	45.61	651.26	44.00	652.87
MW-4		687.83	37.59	650.24	36.38	651.45
MW-5		688.07	37.41	650.66	36.35	651.72
MW-6		690.70	39.93	650.77	38.51	652.19
MW-9		690.14	33.89	656.25	30.96	659.18
P1*	Potentiometry	694.11	41.61	652.50	39.60	654.51
P2*		692.33	38.04	654.29	35.48	656.85
MW-7*		695.98	43.35	652.63	41.20	654.78
MW-8*		687.46	39.10	648.36	38.61	648.85
MW-10D	ASD Expansion Wells	697.42	43.05	654.37	41.62	655.80
MW-11S		694.39	41.37	653.02	38.98	655.41
MW-11D		694.60	41.13	653.47	39.24	655.36
MW-12S		692.09	37.13	654.96	34.55	657.54
MW-13S		690.99	35.65	655.34	32.92	658.07
MW-13BR		702.09	47.10	654.99	45.85	656.24
MW-14S		688.69	33.44	655.25	30.67	658.02

Notes:

TOC = Top of casing

msl = mean sea level

DTW = Depth to water

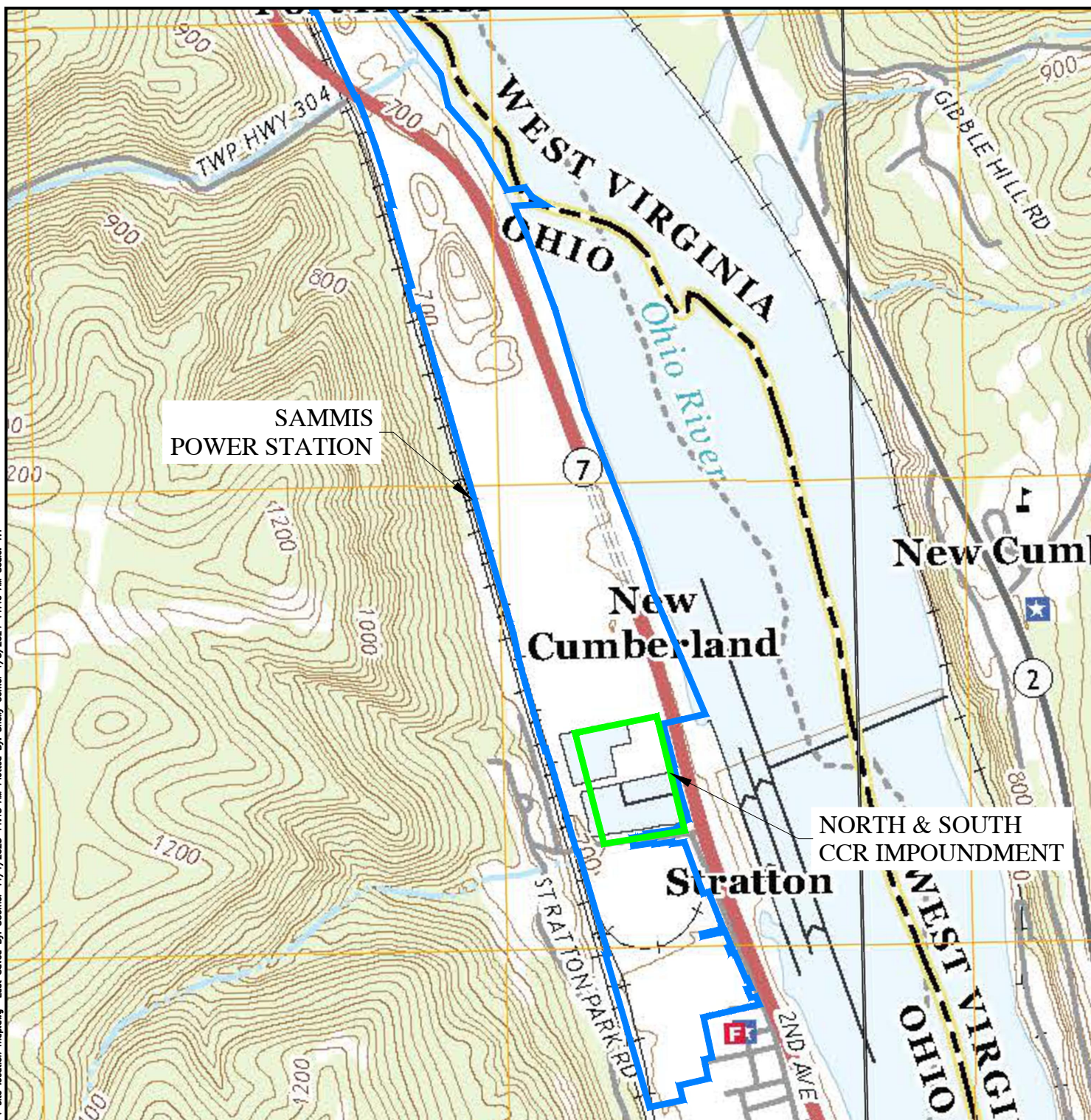
* Excluded from the CCR Network after Baseline Sampling (to be used for water levels only)

Table 3
Groundwater Analytical Results
2023 Annual Groundwater Monitoring and Corrective Action Report
Coal Combustion Residuals (CCR) Rule
Sammis Power Station
Jefferson County, Ohio

			Appendix III Constituents								Appendix IV Constituents																												
		Analyte Name	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt*	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium Combined†**															
		Units	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L															
		MCL	NE	NE	NE	4	5	NE	NE	0.006	0.01	2	0.004	0.005	0.1	0.006	4	0.015	NE	0.002	NE	0.05	0.002	5															
Downgradient Wells																																							
MW-2	Assessment Monitoring	4/17/2023	0.48	46	59	0.1	U	7.15	75	280	0.005	U	0.00068	J	0.041	0.00015	J	0.002	U	0.0012	J	0.005	U	0.1	U	0.005	U	0.0019	J	0.0002	U	0.00041	J	0.00064	J	0.005	U	1.2910	U
		10/10/2023	0.065	39	28.3	0.134		6.52	49.4	260	0.005	U	0.00032	J	0.03	0.002	U	0.002	U	0.00063	J	0.005	U	0.134	U	0.005	U	0.01	U	0.0002	U	0.005	U	0.005	U	0.005	U	2.0300	U
4/17/2023		0.38	48	53	0.1	U	7.65	75	260	0.005	U	0.00023	J	0.04	0.002	U	0.002	U	0.005	U	0.005	U	0.1	U	0.005	U	0.0018	J	0.0002	U	0.005	U	0.005	U	0.005	U	-0.784	U	
10/10/2023		0.076	39	29.3	0.123		6.50	49.3	200	0.005	U	0.00028	J	0.03	0.002	U	0.002	U	0.005	U	0.005	U	0.123	U	0.005	U	0.0021	J	0.0002	U	0.005	U	0.005	U	0.005	U	1.7930	U	
Duplicate		0.074	40	28.3	0.132		NA	48.6	250	0.005	U	0.00026	J	0.03	0.002	U	0.002	U	0.005	U	0.005	U	0.132	U	0.005	U	0.002	J	0.0002	U	0.005	U	0.005	U	0.005	U	1.7980	U	
4/18/2023		0.3	48	47	0.087	J	6.88	74	280	0.005	U	0.00042	J	0.036	0.002	U	0.002	U	0.00077	J	0.005	U	0.087	J	0.005	U	0.0018	J	0.0002	U	0.005	U	0.005	U	0.005	U	5.56	U	
10/9/2023 ⁽¹⁾		0.15	42	33.7	0.231		6.81	58.3	210	0.005	U	0.002	J	0.048	0.00013	J	0.002	U	0.0039	J	0.00044	J	0.231	0.0014	J	0.0026	J	0.0002	U	0.00052	J	0.005	U	0.0014	J	4.845	J+		
4/18/2023		0.11	70	72	0.1	U	6.36	240	480	0.005	U	0.00026	J	0.02	0.002	U	0.00046	J	0.005	U	0.0066		0.1	U	0.005	U	0.0018	J	0.0002	U	0.005	U	0.005	U	0.005	U	5.16	U	
10/10/2023		0.079	43	44.7	0.241		5.79	131	310	0.005	U	0.00036	J	0.016	0.002	U	0.00031	J	0.0011	J	0.0032	J	0.241	0.005	U	0.01	U	0.0002	U	0.0017	J	0.005	U	0.0054		1.0260	U		
12/15/2023		0.081	50	NA	NA		6.12	NA	NA	0.005	U	0.00021	J	0.018	0.002	U	0.00033	J	0.00072	J	0.0033	J	NA	0.00023	J	0.01	U	0.0002	U	0.005	U	0.005	U	0.005	U	NA	U		
4/18/2023		0.13	76	90	0.1	U	5.47	320	590	0.005	U	0.00021	J	0.012	0.00026	J	0.00038	J	0.005	U	0.016		0.1	U	0.005	U	0.01	U	0.0002	U	0.00094	J	0.0015	J	0.0021	J	1.2360	U	
10/10/2023		0.12	59	58.7	0.1	U	5.12	258	520	0.005	U	0.005	U	0.01	0.002	U	0.00028	J	0.005	U	0.01		0.1	U	0.005	U	0.01	U	0.0002	U	0.005	U	0.005	U	0.00064	J	0.5140	U	
Duplicate		0.12	60	57	0.1	U	NA	241	490	0.005	U	0.005	U	0.01	0.002	U	0.00027	J	0.005	U	0.01		0.1	U	0.005	U	0.01	U	0.0002	U	0.005	U	0.00069	J	0.00022	J	1.5500	U	
Upgradient Wells																																							
MW-1	Assessment Monitoring	4/17/2023	0.59	51	58	0.19		7.40	76	260	0.005	U	0.00035	J	0.039	0.00016	J	0.002	U	0.005	U	0.005	U	0.19		0.005	U	0.01	U	0.0002	U	0.005	U	0.005	U	0.005	U	0.6850	U
		10/10/2023	0.16	42	27.6	0.249		6.62	51.2	260	0.005	U	0.0041	J	0.072	0.00036	J	0.002	U	0.0094		0.0028	J	0.249	0.0045	J+	0.0086	J	0.0002	U	0.005	U	0.005	U	0.005	U	0.6320	U	
4/18/2023		0.046	39	32	0.12		7.67	52	180	0.005	U	0.005	U	0.025	0.00029	J	0.002	U	0.005	U	0.005	U	0.12		0.005	U	0.0018	J	0.0002	U	0.0015	J	0.0014	J	0.0022	J	1.78	U	
10/9/2023 ⁽¹⁾		0.2	47	35.8	0.16		7.29	59.5	260	0.005	U	0.00025	J	0.027	0.002	U	0.002	U	0.005	U	0.005	U	0.16		0.005	U	0.0028	J	0.0002	U	0.005	U	0.005	U	0.005	U	2.598	J+	
Piezometers																																							
P-1	ASD Evaluation	4/17/2023	0.15	82	93	0.1	U	4.71	390	650	0.005	U	0.00076	J	0.013	0.00032	J	0.00066	J	0.005	U	0.025		0.1	U	0.005	U	0.0047	J	0.0002	U	0.005	U	0.0012	J	0.00024	J	0.506	
		10/10/2023	0.16	78	77.9	0.1	U	4.68	317	640	0.005	U	0.00065	J	0.011	0.00023	J	0.00073	J	0.00061	J	0.021		0.1	U	0.005	U	0.0047	J	0.0002	U	0.005	U	0.00071	J	0.00018	J	NA	
4/18/2023		0.069	50	53	0.17		7.05	130	290	0.005	U	0.005	U	0.023	0.00014	J	0.002	U	0.005	U	0.0022	J	0.17		0.005	U	0.01	U	0.0002	U	0.005	U	0.00057	J	0.005	U	3.653		
10/11/2023		0.057	46	38.7	0.28		6.66	83.1	280	0.005	U	0.005	U	0.024	0.002	U	0.002	U	0.005	U	0.00093	J	0.28		0.005	U	0.0021	J	0.0002	U	0.005	U	0.005	U	0.005	U	NA		
P-2																																							
ASD Expansion Wells																																							
MW-10D	ASD Evaluation	4/17/2023	0.18	170	2000	0.1	U	7.72	19	3100	0.005	U	0.0031	J	3.6	0.00017	J	0.002	U	0.0015	J	0.00054	J	0.1	U	0.005	U	0.023		0.0002	U	0.0019	J	0.00069	J	0.005	U	3.35	
		10/11/2023	0.2	200	1750	0.1	U	7.37	4.11	3000	0.005	U	0.0048	J	2.7	0.002	U	0.002	U	0.00081	J	0.00036	J	0.1	U	0.005	U	0.024		0.0002	U	0.0023	J	0.005	U	0.005	U	NA	
4/18/2023		0.16	82	100	0.19		4.91	420	690	0.005	U	0.0017	J	0.017	0.00045	J	0.0013	J	0.0009	J	0.045		0.19		0.0011	J+	0.013		0.0002	U	0.005	U	0.00092	J	0.005	U	0.591		
10/11/2023		0.16	170	92.8	0.1	U	6.82	373	850	0.005	U	0.0087		0.033	0.002	U	0.002	U	0.0013	J	0.0098		0.1	U	0.005	U	0.013		0.0002	U	0.0005	J	0.005	U	0.005	U	NA		
4/17/2023		0.16	180	110	0.1	U	7.10	400	840	0.005	U	0.014		0.099	0.00037	J	0.00022	J	0.011		0.023		0.1	U	0.0074		0.019		0.0002	U	0.00079	J	0.00084	J	0.00038	J	0.515		
10/10/2023		0.19	91	84.2	0.215		4.87	367	710	0.005	U	0.0011	J	0.019	0.00045	J	0.0014	J	0.0019	J	0.048		0.215		0.005	U	0.015		0.0002	U	0.005	U	0.00062	J	0.00021	J	NA		
4/18/2023		0.16	84	110	0.13		5.65	400	690	0.005	U	0.0016	J	0.02	0.00027	J	0.026		0.0014	J	0.028		0.13		0.0019	J+	0.014		0.0002	U	0.005	U	0.005	U	0.005	U	0.532		
10/10/2023		0.16	130	80.2	0.331		5.95	327	710	0.005	U	0.024		0.022	0.002	U	0.0035		0.00062	J	0.019		0.331		0.005	U	0.013		0.0002	U	0.0011	J	0.005	U	0.005	U	NA		
4/18/2023		0.11	130	78	0.1	U	6.88	260	640	0.005	U	0.058		0.17	0.00023	J	0.003		0.0032	J	0.005	J	0.1	U	0.003	J+	0.0092	J	0.0002	U	0.0032	J	0.00074	J	0.005	U	0.7793	U	
10/10/2023		0.12	140	83.4	0.1	U	6.58	272	660	0.005	U	0.041		0.15	0.002	U	0.0015	J	0.005	U	0.0026	J	0.1	U	0.005	U	0.0079	J	0.0002	U	0.0029	J	0.005	U	0.005	U	NA		
4/17/2023		0.22	4.2	51	1.8		7.86	5.1	420	0.005	U	0.0028	J	0.09	0.00013	J	0.002	U	0.002	J	0.0007	J	1.8		0.0012	J+	0.0048	J	0.0002	U	0.0013	J	0.005	U	0.00017	J	1.08		
10/11/2023	0.23	4	43.8	1.14		7.68	4.02	390	0.005	U	0.0026	J	0.076	0.002	U	0.002	U	0.00085	J	0.005	U	1.14		0.005	U	0.0054	J	0.0002	U	0.0019	J	0.005	U	0.005	U	0.005	U	NA	
4/18/2023	0.057	56	39	0.2		7.11	76	300	0.005	U	0.00062	J	0.033	0.002	U	0.002	U	0.005	U	0.00071	J	0.2		0.005	U	0.0024	J	0.0002	U	0.005	U	0.005	U	0.005	U	0.005	U	0.359	
10/10/2023	0.064	60	40.4	0.227		6.73	79.4	340	0.005	U	0.00029	J	0.034	0.002	U	0.002	U	0.005	U	0.00048	J	0.227		0.005	U	0.0032	J	0.0002	U	0.005	U	0.005	U	0.005	U	0.005	U	NA	

FIGURES

q:\projects\key projects\etem\sammis\cadd\2023 annual ccr report\figure 1 site location map.dwg Last Saved By: SComer 11/1/2023 11:48 AM Plotted By: Shelly Comer 1/5/2024 11:46 AM Scale: 1:1



PROJECT LOCATION
(JEFFERSON COUNTY)

OHIO

REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE:
- EAST LIVERPOOL SOUTH, KNOXVILLE, WELLSVILLE, OH, 2019
- WEIRTON, WV, 2019

ETEM REMEDIATION ONE, LLC

DRWN:	SCC	DATE:	11/01/23
CHKD:	JK	DATE:	11/06/23
APPD:	DRF	DATE:	
SCALE:	AS SHOWN		
ISSUE DATE:			



FIELD & TECHNICAL
SERVICES, LLC.
200 THIRD AVENUE
CARNEGIE, PA 15106

2023 ANNUAL CCR REPORT
SAMMIS POWER STATION
JEFFERSON COUNTY, OHIO




SITE LOCATION MAP

PROJECT NO: 22-495
DRAWING NUMBER
FIGURE 1

q:\projects\key projects\etem\eammla\cadd\2023 annual ccr report\figure 2 well location map.dwg Last Saved By: SComer 11/1/2023 3:54 PM Plotted By: Shelly Comer 1/5/2024 1:50 PM Scale: 1:1



LEGEND

-  DOWNGRADIENT MONITORING WELL
-  BACKGROUND MONITORING WELL
-  PIEZOMETER



0 300 600
FEET

ETEM REMEDIATION ONE, LLC

DRWN:	SCC	DATE:	11/01/23
CHKD:	JK	DATE:	11/06/23
APPD:	DRF	DATE:	
SCALE:	AS SHOWN		
ISSUE DATE:			



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CARNEGIE, PA 15106

2023 ANNUAL CCR REPORT
SAMMIS POWER STATION
JEFFERSON COUNTY, OHIO

REFERENCE: AERIAL OBTAINED FROM GOOGLE EARTH, DATED 4/26/2023

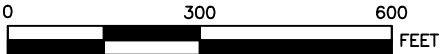
WELL LOCATION MAP

PROJECT NO: 22-495
DRAWING NUMBER
FIGURE 2




LEGEND

- TEMPORARY MONITORING WELL
- ASD EXPANSION MONITORING WELL
- MONITORING WELL
- PIEZOMETER
- ETEM REMEDIATION ONE PRODUCTION WELL
- VILLAGE OF STRATTON PRODUCTION WELL



ETEM REMEDIATION ONE, LLC

DRWN: SCC	DATE: 11/01/23		FIELD & TECHNICAL SERVICES, LLC. 200 THIRD AVENUE CARNEGIE, PA 15106
CHKD: JK	DATE: 11/06/23		
APPD: DRF	DATE:		
SCALE: AS SHOWN	ISSUE DATE:		

2023 ANNUAL CCR REPORT
SAMMIS POWER STATION
JEFFERSON COUNTY, OHIO

ASD MONITORING WELL EXPANSION MAP	PROJECT NO: 22-495 DRAWING NUMBER FIGURE 3
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REFERENCE: AERIAL OBTAINED FROM GOOGLE EARTH, DATED 4/26/2023

REV	#	DATE	DESCRIPTION	APPD

c:\projects\new_projects\etem\sammis\cadd\2023 annual ccr report\figure 3 asd mw expansion map.dwg Last Saved By: SComer 1/5/2024 3:06 PM Plotted By: Shelly Comer 1/15/2024 3:44 PM Scale: 1:1



LEGEND

- ASD EXPANSION MONITORING WELL
- MONITORING WELL
- PIEZOMETER
- ETEM REMEDIATION ONE PRODUCTION WELL
- VILLAGE OF STRATTON PRODUCTION WELL
- GROUNDWATER CONTOUR (FT, MSL)
DASHED WHERE INFERRED
- GROUNDWATER ELEVATION APRIL 17, 2023
- GROUNDWATER FLOW DIRECTION

* - WATER LEVEL OMITTED FROM POTENTIOMETRIC INTERPRETATION

REFERENCE: AERIAL OBTAINED FROM GOOGLE EARTH, DATED 4/26/2023
NEW CUMBERLAND LOCK AND DAM DATA [HTTPS://WATERDATA.USGS.GOV/](https://waterdata.usgs.gov/)

REV	#	DATE	DESCRIPTION	APPD



ETEM REMEDIATION ONE, LLC

DRWN:	SCC	DATE:	11/21/23
CHKD:	RMW	DATE:	11/27/23
APPD:	DRF	DATE:	
SCALE:	AS SHOWN		
ISSUE DATE:			



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200 THIRD AVENUE
CARNEGIE, PA 15106

2023 ANNUAL CCR REPORT
SAMMIS POWER STATION
JEFFERSON COUNTY, OHIO

ASD MONITORING WELL EXPANSION
GROUNDWATER ELEVATION CONTOUR MAP
APRIL 17, 2023

PROJECT NO: 22-495
DRAWING NUMBER
FIGURE 4A



q:\projects\new_projects\etem\sommis\cadd\2023 annual ccr report\figure 4b.asd.mw.gw.october.2023.dwg Last Saved By: SComer 1/5/2024 3:06 PM Plotted By: Shelly Comer 1/15/2024 3:45 PM Scale: 1:1

LEGEND

- ASD EXPANSION MONITORING WELL
- MONITORING WELL
- PIEZOMETER
- ETEM REMEDIATION ONE PRODUCTION WELL
- VILLAGE OF STRATTON PRODUCTION WELL
- GROUNDWATER CONTOUR (FT, MSL)
DASHED WHERE INFERRED
- GROUNDWATER ELEVATION OCTOBER 9, 2023
- GROUNDWATER FLOW DIRECTION
- * - WATER LEVEL OMITTED FROM POTENTIOMETRIC INTERPRETATION

REV	DATE	DESCRIPTION	APPD

REFERENCE: AERIAL OBTAINED FROM GOOGLE EARTH, DATED 4/26/2023
NEW CUMBERLAND LOCK AND DAM DATA [HTTPS://WATERDATA.USGS.GOV/](https://waterdata.usgs.gov/)



ETEM REMEDIATION ONE, LLC

DRWN:	SCC	DATE:	11/21/23
CHKD:	RMW	DATE:	11/27/23
APPD:	DRF	DATE:	
SCALE:	AS SHOWN		
ISSUE DATE:			



FIELD & TECHNICAL
SERVICES, LLC.
200 THIRD AVENUE
CARNEGIE, PA 15106

2023 ANNUAL CCR REPORT
SAMMIS POWER STATION
JEFFERSON COUNTY, OHIO

ASD MONITORING WELL EXPANSION
GROUNDWATER ELEVATION CONTOUR MAP
OCTOBER 9, 2023

PROJECT NO: 22-495
DRAWING NUMBER
FIGURE 4B

APPENDIX A

Laboratory Reports



25-May-2023

Cory Portwood
ERM, Inc.
800 Cranberry Woods Drive
Suite 290
Cranberry Township, PA 16066

Re: **Sammis CCR**

Work Order: **23041559**

Dear Cory,

Revision: **1**

ALS Environmental received 16 samples on 19-Apr-2023 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 201.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

Certificate No: PA: 68-03827

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Client: ERM, Inc.
Project: Sammis CCR
Work Order: 23041559

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
23041559-01	MW-1	Groundwater		4/17/2023 13:00	4/19/2023 09:30	<input type="checkbox"/>
23041559-02	MW-2	Groundwater		4/17/2023 14:25	4/19/2023 09:30	<input type="checkbox"/>
23041559-03	MW-3	Groundwater		4/17/2023 15:25	4/19/2023 09:30	<input type="checkbox"/>
23041559-04	MW-4	Groundwater		4/18/2023 09:45	4/19/2023 09:30	<input type="checkbox"/>
23041559-05	MW-5	Groundwater		4/18/2023 09:50	4/19/2023 09:30	<input type="checkbox"/>
23041559-06	MW-6	Groundwater		4/18/2023 10:45	4/19/2023 09:30	<input type="checkbox"/>
23041559-07	MW-9	Groundwater		4/18/2023 11:50	4/19/2023 09:30	<input type="checkbox"/>
23041559-08	P-1	Groundwater		4/17/2023 15:20	4/19/2023 09:30	<input type="checkbox"/>
23041559-09	P-2	Groundwater		4/18/2023 12:45	4/19/2023 09:30	<input type="checkbox"/>
23041559-10	MW-10D	Groundwater		4/17/2023 10:40	4/19/2023 09:30	<input type="checkbox"/>
23041559-11	MW-11S	Groundwater		4/18/2023 10:50	4/19/2023 09:30	<input type="checkbox"/>
23041559-12	MW-11D	Groundwater		4/17/2023 12:25	4/19/2023 09:30	<input type="checkbox"/>
23041559-13	MW-12S	Groundwater		4/18/2023 11:35	4/19/2023 09:30	<input type="checkbox"/>
23041559-14	MW-13BR	Groundwater		4/17/2023 14:15	4/19/2023 09:30	<input type="checkbox"/>
23041559-15	MW-13S	Groundwater		4/18/2023 12:30	4/19/2023 09:30	<input type="checkbox"/>
23041559-16	MW-14S	Groundwater		4/18/2023 13:25	4/19/2023 09:30	<input type="checkbox"/>

Client: ERM, Inc.
Project: Sammis CCR
WorkOrder: 23041559

**QUALIFIERS,
ACRONYMS, UNITS**

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
as noted	
mg/L	Milligrams per Liter
s.u.	Standard Units

Client: ERM, Inc.
Project: Sammis CCR
Work Order: 23041559

Case Narrative

Samples for the above noted Work Order were received on 4/19/2023. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:

No deviations or anomalies were noted.

Wet Chemistry:

No deviations or anomalies were noted.

Rev1 - revised to include Rad Chem results

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-1
Collection Date: 4/17/2023 01:00 PM

Work Order: 23041559
Lab ID: 23041559-01
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
Method: A4500-H B-11				Analyst: CLIEN			
pH (field)	7.40		0		s.u.	1	4/17/2023
MERCURY BY CVAA							
Method: SW7470A				Prep: SW7470 / 4/20/23		Analyst: KRA	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:10
METALS BY ICP-MS							
Method: SW6020B				Prep: SW3005A / 4/20/23		Analyst: DSC	
Antimony	U		0.00042	0.0050	mg/L	1	4/20/2023 12:07
Arsenic	0.00035	J	0.00019	0.0050	mg/L	1	4/20/2023 12:07
Barium	0.039		0.00057	0.0050	mg/L	1	4/20/2023 12:07
Beryllium	0.00016	J	0.00013	0.0020	mg/L	1	4/20/2023 12:07
Boron	0.59		0.15	0.20	mg/L	10	4/20/2023 13:15
Cadmium	U		0.00014	0.0020	mg/L	1	4/20/2023 12:07
Calcium	51		0.22	0.50	mg/L	1	4/20/2023 12:07
Chromium	U		0.00061	0.0050	mg/L	1	4/20/2023 12:07
Cobalt	U		0.00027	0.0050	mg/L	1	4/20/2023 12:07
Lead	U		0.00022	0.0050	mg/L	1	4/20/2023 12:07
Lithium	U		0.0017	0.010	mg/L	1	4/20/2023 12:07
Magnesium	10		0.037	0.20	mg/L	1	4/20/2023 12:07
Molybdenum	U		0.00033	0.0050	mg/L	1	4/20/2023 12:07
Potassium	2.9		0.034	0.20	mg/L	1	4/20/2023 12:07
Selenium	U		0.00048	0.0050	mg/L	1	4/20/2023 12:07
Sodium	31		0.13	0.20	mg/L	1	4/20/2023 12:07
Thallium	U		0.00015	0.0050	mg/L	1	4/20/2023 12:07
ALKALINITY							
Method: A2320 B-11				Analyst: JMJ			
Alkalinity, Total (as CaCO3)	80.8		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
Method: SW9056A				Analyst: QTN			
Chloride	58		3.1	10	mg/L	10	4/21/2023 15:05
Fluoride	0.19		0.067	0.10	mg/L	1	4/20/2023 19:40
Sulfate	76		1.9	10	mg/L	10	4/21/2023 15:05
TOTAL DISSOLVED SOLIDS							
Method: A2540 C-15				Prep: FILTER / 4/21/23		Analyst: LAD	
Total Dissolved Solids	260		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
Method: SUBCONTRACT				Analyst: GEL			
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-2
Collection Date: 4/17/2023 02:25 PM

Work Order: 23041559
Lab ID: 23041559-02
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	7.15		0		s.u.	1	4/17/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:12
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 4/20/23	
Antimony	U		0.00042	0.0050	mg/L	1	4/20/2023 12:09
Arsenic	0.00068	J	0.00019	0.0050	mg/L	1	4/20/2023 12:09
Barium	0.041		0.00057	0.0050	mg/L	1	4/20/2023 12:09
Beryllium	0.00015	J	0.00013	0.0020	mg/L	1	4/20/2023 12:09
Boron	0.48		0.015	0.020	mg/L	1	4/20/2023 12:09
Cadmium	U		0.00014	0.0020	mg/L	1	4/20/2023 12:09
Calcium	46		0.22	0.50	mg/L	1	4/20/2023 12:09
Chromium	0.0012	J	0.00061	0.0050	mg/L	1	4/20/2023 12:09
Cobalt	U		0.00027	0.0050	mg/L	1	4/20/2023 12:09
Lead	0.00084	J	0.00022	0.0050	mg/L	1	4/20/2023 12:09
Lithium	0.0019	J	0.0017	0.010	mg/L	1	4/20/2023 12:09
Magnesium	10		0.037	0.20	mg/L	1	4/20/2023 12:09
Molybdenum	0.00041	J	0.00033	0.0050	mg/L	1	4/20/2023 12:09
Potassium	2.8		0.034	0.20	mg/L	1	4/20/2023 12:09
Selenium	0.00064	J	0.00048	0.0050	mg/L	1	4/20/2023 12:09
Sodium	34		0.13	0.20	mg/L	1	4/20/2023 12:09
Thallium	U		0.00015	0.0050	mg/L	1	4/20/2023 12:09
ALKALINITY							
			Method: A2320 B-11			Analyst: JMJ	
Alkalinity, Total (as CaCO3)	64.9		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	59		3.1	10	mg/L	10	4/21/2023 15:14
Fluoride	U		0.067	0.10	mg/L	1	4/20/2023 19:49
Sulfate	75		1.9	10	mg/L	10	4/21/2023 15:14
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	280		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-3
Collection Date: 4/17/2023 03:25 PM

Work Order: 23041559
Lab ID: 23041559-03
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)				Method: A4500-H B-11			Analyst: CLIEN
pH (field)	7.65		0		s.u.	1	4/17/2023
MERCURY BY CVAA				Method: SW7470A		Prep: SW7470 / 4/20/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:13
METALS BY ICP-MS				Method: SW6020B		Prep: SW3005A / 4/20/23	Analyst: DSC
Antimony	U		0.00042	0.0050	mg/L	1	4/20/2023 12:11
Arsenic	0.00023	J	0.00019	0.0050	mg/L	1	4/20/2023 12:11
Barium	0.040		0.00057	0.0050	mg/L	1	4/20/2023 12:11
Beryllium	U		0.00013	0.0020	mg/L	1	4/20/2023 12:11
Boron	0.38		0.015	0.020	mg/L	1	4/20/2023 12:11
Cadmium	U		0.00014	0.0020	mg/L	1	4/20/2023 12:11
Calcium	48		0.22	0.50	mg/L	1	4/20/2023 12:11
Chromium	U		0.00061	0.0050	mg/L	1	4/20/2023 12:11
Cobalt	U		0.00027	0.0050	mg/L	1	4/20/2023 12:11
Lead	U		0.00022	0.0050	mg/L	1	4/20/2023 12:11
Lithium	0.0018	J	0.0017	0.010	mg/L	1	4/20/2023 12:11
Magnesium	11		0.037	0.20	mg/L	1	4/20/2023 12:11
Molybdenum	U		0.00033	0.0050	mg/L	1	4/20/2023 12:11
Potassium	2.8		0.034	0.20	mg/L	1	4/20/2023 12:11
Selenium	U		0.00048	0.0050	mg/L	1	4/20/2023 12:11
Sodium	31		0.13	0.20	mg/L	1	4/20/2023 12:11
Thallium	U		0.00015	0.0050	mg/L	1	4/20/2023 12:11
ALKALINITY				Method: A2320 B-11			Analyst: JMJ
Alkalinity, Total (as CaCO3)	74.4		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY				Method: SW9056A			Analyst: QTN
Chloride	53		3.1	10	mg/L	10	4/21/2023 15:24
Fluoride	U		0.067	0.10	mg/L	1	4/20/2023 19:59
Sulfate	75		1.9	10	mg/L	10	4/21/2023 15:24
TOTAL DISSOLVED SOLIDS				Method: A2540 C-15		Prep: FILTER / 4/21/23	Analyst: LAD
Total Dissolved Solids	260		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES				Method: SUBCONTRACT			Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-4
Collection Date: 4/18/2023 09:45 AM

Work Order: 23041559
Lab ID: 23041559-04
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	6.88		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:15
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 4/20/23	
Antimony	U		0.00042	0.0050	mg/L	1	4/20/2023 12:12
Arsenic	0.00042	J	0.00019	0.0050	mg/L	1	4/20/2023 12:12
Barium	0.036		0.00057	0.0050	mg/L	1	4/20/2023 12:12
Beryllium	U		0.00013	0.0020	mg/L	1	4/20/2023 12:12
Boron	0.30		0.015	0.020	mg/L	1	4/20/2023 12:12
Cadmium	U		0.00014	0.0020	mg/L	1	4/20/2023 12:12
Calcium	48		0.22	0.50	mg/L	1	4/20/2023 12:12
Chromium	0.00077	J	0.00061	0.0050	mg/L	1	4/20/2023 12:12
Cobalt	U		0.00027	0.0050	mg/L	1	4/20/2023 12:12
Lead	U		0.00022	0.0050	mg/L	1	4/20/2023 12:12
Lithium	0.0018	J	0.0017	0.010	mg/L	1	4/20/2023 12:12
Magnesium	10		0.037	0.20	mg/L	1	4/20/2023 12:12
Molybdenum	U		0.00033	0.0050	mg/L	1	4/20/2023 12:12
Potassium	2.6		0.034	0.20	mg/L	1	4/20/2023 12:12
Selenium	U		0.00048	0.0050	mg/L	1	4/20/2023 12:12
Sodium	31		0.13	0.20	mg/L	1	4/20/2023 12:12
Thallium	U		0.00015	0.0050	mg/L	1	4/20/2023 12:12
ALKALINITY							
			Method: A2320 B-11			Analyst: JMJ	
Alkalinity, Total (as CaCO3)	83.8		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	47		3.1	10	mg/L	10	4/21/2023 15:34
Fluoride	0.087	J	0.067	0.10	mg/L	1	4/20/2023 20:09
Sulfate	74		1.9	10	mg/L	10	4/21/2023 15:34
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	280		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-5
Collection Date: 4/18/2023 09:50 AM

Work Order: 23041559
Lab ID: 23041559-05
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
Method: A4500-H B-11				Analyst: CLIEN			
pH (field)	6.36		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
Method: SW7470A				Prep: SW7470 / 4/20/23		Analyst: KRA	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:17
METALS BY ICP-MS							
Method: SW6020B				Prep: SW3005A / 4/20/23		Analyst: DSC	
Antimony	U		0.00042	0.0050	mg/L	1	4/20/2023 12:14
Arsenic	0.00026	J	0.00019	0.0050	mg/L	1	4/20/2023 12:14
Barium	0.020		0.00057	0.0050	mg/L	1	4/20/2023 12:14
Beryllium	U		0.00013	0.0020	mg/L	1	4/20/2023 12:14
Boron	0.11		0.015	0.020	mg/L	1	4/20/2023 12:14
Cadmium	0.00046	J	0.00014	0.0020	mg/L	1	4/20/2023 12:14
Calcium	70		0.22	0.50	mg/L	1	4/20/2023 12:14
Chromium	U		0.00061	0.0050	mg/L	1	4/20/2023 12:14
Cobalt	0.0066		0.00027	0.0050	mg/L	1	4/20/2023 12:14
Lead	0.00033	J	0.00022	0.0050	mg/L	1	4/20/2023 12:14
Lithium	0.0018	J	0.0017	0.010	mg/L	1	4/20/2023 12:14
Magnesium	17		0.037	0.20	mg/L	1	4/20/2023 12:14
Molybdenum	U		0.00033	0.0050	mg/L	1	4/20/2023 12:14
Potassium	3.1		0.034	0.20	mg/L	1	4/20/2023 12:14
Selenium	U		0.00048	0.0050	mg/L	1	4/20/2023 12:14
Sodium	56		0.13	0.20	mg/L	1	4/20/2023 12:14
Thallium	U		0.00015	0.0050	mg/L	1	4/20/2023 12:14
ALKALINITY							
Method: A2320 B-11				Analyst: JMJ			
Alkalinity, Total (as CaCO3)	38.5		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
Method: SW9056A				Analyst: QTN			
Chloride	72		5.0	16	mg/L	16	4/21/2023 15:43
Fluoride	U		0.067	0.10	mg/L	1	4/20/2023 20:19
Sulfate	240		3.0	16	mg/L	16	4/21/2023 15:43
TOTAL DISSOLVED SOLIDS							
Method: A2540 C-15				Prep: FILTER / 4/21/23		Analyst: LAD	
Total Dissolved Solids	480		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
Method: SUBCONTRACT				Analyst: GEL			
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-6
Collection Date: 4/18/2023 10:45 AM

Work Order: 23041559
Lab ID: 23041559-06
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	5.47		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:19
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 14:50
Arsenic	0.00021	J	0.00019	0.0050	mg/L	1	5/3/2023 14:50
Barium	0.012		0.00057	0.0050	mg/L	1	5/3/2023 14:50
Beryllium	0.00026	J	0.00013	0.0020	mg/L	1	5/3/2023 14:50
Boron	0.13		0.015	0.020	mg/L	1	5/3/2023 14:50
Cadmium	0.00038	J	0.00014	0.0020	mg/L	1	5/3/2023 14:50
Calcium	76		0.22	0.50	mg/L	1	5/3/2023 14:50
Chromium	U		0.00061	0.0050	mg/L	1	5/3/2023 14:50
Cobalt	0.016		0.00027	0.0050	mg/L	1	5/3/2023 14:50
Lead	0.00029	J	0.00022	0.0050	mg/L	1	5/3/2023 14:50
Lithium	U		0.0017	0.010	mg/L	1	5/3/2023 14:50
Magnesium	19		0.037	0.20	mg/L	1	5/3/2023 14:50
Molybdenum	0.00094	J	0.00033	0.0050	mg/L	1	5/3/2023 14:50
Potassium	3.3		0.034	0.20	mg/L	1	5/3/2023 14:50
Selenium	0.0015	J	0.00048	0.0050	mg/L	1	5/3/2023 14:50
Sodium	66		0.13	0.20	mg/L	1	5/3/2023 14:50
Thallium	0.0021	J	0.00015	0.0050	mg/L	1	5/3/2023 14:50
ALKALINITY							
			Method: A2320 B-11			Analyst: JMJ	
Alkalinity, Total (as CaCO3)	U		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	90		12	40	mg/L	40	4/21/2023 16:52
Fluoride	U		0.067	0.10	mg/L	1	4/20/2023 20:28
Sulfate	320		7.6	40	mg/L	40	4/21/2023 16:52
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	590		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-9
Collection Date: 4/18/2023 11:50 AM

Work Order: 23041559
Lab ID: 23041559-07
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	7.67		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:49
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 16:51
Arsenic	U		0.00019	0.0050	mg/L	1	5/3/2023 16:51
Barium	0.025		0.00057	0.0050	mg/L	1	5/3/2023 16:51
Beryllium	0.00029	J	0.00013	0.0020	mg/L	1	5/3/2023 16:51
Boron	0.046		0.015	0.020	mg/L	1	5/3/2023 16:51
Cadmium	U		0.00014	0.0020	mg/L	1	5/3/2023 16:51
Calcium	39		0.22	0.50	mg/L	1	5/3/2023 16:51
Chromium	U		0.00061	0.0050	mg/L	1	5/3/2023 16:51
Cobalt	U		0.00027	0.0050	mg/L	1	5/3/2023 16:51
Lead	U		0.00022	0.0050	mg/L	1	5/3/2023 16:51
Lithium	0.0018	J	0.0017	0.010	mg/L	1	5/3/2023 16:51
Magnesium	7.9		0.037	0.20	mg/L	1	5/3/2023 16:51
Molybdenum	0.0015	J	0.00033	0.0050	mg/L	1	5/3/2023 16:51
Potassium	2.2		0.034	0.20	mg/L	1	5/3/2023 16:51
Selenium	0.0014	J	0.00048	0.0050	mg/L	1	5/3/2023 16:51
Sodium	21		0.13	0.20	mg/L	1	5/3/2023 16:51
Thallium	0.0022	J	0.00015	0.0050	mg/L	1	5/3/2023 16:51
ALKALINITY							
			Method: A2320 B-11			Analyst: JMJ	
Alkalinity, Total (as CaCO3)	76.4		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	32		3.1	10	mg/L	10	4/21/2023 17:21
Fluoride	0.12		0.067	0.10	mg/L	1	4/20/2023 20:38
Sulfate	52		1.9	10	mg/L	10	4/21/2023 17:21
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	180		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: P-1
Collection Date: 4/17/2023 03:20 PM

Work Order: 23041559
Lab ID: 23041559-08
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	4.71		0		s.u.	1	4/17/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:51
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 16:56
Arsenic	0.00076	J	0.00019	0.0050	mg/L	1	5/3/2023 16:56
Barium	0.013		0.00057	0.0050	mg/L	1	5/3/2023 16:56
Beryllium	0.00032	J	0.00013	0.0020	mg/L	1	5/3/2023 16:56
Boron	0.15		0.015	0.020	mg/L	1	5/3/2023 16:56
Cadmium	0.00066	J	0.00014	0.0020	mg/L	1	5/3/2023 16:56
Calcium	82		0.22	0.50	mg/L	1	5/3/2023 16:56
Chromium	U		0.00061	0.0050	mg/L	1	5/3/2023 16:56
Cobalt	0.025		0.00027	0.0050	mg/L	1	5/3/2023 16:56
Lead	0.00029	J	0.00022	0.0050	mg/L	1	5/3/2023 16:56
Lithium	0.0047	J	0.0017	0.010	mg/L	1	5/3/2023 16:56
Magnesium	20		0.037	0.20	mg/L	1	5/3/2023 16:56
Molybdenum	U		0.00033	0.0050	mg/L	1	5/3/2023 16:56
Potassium	3.5		0.034	0.20	mg/L	1	5/3/2023 16:56
Selenium	0.0012	J	0.00048	0.0050	mg/L	1	5/3/2023 16:56
Sodium	73		0.13	0.20	mg/L	1	5/3/2023 16:56
Thallium	0.00024	J	0.00015	0.0050	mg/L	1	5/3/2023 16:56
ALKALINITY							
			Method: A2320 B-11			Analyst: JMJ	
Alkalinity, Total (as CaCO3)	U		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	93		12	40	mg/L	40	4/21/2023 17:30
Fluoride	U		0.067	0.10	mg/L	1	4/20/2023 20:48
Sulfate	390		7.6	40	mg/L	40	4/21/2023 17:30
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	650		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: P-2
Collection Date: 4/18/2023 12:45 PM

Work Order: 23041559
Lab ID: 23041559-09
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
Method: A4500-H B-11				Analyst: CLIEN			
pH (field)	7.05		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
Method: SW7470A				Prep: SW7470 / 4/20/23		Analyst: KRA	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:53
METALS BY ICP-MS							
Method: SW6020B				Prep: SW3005A / 5/3/23		Analyst: STP	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 16:57
Arsenic	U		0.00019	0.0050	mg/L	1	5/3/2023 16:57
Barium	0.023		0.00057	0.0050	mg/L	1	5/3/2023 16:57
Beryllium	0.00014	J	0.00013	0.0020	mg/L	1	5/3/2023 16:57
Boron	0.069		0.015	0.020	mg/L	1	5/3/2023 16:57
Cadmium	U		0.00014	0.0020	mg/L	1	5/3/2023 16:57
Calcium	50		0.22	0.50	mg/L	1	5/3/2023 16:57
Chromium	U		0.00061	0.0050	mg/L	1	5/3/2023 16:57
Cobalt	0.0022	J	0.00027	0.0050	mg/L	1	5/3/2023 16:57
Lead	0.00027	J	0.00022	0.0050	mg/L	1	5/3/2023 16:57
Lithium	U		0.0017	0.010	mg/L	1	5/3/2023 16:57
Magnesium	11		0.037	0.20	mg/L	1	5/3/2023 16:57
Molybdenum	U		0.00033	0.0050	mg/L	1	5/3/2023 16:57
Potassium	2.6		0.034	0.20	mg/L	1	5/3/2023 16:57
Selenium	0.00057	J	0.00048	0.0050	mg/L	1	5/3/2023 16:57
Sodium	37		0.13	0.20	mg/L	1	5/3/2023 16:57
Thallium	U		0.00015	0.0050	mg/L	1	5/3/2023 16:57
ALKALINITY							
Method: A2320 B-11				Analyst: JMJ			
Alkalinity, Total (as CaCO3)	58.5		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
Method: SW9056A				Analyst: QTN			
Chloride	53		3.1	10	mg/L	10	4/24/2023 13:26
Fluoride	0.17		0.067	0.10	mg/L	1	4/21/2023 20:18
Sulfate	130		1.9	10	mg/L	10	4/24/2023 13:26
TOTAL DISSOLVED SOLIDS							
Method: A2540 C-15				Prep: FILTER / 4/24/23		Analyst: LAD	
Total Dissolved Solids	290		37	50	mg/L	1	4/26/2023 13:11
SUBCONTRACTED ANALYSES							
Method: SUBCONTRACT				Analyst: GEL			
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-10D
Collection Date: 4/17/2023 10:40 AM

Work Order: 23041559
Lab ID: 23041559-10
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	7.72		0		s.u.	1	4/17/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:54
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 16:59
Arsenic	0.0031	J	0.00019	0.0050	mg/L	1	5/3/2023 16:59
Barium	3.6		0.0057	0.050	mg/L	10	5/4/2023 12:41
Beryllium	0.00017	J	0.00013	0.0020	mg/L	1	5/3/2023 16:59
Boron	0.18		0.015	0.020	mg/L	1	5/3/2023 16:59
Cadmium	U		0.00014	0.0020	mg/L	1	5/3/2023 16:59
Calcium	170		2.2	5.0	mg/L	10	5/4/2023 12:41
Chromium	0.0015	J	0.00061	0.0050	mg/L	1	5/3/2023 16:59
Cobalt	0.00054	J	0.00027	0.0050	mg/L	1	5/3/2023 16:59
Lead	0.00030	J	0.00022	0.0050	mg/L	1	5/3/2023 16:59
Lithium	0.023		0.0017	0.010	mg/L	1	5/3/2023 16:59
Magnesium	51		0.037	0.20	mg/L	1	5/3/2023 16:59
Molybdenum	0.0019	J	0.00033	0.0050	mg/L	1	5/3/2023 16:59
Potassium	7.9		0.034	0.20	mg/L	1	5/3/2023 16:59
Selenium	0.00069	J	0.00048	0.0050	mg/L	1	5/3/2023 16:59
Sodium	750		1.3	2.0	mg/L	10	5/4/2023 12:41
Thallium	U		0.00015	0.0050	mg/L	1	5/3/2023 16:59
ALKALINITY							
			Method: A2320 B-11			Analyst: JMJ	
Alkalinity, Total (as CaCO3)	167		8.4	10	mg/L	1	4/20/2023 16:40
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	2,000		50	160	mg/L	160	4/24/2023 13:46
Fluoride	U		0.067	0.10	mg/L	1	4/21/2023 20:28
Sulfate	19		0.19	1.0	mg/L	1	4/21/2023 20:28
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	3,100		220	300	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-11S
Collection Date: 4/18/2023 10:50 AM

Work Order: 23041559
Lab ID: 23041559-11
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	4.91		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:56
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 17:01
Arsenic	0.0017	J	0.00019	0.0050	mg/L	1	5/3/2023 17:01
Barium	0.017		0.00057	0.0050	mg/L	1	5/3/2023 17:01
Beryllium	0.00045	J	0.00013	0.0020	mg/L	1	5/3/2023 17:01
Boron	0.16		0.015	0.020	mg/L	1	5/3/2023 17:01
Cadmium	0.0013	J	0.00014	0.0020	mg/L	1	5/3/2023 17:01
Calcium	82		0.22	0.50	mg/L	1	5/3/2023 17:01
Chromium	0.00090	J	0.00061	0.0050	mg/L	1	5/3/2023 17:01
Cobalt	0.045		0.00027	0.0050	mg/L	1	5/3/2023 17:01
Lead	0.0011	J	0.00022	0.0050	mg/L	1	5/3/2023 17:01
Lithium	0.013		0.0017	0.010	mg/L	1	5/3/2023 17:01
Magnesium	20		0.037	0.20	mg/L	1	5/3/2023 17:01
Molybdenum	U		0.00033	0.0050	mg/L	1	5/3/2023 17:01
Potassium	3.5		0.034	0.20	mg/L	1	5/3/2023 17:01
Selenium	0.00092	J	0.00048	0.0050	mg/L	1	5/3/2023 17:01
Sodium	69		0.13	0.20	mg/L	1	5/3/2023 17:01
Thallium	U		0.00015	0.0050	mg/L	1	5/3/2023 17:01
ALKALINITY							
			Method: A2320 B-11			Analyst: JB	
Alkalinity, Total (as CaCO3)	U		8.4	10	mg/L	1	5/1/2023 17:42
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	100		12	40	mg/L	40	4/24/2023 13:56
Fluoride	0.19		0.067	0.10	mg/L	1	4/21/2023 20:38
Sulfate	420		7.6	40	mg/L	40	4/24/2023 13:56
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	690		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

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ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-11D
Collection Date: 4/17/2023 12:25 PM

Work Order: 23041559
Lab ID: 23041559-12
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11				Analyst: CLIEN
pH (field)	7.10		0		s.u.	1	4/17/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 15:58
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 17:02
Arsenic	0.014		0.00019	0.0050	mg/L	1	5/3/2023 17:02
Barium	0.099		0.00057	0.0050	mg/L	1	5/3/2023 17:02
Beryllium	0.00037	J	0.00013	0.0020	mg/L	1	5/3/2023 17:02
Boron	0.16		0.015	0.020	mg/L	1	5/3/2023 17:02
Cadmium	0.00022	J	0.00014	0.0020	mg/L	1	5/3/2023 17:02
Calcium	180		2.2	5.0	mg/L	10	5/4/2023 12:43
Chromium	0.011		0.00061	0.0050	mg/L	1	5/3/2023 17:02
Cobalt	0.023		0.00027	0.0050	mg/L	1	5/3/2023 17:02
Lead	0.0074		0.00022	0.0050	mg/L	1	5/3/2023 17:02
Lithium	0.019		0.0017	0.010	mg/L	1	5/3/2023 17:02
Magnesium	28		0.037	0.20	mg/L	1	5/3/2023 17:02
Molybdenum	0.00079	J	0.00033	0.0050	mg/L	1	5/3/2023 17:02
Potassium	4.4		0.034	0.20	mg/L	1	5/3/2023 17:02
Selenium	0.00084	J	0.00048	0.0050	mg/L	1	5/3/2023 17:02
Sodium	73		0.13	0.20	mg/L	1	5/3/2023 17:02
Thallium	0.00038	J	0.00015	0.0050	mg/L	1	5/3/2023 17:02
ALKALINITY							
			Method: A2320 B-11				Analyst: QTN
Alkalinity, Total (as CaCO3)	206		8.4	10	mg/L	1	4/30/2023 19:24
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	110		12	40	mg/L	40	4/24/2023 14:05
Fluoride	U		0.067	0.10	mg/L	1	4/21/2023 20:47
Sulfate	400		7.6	40	mg/L	40	4/24/2023 14:05
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	Analyst: LAD
Total Dissolved Solids	840		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-12S
Collection Date: 4/18/2023 11:35 AM

Work Order: 23041559
Lab ID: 23041559-13
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	5.65		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 16:00
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 17:04
Arsenic	0.0016	J	0.00019	0.0050	mg/L	1	5/3/2023 17:04
Barium	0.020		0.00057	0.0050	mg/L	1	5/3/2023 17:04
Beryllium	0.00027	J	0.00013	0.0020	mg/L	1	5/3/2023 17:04
Boron	0.16		0.015	0.020	mg/L	1	5/3/2023 17:04
Cadmium	0.026		0.00014	0.0020	mg/L	1	5/3/2023 17:04
Calcium	84		0.22	0.50	mg/L	1	5/3/2023 17:04
Chromium	0.0014	J	0.00061	0.0050	mg/L	1	5/3/2023 17:04
Cobalt	0.028		0.00027	0.0050	mg/L	1	5/3/2023 17:04
Lead	0.0019	J	0.00022	0.0050	mg/L	1	5/3/2023 17:04
Lithium	0.014		0.0017	0.010	mg/L	1	5/3/2023 17:04
Magnesium	18		0.037	0.20	mg/L	1	5/3/2023 17:04
Molybdenum	U		0.00033	0.0050	mg/L	1	5/3/2023 17:04
Potassium	3.3		0.034	0.20	mg/L	1	5/3/2023 17:04
Selenium	U		0.00048	0.0050	mg/L	1	5/3/2023 17:04
Sodium	60		0.13	0.20	mg/L	1	5/3/2023 17:04
Thallium	U		0.00015	0.0050	mg/L	1	5/3/2023 17:04
ALKALINITY							
			Method: A2320 B-11			Analyst: JB	
Alkalinity, Total (as CaCO3)	31.4		8.4	10	mg/L	1	5/1/2023 17:42
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	110		12	40	mg/L	40	4/24/2023 14:34
Fluoride	0.13		0.067	0.10	mg/L	1	4/21/2023 20:57
Sulfate	400		7.6	40	mg/L	40	4/24/2023 14:34
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/21/23	
Total Dissolved Solids	690		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-13BR
Collection Date: 4/17/2023 02:15 PM

Work Order: 23041559
Lab ID: 23041559-14
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
Method: A4500-H B-11				Analyst: CLIEN			
pH (field)	7.86		0		s.u.	1	4/17/2023
MERCURY BY CVAA							
Method: SW7470A				Prep: SW7470 / 4/20/23		Analyst: KRA	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 16:02
METALS BY ICP-MS							
Method: SW6020B				Prep: SW3005A / 5/3/23		Analyst: STP	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 17:06
Arsenic	0.0028	J	0.00019	0.0050	mg/L	1	5/3/2023 17:06
Barium	0.090		0.00057	0.0050	mg/L	1	5/3/2023 17:06
Beryllium	0.00013	J	0.00013	0.0020	mg/L	1	5/3/2023 17:06
Boron	0.22		0.015	0.020	mg/L	1	5/3/2023 17:06
Cadmium	U		0.00014	0.0020	mg/L	1	5/3/2023 17:06
Calcium	4.2		0.22	0.50	mg/L	1	5/3/2023 17:06
Chromium	0.0020	J	0.00061	0.0050	mg/L	1	5/3/2023 17:06
Cobalt	0.00070	J	0.00027	0.0050	mg/L	1	5/3/2023 17:06
Lead	0.0012	J	0.00022	0.0050	mg/L	1	5/3/2023 17:06
Lithium	0.0048	J	0.0017	0.010	mg/L	1	5/3/2023 17:06
Magnesium	1.0		0.037	0.20	mg/L	1	5/3/2023 17:06
Molybdenum	0.0013	J	0.00033	0.0050	mg/L	1	5/3/2023 17:06
Potassium	1.6		0.034	0.20	mg/L	1	5/3/2023 17:06
Selenium	U		0.00048	0.0050	mg/L	1	5/3/2023 17:06
Sodium	160		0.13	0.20	mg/L	1	5/3/2023 17:06
Thallium	0.00017	J	0.00015	0.0050	mg/L	1	5/3/2023 17:06
ALKALINITY							
Method: A2320 B-11				Analyst: QTN			
Alkalinity, Total (as CaCO3)	290		8.4	10	mg/L	1	4/30/2023 19:24
ANIONS BY ION CHROMATOGRAPHY							
Method: SW9056A				Analyst: QTN			
Chloride	51		3.1	10	mg/L	10	4/25/2023 19:23
Fluoride	1.8		0.067	0.10	mg/L	1	4/24/2023 17:13
Sulfate	5.1		0.19	1.0	mg/L	1	4/24/2023 17:13
TOTAL DISSOLVED SOLIDS							
Method: A2540 C-15				Prep: FILTER / 4/21/23		Analyst: LAD	
Total Dissolved Solids	420		37	50	mg/L	1	4/24/2023 14:28
SUBCONTRACTED ANALYSES							
Method: SUBCONTRACT				Analyst: GEL			
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-13S
Collection Date: 4/18/2023 12:30 PM

Work Order: 23041559
Lab ID: 23041559-15
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)							
			Method: A4500-H B-11			Analyst: CLIEN	
pH (field)	6.88		0		s.u.	1	4/18/2023
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 4/20/23	
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 16:03
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3005A / 5/3/23	
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 17:07
Arsenic	0.058		0.00019	0.0050	mg/L	1	5/3/2023 17:07
Barium	0.17		0.00057	0.0050	mg/L	1	5/3/2023 17:07
Beryllium	0.00023	J	0.00013	0.0020	mg/L	1	5/3/2023 17:07
Boron	0.11		0.015	0.020	mg/L	1	5/3/2023 17:07
Cadmium	0.0030		0.00014	0.0020	mg/L	1	5/3/2023 17:07
Calcium	130		0.22	0.50	mg/L	1	5/3/2023 17:07
Chromium	0.0032	J	0.00061	0.0050	mg/L	1	5/3/2023 17:07
Cobalt	0.0050	J	0.00027	0.0050	mg/L	1	5/3/2023 17:07
Lead	0.0030	J	0.00022	0.0050	mg/L	1	5/3/2023 17:07
Lithium	0.0092	J	0.0017	0.010	mg/L	1	5/3/2023 17:07
Magnesium	25		0.037	0.20	mg/L	1	5/3/2023 17:07
Molybdenum	0.0032	J	0.00033	0.0050	mg/L	1	5/3/2023 17:07
Potassium	2.4		0.034	0.20	mg/L	1	5/3/2023 17:07
Selenium	0.00074	J	0.00048	0.0050	mg/L	1	5/3/2023 17:07
Sodium	51		0.13	0.20	mg/L	1	5/3/2023 17:07
Thallium	U		0.00015	0.0050	mg/L	1	5/3/2023 17:07
ALKALINITY							
			Method: A2320 B-11			Analyst: JB	
Alkalinity, Total (as CaCO3)	158		8.4	10	mg/L	1	5/1/2023 17:42
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A			Analyst: QTN	
Chloride	78		12	40	mg/L	40	4/25/2023 19:32
Fluoride	U		0.067	0.10	mg/L	1	4/24/2023 17:23
Sulfate	260		7.6	40	mg/L	40	4/25/2023 19:32
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 4/25/23	
Total Dissolved Solids	640		37	50	mg/L	1	4/27/2023 13:44
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT			Analyst: GEL	
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Project: Sammis CCR
Sample ID: MW-14S
Collection Date: 4/18/2023 01:25 PM

Work Order: 23041559
Lab ID: 23041559-16
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PH (FIELD)			Method: A4500-H B-11				Analyst: CLIEN
pH (field)	7.11		0		s.u.	1	4/18/2023
MERCURY BY CVAA			Method: SW7470A			Prep: SW7470 / 4/20/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	4/20/2023 16:05
METALS BY ICP-MS			Method: SW6020B			Prep: SW3005A / 5/3/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	5/3/2023 17:09
Arsenic	0.00062	J	0.00019	0.0050	mg/L	1	5/3/2023 17:09
Barium	0.033		0.00057	0.0050	mg/L	1	5/3/2023 17:09
Beryllium	U		0.00013	0.0020	mg/L	1	5/3/2023 17:09
Boron	0.057		0.015	0.020	mg/L	1	5/3/2023 17:09
Cadmium	U		0.00014	0.0020	mg/L	1	5/3/2023 17:09
Calcium	56		0.22	0.50	mg/L	1	5/3/2023 17:09
Chromium	U		0.00061	0.0050	mg/L	1	5/3/2023 17:09
Cobalt	0.00071	J	0.00027	0.0050	mg/L	1	5/3/2023 17:09
Lead	U		0.00022	0.0050	mg/L	1	5/3/2023 17:09
Lithium	0.0024	J	0.0017	0.010	mg/L	1	5/3/2023 17:09
Magnesium	10		0.037	0.20	mg/L	1	5/3/2023 17:09
Molybdenum	U		0.00033	0.0050	mg/L	1	5/3/2023 17:09
Potassium	2.4		0.034	0.20	mg/L	1	5/3/2023 17:09
Selenium	U		0.00048	0.0050	mg/L	1	5/3/2023 17:09
Sodium	31		0.13	0.20	mg/L	1	5/3/2023 17:09
Thallium	U		0.00015	0.0050	mg/L	1	5/3/2023 17:09
ALKALINITY			Method: A2320 B-11				Analyst: JB
Alkalinity, Total (as CaCO3)	110		8.4	10	mg/L	1	5/1/2023 17:42
ANIONS BY ION CHROMATOGRAPHY			Method: SW9056A				Analyst: QTN
Chloride	39		3.1	10	mg/L	10	4/25/2023 19:42
Fluoride	0.20		0.067	0.10	mg/L	1	4/24/2023 17:33
Sulfate	76		1.9	10	mg/L	10	4/25/2023 19:42
TOTAL DISSOLVED SOLIDS			Method: A2540 C-15			Prep: FILTER / 4/25/23	Analyst: LAD
Total Dissolved Solids	300		37	50	mg/L	1	4/27/2023 13:44
SUBCONTRACTED ANALYSES			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	5/25/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group, USA

Date: 25-May-23

Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: **214774** Instrument ID **HG4** Method: **SW7470A**

MBLK		Sample ID: MBLK-214774-214774				Units: mg/L		Analysis Date: 4/20/2023 02:47 PM			
Client ID:		Run ID: HG4_230420B				SeqNo: 9461902		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.00016	0.00020								

LCS		Sample ID: LCS-214774-214774				Units: mg/L		Analysis Date: 4/20/2023 02:48 PM			
Client ID:		Run ID: HG4_230420B				SeqNo: 9461903		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.001905	0.00016	0.00020	0.002	0	95.2	80-120	0			

MS		Sample ID: 23041655-01EMS				Units: mg/L		Analysis Date: 4/20/2023 03:37 PM			
Client ID:		Run ID: HG4_230420B				SeqNo: 9461930		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00219	0.00016	0.00020	0.002	-0.000021	111	75-125	0			

MSD		Sample ID: 23041655-01EMSD				Units: mg/L		Analysis Date: 4/20/2023 03:38 PM			
Client ID:		Run ID: HG4_230420B				SeqNo: 9461931		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00216	0.00016	0.00020	0.002	-0.000021	109	75-125	0.00219	1.38	20	

The following samples were analyzed in this batch:

23041559-01C	23041559-02C	23041559-03C
23041559-04C	23041559-05C	23041559-06C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

QC Page: 1 of 25

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: 214776 Instrument ID HG4 Method: SW7470A

MBLK		Sample ID: MBLK-214776-214776				Units: mg/L		Analysis Date: 4/20/2023 03:40 PM			
Client ID:		Run ID: HG4_230420B				SeqNo: 9461932		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.00016	0.00020								

LCS		Sample ID: LCS-214776-214776				Units: mg/L		Analysis Date: 4/20/2023 03:42 PM			
Client ID:		Run ID: HG4_230420B				SeqNo: 9461933		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.001995	0.00016	0.00020	0.002	0	99.8	80-120	0			

MS		Sample ID: 23041559-16CMS				Units: mg/L		Analysis Date: 4/20/2023 04:12 PM			
Client ID: MW-14S		Run ID: HG4_230420B				SeqNo: 9461950		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00216	0.00016	0.00020	0.002	-0.0000225	109	75-125	0			

MSD		Sample ID: 23041559-16CMSD				Units: mg/L		Analysis Date: 4/20/2023 04:14 PM			
Client ID: MW-14S		Run ID: HG4_230420B				SeqNo: 9461951		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002175	0.00016	0.00020	0.002	-0.0000225	110	75-125	0.00216	0.692	20	

The following samples were analyzed in this batch:

23041559-07C	23041559-08C	23041559-09C
23041559-10C	23041559-11C	23041559-12C
23041559-13C	23041559-14C	23041559-15C
23041559-16C		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

QC Page: 2 of 25

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **214728** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK		Sample ID: MBLK-214728-214728				Units: mg/L		Analysis Date: 4/20/2023 11:49 AM			
Client ID:		Run ID: ICPMS3_230420A				SeqNo: 9460111		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	U	0.00022	0.0050								
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	U	0.034	0.20								
Selenium	U	0.00048	0.0050								
Sodium	U	0.13	0.20								
Thallium	U	0.00015	0.0050								

LCS		Sample ID: LCS-214728-214728				Units: mg/L		Analysis Date: 4/20/2023 11:51 AM			
Client ID:		Run ID: ICPMS3_230420A				SeqNo: 9460112		Prep Date: 4/20/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1032	0.00042	0.0050	0.1	0	103	80-120	0			
Arsenic	0.1028	0.00019	0.0050	0.1	0	103	80-120	0			
Barium	0.09866	0.00057	0.0050	0.1	0	98.7	80-120	0			
Beryllium	0.1008	0.00013	0.0020	0.1	0	101	80-120	0			
Boron	0.4746	0.015	0.020	0.5	0	94.9	80-120	0			
Cadmium	0.1006	0.00014	0.0020	0.1	0	101	80-120	0			
Calcium	10.14	0.22	0.50	10	0	101	80-120	0			
Chromium	0.1026	0.00061	0.0050	0.1	0	103	80-120	0			
Cobalt	0.106	0.00027	0.0050	0.1	0	106	80-120	0			
Lead	0.1009	0.00022	0.0050	0.1	0	101	80-120	0			
Lithium	0.1017	0.0017	0.010	0.1	0	102	80-120	0			
Magnesium	10.5	0.037	0.20	10	0	105	80-120	0			
Molybdenum	0.09337	0.00033	0.0050	0.1	0	93.4	80-120	0			
Potassium	10.17	0.034	0.20	10	0	102	80-120	0			
Selenium	0.1032	0.00048	0.0050	0.1	0	103	80-120	0			
Sodium	10.26	0.13	0.20	10	0	103	80-120	0			
Thallium	0.09551	0.00015	0.0050	0.1	0	95.5	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: 214728 Instrument ID ICPMS3 Method: SW6020B

MS Sample ID: 23041343-13BMS					Units: mg/L		Analysis Date: 4/20/2023 11:58 AM				
Client ID:		Run ID: ICPMS3_230420A			SeqNo: 9460116		Prep Date: 4/20/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1035	0.00042	0.0050	0.1	0.000689	103	75-125	0			
Arsenic	0.1128	0.00019	0.0050	0.1	0.01026	103	75-125	0			
Barium	0.2653	0.00057	0.0050	0.1	0.1584	107	75-125	0			
Beryllium	0.1038	0.00013	0.0020	0.1	0.00012	104	75-125	0			
Boron	0.5671	0.015	0.020	0.5	0.07485	98.5	75-125	0			
Cadmium	0.099	0.00014	0.0020	0.1	0.000087	98.9	75-125	0			
Calcium	65.33	0.22	0.50	10	55.76	95.7	75-125	0			O
Chromium	0.1032	0.00061	0.0050	0.1	0.001056	102	75-125	0			
Cobalt	0.1116	0.00027	0.0050	0.1	0.008713	103	75-125	0			
Lead	0.1298	0.00022	0.0050	0.1	0.02851	101	75-125	0			
Lithium	0.1084	0.0017	0.010	0.1	0.004501	104	75-125	0			
Magnesium	18.37	0.037	0.20	10	8.027	103	75-125	0			
Molybdenum	0.09799	0.00033	0.0050	0.1	0.002745	95.2	75-125	0			
Potassium	14.59	0.034	0.20	10	4.272	103	75-125	0			
Selenium	0.1032	0.00048	0.0050	0.1	0.000327	103	75-125	0			
Sodium	28.27	0.13	0.20	10	18.26	100	75-125	0			
Thallium	0.09401	0.00015	0.0050	0.1	0.000051	94	75-125	0			

MSD Sample ID: 23041343-13BMSD					Units: mg/L		Analysis Date: 4/20/2023 11:59 AM				
Client ID:		Run ID: ICPMS3_230420A			SeqNo: 9460117		Prep Date: 4/20/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1041	0.00042	0.0050	0.1	0.000689	103	75-125	0.1035	0.516	20	
Arsenic	0.1132	0.00019	0.0050	0.1	0.01026	103	75-125	0.1128	0.394	20	
Barium	0.2668	0.00057	0.0050	0.1	0.1584	108	75-125	0.2653	0.577	20	
Beryllium	0.1031	0.00013	0.0020	0.1	0.00012	103	75-125	0.1038	0.741	20	
Boron	0.5733	0.015	0.020	0.5	0.07485	99.7	75-125	0.5671	1.08	20	
Cadmium	0.1005	0.00014	0.0020	0.1	0.000087	100	75-125	0.099	1.52	20	
Calcium	65.84	0.22	0.50	10	55.76	101	75-125	65.33	0.773	20	O
Chromium	0.1021	0.00061	0.0050	0.1	0.001056	101	75-125	0.1032	1.04	20	
Cobalt	0.1117	0.00027	0.0050	0.1	0.008713	103	75-125	0.1116	0.0931	20	
Lead	0.13	0.00022	0.0050	0.1	0.02851	101	75-125	0.1298	0.181	20	
Lithium	0.1083	0.0017	0.010	0.1	0.004501	104	75-125	0.1084	0.146	20	
Magnesium	18.34	0.037	0.20	10	8.027	103	75-125	18.37	0.128	20	
Molybdenum	0.09934	0.00033	0.0050	0.1	0.002745	96.6	75-125	0.09799	1.37	20	
Potassium	14.53	0.034	0.20	10	4.272	103	75-125	14.59	0.394	20	
Selenium	0.1013	0.00048	0.0050	0.1	0.000327	101	75-125	0.1032	1.88	20	
Sodium	28.14	0.13	0.20	10	18.26	98.8	75-125	28.27	0.44	20	
Thallium	0.09557	0.00015	0.0050	0.1	0.000051	95.5	75-125	0.09401	1.65	20	

The following samples were analyzed in this batch:

23041559-01C	23041559-02C	23041559-03C
23041559-04C	23041559-05C	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

QC Page: 4 of 25

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **215465** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK		Sample ID: MBLK-215465-215465				Units: mg/L		Analysis Date: 5/3/2023 02:47 PM			
Client ID:		Run ID: ICPMS3_230503A				SeqNo: 9504443		Prep Date: 5/3/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	0.000427	0.00022	0.0050								J
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	0.0647	0.034	0.20								J
Selenium	U	0.00048	0.0050								
Sodium	U	0.13	0.20								
Thallium	U	0.00015	0.0050								

LCS		Sample ID: LCS-215465-215465				Units: mg/L		Analysis Date: 5/3/2023 02:48 PM			
Client ID:		Run ID: ICPMS3_230503A				SeqNo: 9504444		Prep Date: 5/3/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1015	0.00042	0.0050	0.1	0	101	80-120	0			
Arsenic	0.102	0.00019	0.0050	0.1	0	102	80-120	0			
Barium	0.1	0.00057	0.0050	0.1	0	100	80-120	0			
Beryllium	0.1	0.00013	0.0020	0.1	0	100	80-120	0			
Boron	0.4795	0.015	0.020	0.5	0	95.9	80-120	0			
Cadmium	0.09928	0.00014	0.0020	0.1	0	99.3	80-120	0			
Calcium	10.15	0.22	0.50	10	0	102	80-120	0			
Chromium	0.1027	0.00061	0.0050	0.1	0	103	80-120	0			
Cobalt	0.1048	0.00027	0.0050	0.1	0	105	80-120	0			
Lead	0.1013	0.00022	0.0050	0.1	0	101	80-120	0			
Lithium	0.09949	0.0017	0.010	0.1	0	99.5	80-120	0			
Magnesium	10.3	0.037	0.20	10	0	103	80-120	0			
Molybdenum	0.09513	0.00033	0.0050	0.1	0	95.1	80-120	0			
Potassium	10.43	0.034	0.20	10	0	104	80-120	0			
Selenium	0.09968	0.00048	0.0050	0.1	0	99.7	80-120	0			
Sodium	10.21	0.13	0.20	10	0	102	80-120	0			
Thallium	0.09231	0.00015	0.0050	0.1	0	92.3	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: 215465 Instrument ID ICPMS3 Method: SW6020B

MS Sample ID: 23042337-01AMS					Units: mg/L		Analysis Date: 5/3/2023 04:38 PM				
Client ID:		Run ID: ICPMS3_230503A			SeqNo: 9505199		Prep Date: 5/3/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	1.015	0.0042	0.050	1	0.0017	101	75-125	0			
Arsenic	1.036	0.0019	0.050	1	0.00162	103	75-125	0			
Barium	1.069	0.0057	0.050	1	0.05793	101	75-125	0			
Beryllium	0.9952	0.0013	0.020	1	0.00097	99.4	75-125	0			
Boron	6.594	0.15	0.20	5	1.632	99.2	75-125	0			
Cadmium	0.989	0.0014	0.020	1	0.00112	98.8	75-125	0			
Calcium	105.3	2.2	5.0	100	3.751	102	75-125	0			
Chromium	1.066	0.0061	0.050	1	0.00864	106	75-125	0			
Cobalt	1.053	0.0027	0.050	1	0.00315	105	75-125	0			
Lead	1.062	0.0022	0.050	1	0.03336	103	75-125	0			
Lithium	0.9826	0.017	0.10	1	-0.00104	98.4	75-125	0			
Magnesium	102	0.37	2.0	100	0.5912	101	75-125	0			
Molybdenum	1.159	0.0033	0.050	1	0.1815	97.8	75-125	0			
Potassium	114.4	0.34	2.0	100	13.6	101	75-125	0			
Selenium	1.015	0.0048	0.050	1	0.00293	101	75-125	0			
Sodium	1962	1.3	2.0	100	1904	58.3	75-125	0			SEO
Thallium	0.9231	0.0015	0.050	1	0.00036	92.3	75-125	0			

MSD Sample ID: 23042337-01AMSD					Units: mg/L		Analysis Date: 5/3/2023 04:40 PM				
Client ID:		Run ID: ICPMS3_230503A			SeqNo: 9505200		Prep Date: 5/3/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	1.012	0.0042	0.050	1	0.0017	101	75-125	1.015	0.354	20	
Arsenic	1.041	0.0019	0.050	1	0.00162	104	75-125	1.036	0.532	20	
Barium	1.071	0.0057	0.050	1	0.05793	101	75-125	1.069	0.236	20	
Beryllium	1.003	0.0013	0.020	1	0.00097	100	75-125	0.9952	0.742	20	
Boron	6.744	0.15	0.20	5	1.632	102	75-125	6.594	2.26	20	
Cadmium	0.9875	0.0014	0.020	1	0.00112	98.6	75-125	0.989	0.148	20	
Calcium	105.4	2.2	5.0	100	3.751	102	75-125	105.3	0.0579	20	
Chromium	1.039	0.0061	0.050	1	0.00864	103	75-125	1.066	2.54	20	
Cobalt	1.044	0.0027	0.050	1	0.00315	104	75-125	1.053	0.881	20	
Lead	1.055	0.0022	0.050	1	0.03336	102	75-125	1.062	0.66	20	
Lithium	0.9855	0.017	0.10	1	-0.00104	98.7	75-125	0.9826	0.302	20	
Magnesium	101.3	0.37	2.0	100	0.5912	101	75-125	102	0.713	20	
Molybdenum	1.174	0.0033	0.050	1	0.1815	99.3	75-125	1.159	1.26	20	
Potassium	114.7	0.34	2.0	100	13.6	101	75-125	114.4	0.224	20	
Selenium	1.011	0.0048	0.050	1	0.00293	101	75-125	1.015	0.421	20	
Sodium	2003	1.3	2.0	100	1904	99	75-125	1962	2.05	20	EO
Thallium	0.9451	0.0015	0.050	1	0.00036	94.5	75-125	0.9231	2.36	20	

The following samples were analyzed in this batch:

23041559-06C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

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Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **215468** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK		Sample ID: MBLK-215468-215468				Units: mg/L		Analysis Date: 5/3/2023 04:48 PM			
Client ID:		Run ID: ICPMS3_230503A				SeqNo: 9505204		Prep Date: 5/3/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	U	0.00022	0.0050								
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	U	0.034	0.20								
Selenium	U	0.00048	0.0050								
Sodium	U	0.13	0.20								
Thallium	U	0.00015	0.0050								

LCS		Sample ID: LCS-215468-215468				Units: mg/L		Analysis Date: 5/3/2023 04:49 PM			
Client ID:		Run ID: ICPMS3_230503A				SeqNo: 9505205		Prep Date: 5/3/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.1021	0.00057	0.0050	0.1	0	102	80-120	0			
Beryllium	0.09916	0.00013	0.0020	0.1	0	99.2	80-120	0			
Boron	0.4965	0.015	0.020	0.5	0	99.3	80-120	0			
Cadmium	0.1012	0.00014	0.0020	0.1	0	101	80-120	0			
Calcium	10.43	0.22	0.50	10	0	104	80-120	0			
Lead	0.1032	0.00022	0.0050	0.1	0	103	80-120	0			
Lithium	0.09861	0.0017	0.010	0.1	0	98.6	80-120	0			
Molybdenum	0.09758	0.00033	0.0050	0.1	0	97.6	80-120	0			
Thallium	0.09271	0.00015	0.0050	0.1	0	92.7	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: 215468 Instrument ID ICPMS3 Method: SW6020B

LCS Sample ID: LCS-215468-215468					Units: mg/L		Analysis Date: 5/3/2023 05:37 PM				
Client ID:		Run ID: ICPMS3_230503A			SeqNo: 9505718		Prep Date: 5/3/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1033	0.00042	0.0050	0.1	0	103	80-120	0			
Arsenic	0.1023	0.00019	0.0050	0.1	0	102	80-120	0			
Chromium	0.1039	0.00061	0.0050	0.1	0	104	80-120	0			
Cobalt	0.107	0.00027	0.0050	0.1	0	107	80-120	0			
Magnesium	10.41	0.037	0.20	10	0	104	80-120	0			
Potassium	10.44	0.034	0.20	10	0	104	80-120	0			
Selenium	0.09963	0.00048	0.0050	0.1	0	99.6	80-120	0			
Sodium	10.34	0.13	0.20	10	0	103	80-120	0			

MS Sample ID: 23042243-20BMS					Units: mg/L		Analysis Date: 5/3/2023 05:28 PM				
Client ID:		Run ID: ICPMS3_230503A			SeqNo: 9505713		Prep Date: 5/3/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1004	0.00042	0.0050	0.1	0.000039	100	75-125	0			
Arsenic	0.1014	0.00019	0.0050	0.1	0.000473	101	75-125	0			
Barium	0.1077	0.00057	0.0050	0.1	0.007412	100	75-125	0			
Beryllium	0.09815	0.00013	0.0020	0.1	0.000025	98.1	75-125	0			
Boron	0.4969	0.015	0.020	0.5	0.01353	96.7	75-125	0			
Cadmium	0.09755	0.00014	0.0020	0.1	0.000012	97.5	75-125	0			
Calcium	67.87	0.22	0.50	10	59.23	86.5	75-125	0			O
Chromium	0.104	0.00061	0.0050	0.1	0.001903	102	75-125	0			
Cobalt	0.1014	0.00027	0.0050	0.1	0.000058	101	75-125	0			
Lead	0.1013	0.00022	0.0050	0.1	0.000008	101	75-125	0			
Lithium	0.09846	0.0017	0.010	0.1	0.00139	97.1	75-125	0			
Magnesium	61.32	0.037	0.20	10	52.14	91.8	75-125	0			O
Molybdenum	0.09706	0.00033	0.0050	0.1	0.000411	96.6	75-125	0			
Potassium	11.4	0.034	0.20	10	1.002	104	75-125	0			
Selenium	0.1002	0.00048	0.0050	0.1	0.000879	99.4	75-125	0			
Sodium	12.22	0.13	0.20	10	2.031	102	75-125	0			
Thallium	0.09369	0.00015	0.0050	0.1	0.000001	93.7	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: **215468** Instrument ID **ICPMS3** Method: **SW6020B**

MSD					Sample ID: 23042243-20BMSD			Units: mg/L		Analysis Date: 5/3/2023 05:30 PM		
Client ID:		Run ID: ICPMS3_230503A			SeqNo: 9505714		Prep Date: 5/3/2023		DF: 1			
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09782	0.00042	0.0050	0.1	0.000039	97.8	75-125	0.1004	2.61	20		
Arsenic	0.09857	0.00019	0.0050	0.1	0.000473	98.1	75-125	0.1014	2.79	20		
Barium	0.1043	0.00057	0.0050	0.1	0.007412	96.8	75-125	0.1077	3.23	20		
Beryllium	0.0947	0.00013	0.0020	0.1	0.000025	94.7	75-125	0.09815	3.58	20		
Boron	0.4885	0.015	0.020	0.5	0.01353	95	75-125	0.4969	1.71	20		
Cadmium	0.09538	0.00014	0.0020	0.1	0.000012	95.4	75-125	0.09755	2.25	20		
Calcium	64.52	0.22	0.50	10	59.23	52.9	75-125	67.87	5.07	20	SO	
Chromium	0.1015	0.00061	0.0050	0.1	0.001903	99.6	75-125	0.104	2.44	20		
Cobalt	0.09864	0.00027	0.0050	0.1	0.000058	98.6	75-125	0.1014	2.73	20		
Lead	0.09898	0.00022	0.0050	0.1	0.000008	99	75-125	0.1013	2.37	20		
Lithium	0.09538	0.0017	0.010	0.1	0.00139	94	75-125	0.09846	3.18	20		
Magnesium	58.09	0.037	0.20	10	52.14	59.5	75-125	61.32	5.4	20	SO	
Molybdenum	0.09566	0.00033	0.0050	0.1	0.000411	95.2	75-125	0.09706	1.45	20		
Potassium	11.03	0.034	0.20	10	1.002	100	75-125	11.4	3.26	20		
Selenium	0.09602	0.00048	0.0050	0.1	0.000879	95.1	75-125	0.1002	4.3	20		
Sodium	11.91	0.13	0.20	10	2.031	98.8	75-125	12.22	2.53	20		
Thallium	0.09348	0.00015	0.0050	0.1	0.000001	93.5	75-125	0.09369	0.23	20		

The following samples were analyzed in this batch:

23041559-07C	23041559-08C	23041559-09C
23041559-10C	23041559-11C	23041559-12C
23041559-13C	23041559-14C	23041559-15C
23041559-16C		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **214844** Instrument ID **TDS** Method: **A2540 C-15**

MBLK		Sample ID: MBLK-214844-214844				Units: mg/L		Analysis Date: 4/24/2023 02:28 PM			
Client ID:		Run ID: TDS_230424A				SeqNo: 9471704		Prep Date: 4/21/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	U	22	30								

LCS		Sample ID: LCS-214844-214844				Units: mg/L		Analysis Date: 4/24/2023 02:28 PM			
Client ID:		Run ID: TDS_230424A				SeqNo: 9471703		Prep Date: 4/21/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	488	22	30	495	0	98.6	85-109	0			

DUP		Sample ID: 23041559-01B DUP				Units: mg/L		Analysis Date: 4/24/2023 02:28 PM			
Client ID: MW-1		Run ID: TDS_230424A				SeqNo: 9471683		Prep Date: 4/21/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	276.7	37	50	0	0	0	0-0	260	6.21	10	

DUP		Sample ID: 23041559-02B DUP				Units: mg/L		Analysis Date: 4/24/2023 02:28 PM			
Client ID: MW-2		Run ID: TDS_230424A				SeqNo: 9471685		Prep Date: 4/21/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	283.3	37	50	0	0	0	0-0	276.7	2.38	10	

The following samples were analyzed in this batch:

23041559-01B	23041559-02B	23041559-03B
23041559-04B	23041559-05B	23041559-06B
23041559-07B	23041559-08B	23041559-10B
23041559-11B	23041559-12B	23041559-13B
23041559-14B		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

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Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: **214971** Instrument ID **TDS** Method: **A2540 C-15**

MBLK		Sample ID: MBLK-214971-214971				Units: mg/L		Analysis Date: 4/26/2023 01:11 PM			
Client ID:		Run ID: TDS_230426A				SeqNo: 9480215		Prep Date: 4/24/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	U	22	30								

LCS		Sample ID: LCS-214971-214971				Units: mg/L		Analysis Date: 4/26/2023 01:11 PM			
Client ID:		Run ID: TDS_230426A				SeqNo: 9480214		Prep Date: 4/24/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	460	22	30	495	0	92.9	85-109	0			

DUP		Sample ID: 23041559-09B DUP				Units: mg/L		Analysis Date: 4/26/2023 01:11 PM			
Client ID: P-2		Run ID: TDS_230426A				SeqNo: 9480211		Prep Date: 4/24/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	316.7	37	50	0	0	0	0-0	293.3	7.65	10	

The following samples were analyzed in this batch:

23041559-09B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

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Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **215001** Instrument ID **TDS** Method: **A2540 C-15**

MBLK		Sample ID: MBLK-215001-215001				Units: mg/L		Analysis Date: 4/27/2023 01:44 PM			
Client ID:		Run ID: TDS_230427B				SeqNo: 9485207		Prep Date: 4/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	U	22	30								

LCS		Sample ID: LCS-215001-215001				Units: mg/L		Analysis Date: 4/27/2023 01:44 PM			
Client ID:		Run ID: TDS_230427B				SeqNo: 9485206		Prep Date: 4/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	480	22	30	495	0	97	85-109	0			

DUP		Sample ID: 23041700-01D DUP				Units: mg/L		Analysis Date: 4/27/2023 01:44 PM			
Client ID:		Run ID: TDS_230427B				SeqNo: 9485194		Prep Date: 4/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	623.3	37	50	0	0	0	0-0	610	2.16	10	

DUP		Sample ID: 23041700-04A DUP				Units: mg/L		Analysis Date: 4/27/2023 01:44 PM			
Client ID:		Run ID: TDS_230427B				SeqNo: 9485205		Prep Date: 4/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	616.7	37	50	0	0	0	0-0	613.3	0.542	10	

The following samples were analyzed in this batch:

23041559-15B	23041559-16B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

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Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369009** Instrument ID **Titration 1** Method: **A2320 B-11**

MBLK		Sample ID: MB-R369009-R369009				Units: mg/L		Analysis Date: 4/20/2023 04:40 PM			
Client ID:		Run ID: TITRATOR 1_230420C				SeqNo: 9463777		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	U	8.4	10								

LCS		Sample ID: LCS-R369009-R369009				Units: mg/L		Analysis Date: 4/20/2023 04:40 PM			
Client ID:		Run ID: TITRATOR 1_230420C				SeqNo: 9463778		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	928.2	8.4	10	1000	0	92.8	90-110	0			

DUP		Sample ID: 23041559-01A dup				Units: mg/L		Analysis Date: 4/20/2023 04:40 PM			
Client ID: MW-1		Run ID: TITRATOR 1_230420C				SeqNo: 9463780		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	78.49	8.4	10	0	0	0	0-0	80.82	2.93	10	

The following samples were analyzed in this batch:

23041559-01A	23041559-02A	23041559-03A
23041559-04A	23041559-05A	23041559-06A
23041559-07A	23041559-08A	23041559-09A
23041559-10A	23041559-11A	23041559-12A
23041559-13A	23041559-14A	23041559-15A
23041559-16A		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

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Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369022B** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: CCB/MBLK-D-R369022B				Units: mg/L		Analysis Date: 4/20/2023 05:14 PM			
Client ID:		Run ID: IC4_230420A				SeqNo: 9464193		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

MBLK		Sample ID: CCB/MBLK-E-R369022B				Units: mg/L		Analysis Date: 4/20/2023 07:10 PM			
Client ID:		Run ID: IC4_230420A				SeqNo: 9464210		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

MBLK		Sample ID: CCB/MBLK-F-R369022B				Units: mg/L		Analysis Date: 4/20/2023 09:07 PM			
Client ID:		Run ID: IC4_230420A				SeqNo: 9464225		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

LCS		Sample ID: MLCCV/LCS-D-R369022B				Units: mg/L		Analysis Date: 4/20/2023 05:04 PM			
Client ID:		Run ID: IC4_230420A				SeqNo: 9464192		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.178	0.067	0.10	2	0	109	84-120	0			

LCS		Sample ID: MLCCV/LCS-E-R369022B				Units: mg/L		Analysis Date: 4/20/2023 07:01 PM			
Client ID:		Run ID: IC4_230420A				SeqNo: 9464209		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.178	0.067	0.10	2	0	109	84-120	0			

LCS		Sample ID: MLCCV/LCS-F-R369022B				Units: mg/L		Analysis Date: 4/20/2023 08:58 PM			
Client ID:		Run ID: IC4_230420A				SeqNo: 9464224		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.168	0.067	0.10	2	0	108	84-120	0			

MS		Sample ID: 23041692-01B MS				Units: mg/L		Analysis Date: 4/20/2023 06:02 PM			
Client ID:		Run ID: IC4_230420A				SeqNo: 9464200		Prep Date:		DF: 16	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	38.5	1.1	1.6	32	0	120	84-120	0			S

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: R369022B Instrument ID IC4 Method: SW9056A

MSD		Sample ID: 23041692-01B MSD				Units: mg/L		Analysis Date: 4/20/2023 06:12 PM				
Client ID:		Run ID: IC4_230420A				SeqNo: 9464202		Prep Date:		DF: 16		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Fluoride	38.57	1.1	1.6	32	0	121	84-120	38.5	0.187	20	S	

The following samples were analyzed in this batch:	23041559-01A	23041559-02A	23041559-03A
	23041559-04A	23041559-05A	23041559-06A
	23041559-07A	23041559-08A	

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369161A** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: CCB/MBLK-A-R369161A				Units: mg/L		Analysis Date: 4/21/2023 11:22 AM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469619		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-B-R369161A				Units: mg/L		Analysis Date: 4/21/2023 02:06 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469631		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-C-R369161A				Units: mg/L		Analysis Date: 4/21/2023 04:03 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469643		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

LCS		Sample ID: MLCCV/LCS-A-R369161A				Units: mg/L		Analysis Date: 4/21/2023 11:12 AM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469618		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.843	0.31	1.0	10	0	98.4	88-110	0			
Sulfate	10.05	0.19	1.0	10	0	100	90-110	0			

LCS		Sample ID: MLCCV/LCS-B-R369161A				Units: mg/L		Analysis Date: 4/21/2023 01:56 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469630		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.748	0.31	1.0	10	0	97.5	88-110	0			
Sulfate	10.12	0.19	1.0	10	0	101	90-110	0			

LCS		Sample ID: MLCCV/LCS-C-R369161A				Units: mg/L		Analysis Date: 4/21/2023 03:53 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469642		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.83	0.31	1.0	10	0	98.3	88-110	0			
Sulfate	10.13	0.19	1.0	10	0	101	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: R369161A Instrument ID IC4 Method: SW9056A

MS		Sample ID: 23041664-02B MS					Units: mg/L		Analysis Date: 4/21/2023 12:29 PM			
Client ID:		Run ID: IC4_230421A					SeqNo: 9469621		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	205.9	3.1	10	100	111.6	94.3	88-110	0			E	
Sulfate	139	1.9	10	100	39	100	90-110	0				

MSD		Sample ID: 23041664-02B MSD					Units: mg/L		Analysis Date: 4/21/2023 12:38 PM			
Client ID:		Run ID: IC4_230421A					SeqNo: 9469622		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	207.1	3.1	10	100	111.6	95.5	88-110	205.9	0.586	20	E	
Sulfate	139	1.9	10	100	39	100	90-110	139	0.0266	20		

The following samples were analyzed in this batch:

23041559-01A	23041559-02A	23041559-03A
23041559-04A	23041559-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369161B** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: CCB/MBLK-D-R369161B				Units: mg/L		Analysis Date: 4/21/2023 04:42 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469647		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-E-R369161B				Units: mg/L		Analysis Date: 4/21/2023 07:20 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469659		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-F-R369161B				Units: mg/L		Analysis Date: 4/21/2023 09:17 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469671		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

LCS		Sample ID: MLCCV/LCS-D-R369161B				Units: mg/L		Analysis Date: 4/21/2023 04:32 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469646		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.831	0.31	1.0	10	0	98.3	88-110	0			
Fluoride	2.104	0.067	0.10	2	0	105	84-120	0			
Sulfate	10.08	0.19	1.0	10	0	101	90-110	0			

LCS		Sample ID: MLCCV/LCS-E-R369161B				Units: mg/L		Analysis Date: 4/21/2023 07:10 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469658		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.793	0.31	1.0	10	0	97.9	88-110	0			
Fluoride	2.088	0.067	0.10	2	0	104	84-120	0			
Sulfate	10.06	0.19	1.0	10	0	101	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

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Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369161B** Instrument ID **IC4** Method: **SW9056A**

LCS		Sample ID: MLCCV/LCS-F-R369161B				Units: mg/L		Analysis Date: 4/21/2023 09:07 PM			
Client ID:		Run ID: IC4_230421A				SeqNo: 9469670		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.899	0.31	1.0	10	0	99	88-110	0			
Fluoride	2.178	0.067	0.10	2	0	109	84-120	0			
Sulfate	10.03	0.19	1.0	10	0	100	90-110	0			

MS		Sample ID: 23041559-06A MS				Units: mg/L		Analysis Date: 4/21/2023 05:01 PM			
Client ID: MW-6		Run ID: IC4_230421A				SeqNo: 9469649		Prep Date:		DF: 40	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	482.9	12	40	400	89.95	98.2	88-110	0			
Fluoride	90.46	2.7	4.0	80	-1.072	114	84-120	0			
Sulfate	733.8	7.6	40	400	324.7	102	90-110	0			

MSD		Sample ID: 23041559-06A MSD				Units: mg/L		Analysis Date: 4/21/2023 05:11 PM			
Client ID: MW-6		Run ID: IC4_230421A				SeqNo: 9469650		Prep Date:		DF: 40	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	487.8	12	40	400	89.95	99.5	88-110	482.9	1.01	20	
Fluoride	92.27	2.7	4.0	80	-1.072	117	84-120	90.46	1.98	20	
Sulfate	741.9	7.6	40	400	324.7	104	90-110	733.8	1.1	20	

The following samples were analyzed in this batch:

23041559-06A	23041559-07A	23041559-08A
23041559-09A	23041559-10A	23041559-11A
23041559-12A	23041559-13A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

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Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369283A** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: CCB/MBLK-A-R369283A				Units: mg/L		Analysis Date: 4/24/2023 12:28 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474867		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-B-R369283A				Units: mg/L		Analysis Date: 4/24/2023 02:25 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474879		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-C-R369283A				Units: mg/L		Analysis Date: 4/24/2023 05:52 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474885		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

LCS		Sample ID: MLCCV/LCS-A-R369283A				Units: mg/L		Analysis Date: 4/24/2023 12:18 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474866		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	10.56	0.31	1.0	10	0	106	88-110	0			
Fluoride	2.135	0.067	0.10	2	0	107	84-120	0			
Sulfate	10.68	0.19	1.0	10	0	107	90-110	0			

LCS		Sample ID: MLCCV/LCS-B-R369283A				Units: mg/L		Analysis Date: 4/24/2023 02:15 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474878		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	10.57	0.31	1.0	10	0	106	88-110	0			
Fluoride	2.133	0.067	0.10	2	0	107	84-120	0			
Sulfate	10.74	0.19	1.0	10	0	107	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

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Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369283A** Instrument ID **IC4** Method: **SW9056A**

LCS		Sample ID: MLCCV/LCS-C-R369283A				Units: mg/L		Analysis Date: 4/24/2023 05:42 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474884		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	10.59	0.31	1.0	10	0	106	88-110	0			
Fluoride	2.19	0.067	0.10	2	0	109	84-120	0			
Sulfate	10.82	0.19	1.0	10	0	108	90-110	0			

MS		Sample ID: 23041692-09B MS				Units: mg/L		Analysis Date: 4/24/2023 01:07 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474871		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	194.3	3.1	10	100	92.42	102	88-110	0			
Fluoride	23.04	0.67	1.0	20	-1.263	122	84-120	0			S
Sulfate	156.8	1.9	10	100	50.34	106	90-110	0			

MSD		Sample ID: 23041692-09B MSD				Units: mg/L		Analysis Date: 4/24/2023 01:17 PM			
Client ID:		Run ID: IC4_230424A				SeqNo: 9474872		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	195	3.1	10	100	92.42	103	88-110	194.3	0.374	20	
Fluoride	23.46	0.67	1.0	20	-1.263	124	84-120	23.04	1.79	20	S
Sulfate	156.9	1.9	10	100	50.34	107	90-110	156.8	0.0357	20	

The following samples were analyzed in this batch:

23041559-09A	23041559-10A	23041559-11A
23041559-12A	23041559-13A	23041559-14A
23041559-15A	23041559-16A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

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Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369382B** Instrument ID **IC3** Method: **E300.0**

MBLK		Sample ID: CCB/MBLK-D-R369382B				Units: mg/L		Analysis Date: 4/25/2023 05:16 PM			
Client ID:		Run ID: IC3_230425A				SeqNo: 9479372		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-E-R369382B				Units: mg/L		Analysis Date: 4/25/2023 07:13 PM			
Client ID:		Run ID: IC3_230425A				SeqNo: 9479384		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-F-R369382B				Units: mg/L		Analysis Date: 4/25/2023 08:11 PM			
Client ID:		Run ID: IC3_230425A				SeqNo: 9479390		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

LCS		Sample ID: MLCCV/LCS-D-R369382B				Units: mg/L		Analysis Date: 4/25/2023 05:06 PM			
Client ID:		Run ID: IC3_230425A				SeqNo: 9479371		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.375	0.31	1.0	10	0	93.8	90-110	0			
Sulfate	9.787	0.19	1.0	10	0	97.9	90-110	0			

LCS		Sample ID: MLCCV/LCS-E-R369382B				Units: mg/L		Analysis Date: 4/25/2023 07:03 PM			
Client ID:		Run ID: IC3_230425A				SeqNo: 9479383		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.315	0.31	1.0	10	0	93.2	90-110	0			
Sulfate	9.778	0.19	1.0	10	0	97.8	90-110	0			

LCS		Sample ID: MLCCV/LCS-F-R369382B				Units: mg/L		Analysis Date: 4/25/2023 08:02 PM			
Client ID:		Run ID: IC3_230425A				SeqNo: 9479389		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.712	0.31	1.0	10	0	97.1	90-110	0			
Sulfate	9.798	0.19	1.0	10	0	98	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: R369382B Instrument ID IC3 Method: E300.0

MS					Sample ID: 23040923-02B MS			Units: mg/L		Analysis Date: 4/25/2023 05:36 PM		
Client ID:					Run ID: IC3_230425A			SeqNo: 9479374		Prep Date:		DF: 10
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	97.48	3.1	10	100	7.134	90.3	80-120	0				
Sulfate	106.9	1.9	10	100	8.569	98.4	80-120	0				

MSD					Sample ID: 23040923-02B MSD			Units: mg/L		Analysis Date: 4/25/2023 05:45 PM		
Client ID:					Run ID: IC3_230425A			SeqNo: 9479375		Prep Date:		DF: 10
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	97.71	3.1	10	100	7.134	90.6	80-120	97.48	0.237	20		
Sulfate	107.7	1.9	10	100	8.569	99.1	80-120	106.9	0.66	20		

The following samples were analyzed in this batch:

23041559-14A	23041559-15A	23041559-16A
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ERM, Inc.
Work Order: 23041559
Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369705A** Instrument ID **Titration 1** Method: **A2320 B-11**

MBLK		Sample ID: MB-R369705-R369705A				Units: mg/L		Analysis Date: 4/30/2023 07:24 PM			
Client ID:		Run ID: TITRATOR 1_230429A				SeqNo: 9493321		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	U	8.4	10								

LCS		Sample ID: LCS-R369705-R369705A				Units: mg/L		Analysis Date: 4/30/2023 07:24 PM			
Client ID:		Run ID: TITRATOR 1_230429A				SeqNo: 9493322		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	919	8.4	10	1000	0	91.9	90-110	0			

DUP		Sample ID: 23042206-01A DUP				Units: mg/L		Analysis Date: 4/30/2023 07:24 PM			
Client ID:		Run ID: TITRATOR 1_230429A				SeqNo: 9493327		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	195.1	8.4	10	0	0	0	0-0	192.7	1.21	10	

DUP		Sample ID: 23042273-06D DUP				Units: mg/L		Analysis Date: 4/30/2023 07:24 PM			
Client ID:		Run ID: TITRATOR 1_230429A				SeqNo: 9493335		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	790.7	8.4	10	0	0	0	0-0	786.5	0.533	10	

DUP		Sample ID: 23042417-01A DUP				Units: mg/L		Analysis Date: 4/30/2023 07:24 PM			
Client ID:		Run ID: TITRATOR 1_230429A				SeqNo: 9493338		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	1171	8.4	10	0	0	0	0-0	1179	0.689	10	

The following samples were analyzed in this batch:

23041559-12A 23041559-14A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

QC Page: 24 of 25

Client: ERM, Inc.
 Work Order: 23041559
 Project: Sammis CCR

QC BATCH REPORT

Batch ID: **R369796** Instrument ID **Titration 1** Method: **A2320 B-11**

MBLK		Sample ID: MB-R369796-R369796				Units: mg/L		Analysis Date: 5/1/2023 05:42 PM			
Client ID:		Run ID: TITRATOR 1_230501B				SeqNo: 9496980		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	U	8.4	10								

LCS		Sample ID: LCS-R369796-R369796				Units: mg/L		Analysis Date: 5/1/2023 05:42 PM			
Client ID:		Run ID: TITRATOR 1_230501B				SeqNo: 9496981		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	951.4	8.4	10	1000	0	95.1	90-110	0			

DUP		Sample ID: 23042309-01D DUP				Units: mg/L		Analysis Date: 5/1/2023 05:42 PM			
Client ID:		Run ID: TITRATOR 1_230501B				SeqNo: 9496983		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	373.8	8.4	10	0	0	0	0-0	375.8	0.542	10	

DUP		Sample ID: 23042322-01D DUP				Units: mg/L		Analysis Date: 5/1/2023 05:42 PM			
Client ID:		Run ID: TITRATOR 1_230501B				SeqNo: 9496995		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	746.1	8.4	10	0	0	0	0-0	730.5	2.12	10	

The following samples were analyzed in this batch:

23041559-11A	23041559-13A	23041559-15A
23041559-16A		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

QC Page: 25 of 25

May 24, 2023

Jodi Blouw
ALS Group USA, Corp
3352 128th Ave
Holland, Michigan 49424

Re: Holland - Blouw L4
Work Order: 619900

Dear Jodi Blouw:

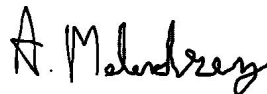
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 27, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4422.

Sincerely,



Adrian Melendrez for
Jacob Crook
Project Manager

Purchase Order: Pending
Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSE001 ALS Environmental

Client SDG: 619900 GEL Work Order: 619900

The Qualifiers in this report are defined as follows:

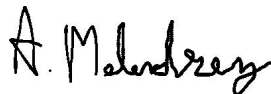
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Jacob Crook.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Report Date: May 24, 2023

Client Sample ID: MW-1
Sample ID: 619900001
Matrix: Ground Water
Collect Date: 17-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.395	+/-0.882	1.58	+/-0.888	3.00	pCi/L			JE1	05/18/23	1153	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.290	+/-0.246	0.347	+/-0.253	1.00	pCi/L			LXP1	05/21/23	0746	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	85.2	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Report Date: May 24, 2023

Client Sample ID: MW-2
Sample ID: 619900002
Matrix: Ground Water
Collect Date: 17-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting <i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.960	+/-0.878	1.40	+/-0.911	3.00	pCi/L			JE1	05/18/23	1153	2421258	1
Rad Radium-226 <i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.331	+/-0.380	0.633	+/-0.384	1.00	pCi/L			LXP1	05/21/23	0746	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	74.3	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-3
Sample ID: 619900003
Matrix: Ground Water
Collect Date: 17-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	-1.06	+/-0.867	1.91	+/-0.867	3.00	pCi/L			JE1	05/18/23	1153	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.276	+/-0.287	0.463	+/-0.291	1.00	pCi/L			LXP1	05/21/23	0746	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	83.2	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Report Date: May 24, 2023

Client Sample ID: MW-4
Sample ID: 619900004
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.136	+/-1.37	2.49	+/-1.38	3.00	pCi/L			JE1	05/18/23	1153	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		5.56	+/-0.864	0.264	+/-1.36	1.00	pCi/L			LXP1	05/21/23	0746	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	83.6	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-5
Sample ID: 619900005
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting <i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228		3.96	+/-1.70	2.36	+/-1.98	3.00	pCi/L			JE1	05/18/23	1320	2421258	1
Rad Radium-226 <i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		1.20	+/-0.451	0.372	+/-0.516	1.00	pCi/L			LXP1	05/21/23	0746	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	79	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Report Date: May 24, 2023

Client Sample ID: MW-6
Sample ID: 619900006
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.834	+/-1.49	2.60	+/-1.51	3.00	pCi/L			JE1	05/18/23	1320	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.402	+/-0.315	0.445	+/-0.324	1.00	pCi/L			LXP1	05/21/23	0747	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	82.7	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-9
Sample ID: 619900007
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228		1.78	+/-1.19	1.77	+/-1.27	3.00	pCi/L			JE1	05/18/23	1319	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.170	+/-0.221	0.376	+/-0.223	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	75.4	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Report Date: May 24, 2023

Client Sample ID: P-1
Sample ID: 619900008
Matrix: Ground Water
Collect Date: 17-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting <i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	1.46	+/-1.07	1.61	+/-1.13	3.00	pCi/L			JE1	05/18/23	1319	2421258	1
Rad Radium-226 <i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.506	+/-0.317	0.400	+/-0.337	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	73.2	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: P-2
Sample ID: 619900009
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting <i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228		3.11	+/-1.66	2.45	+/-1.84	3.00	pCi/L			JE1	05/18/23	1319	2421258	1
Rad Radium-226 <i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.543	+/-0.357	0.477	+/-0.379	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	79.1	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-10D
Sample ID: 619900010
Matrix: Ground Water
Collect Date: 17-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Report Date: May 24, 2023

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting <i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	2.60	+/-1.69	2.66	+/-1.81	3.00	pCi/L			JE1	05/18/23	1321	2421258	1
Rad Radium-226 <i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		3.35	+/-0.742	0.391	+/-0.972	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	90.5	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Report Date: May 24, 2023

Client Sample ID: MW-11S
Sample ID: 619900011
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.597	+/-1.62	2.85	+/-1.63	3.00	pCi/L			JE1	05/18/23	1321	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.591	+/-0.288	0.251	+/-0.310	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	79.4	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-11D
Sample ID: 619900012
Matrix: Ground Water
Collect Date: 17-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting <i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	2.51	+/-1.75	2.77	+/-1.87	3.00	pCi/L			JE1	05/18/23	1321	2421258	1
Rad Radium-226 <i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.515	+/-0.288	0.281	+/-0.305	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	69.8	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-12S
Sample ID: 619900013
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	-0.0584	+/-1.02	2.00	+/-1.02	3.00	pCi/L			JE1	05/18/23	1319	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.532	+/-0.319	0.392	+/-0.334	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	77	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-13BR
Sample ID: 619900014
Matrix: Ground Water
Collect Date: 17-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	1.70	+/-1.61	2.67	+/-1.67	3.00	pCi/L			JE1	05/18/23	1321	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		1.08	+/-0.471	0.477	+/-0.501	1.00	pCi/L			LXP1	05/21/23	0819	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	90.9	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-13S
Sample ID: 619900015
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Report Date: May 24, 2023

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting <i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.817	+/-1.34	2.34	+/-1.36	3.00	pCi/L			JE1	05/18/23	1320	2421258	1
Rad Radium-226 <i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	-0.0377	+/-0.221	0.505	+/-0.222	1.00	pCi/L			LXP1	05/21/23	0850	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	78.9	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

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Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L4

Client Sample ID: MW-14S
Sample ID: 619900016
Matrix: Ground Water
Collect Date: 18-APR-23
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Report Date: May 24, 2023

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	1.53	+/-1.35	2.18	+/-1.40	3.00	pCi/L			JE1	05/18/23	1320	2421258	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.359	+/-0.248	0.313	+/-0.254	1.00	pCi/L			LXP1	05/21/23	0850	2421259	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2421258	78.8	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

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QC Summary

Client : ALS Group USA, Corp
3352 128th Ave

Report Date: May 24, 2023
Page 1 of 2

Contact: Holland, Michigan

Workorder: Jodi Blouw

619900

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2421258										
QC1205389309	619900001	DUP									
Radium-228		U	0.395	U	1.33	pCi/L	0		N/A	JE1	05/18/2313:20
		Uncert:	+/-0.882		+/-1.51						
		TPU:	+/-0.888		+/-1.55						
QC1205389312	LCS										
Radium-228	80.8				81.6	pCi/L	101	(75%-125%)	JE1	05/18/2313:58	
		Uncert:			+/-5.36						
		TPU:			+/-21.4						
QC1205389308	MB										
Radium-228			U	1.89	pCi/L				JE1	05/18/2315:26	
		Uncert:		+/-1.58							
		TPU:		+/-1.65							
QC1205389310	619347021	MS									
Radium-228	468	U	0.573		383	pCi/L	81.8	(75%-125%)	JE1	05/18/2313:58	
		Uncert:	+/-1.46		+/-27.5						
		TPU:	+/-1.47		+/-101						
QC1205389311	619347021	MSD									
Radium-228	487	U	0.573		491	pCi/L	24.7*	101	(0%-20%)	JE1	05/18/2313:58
		Uncert:	+/-1.46		+/-35.0						
		TPU:	+/-1.47		+/-130						
Rad Ra-226											
Batch	2421259										
QC1205389314	619900001	DUP									
Radium-226		U	0.290		0.574	pCi/L	65.7	(0% - 100%)	LXP1	05/21/2308:50	
		Uncert:	+/-0.246		+/-0.341						
		TPU:	+/-0.253		+/-0.359						
QC1205389318	LCS										
Radium-226	26.4				21.3	pCi/L	80.7	(75%-125%)	LXP1	05/21/2308:50	
		Uncert:			+/-1.85						
		TPU:			+/-4.09						
QC1205389313	MB										
Radium-226			U	0.291	pCi/L				LXP1	05/21/2308:50	
		Uncert:		+/-0.304							
		TPU:		+/-0.311							
QC1205389316	619900001	MS									
Radium-226	131	U	0.290		123	pCi/L	94	(75%-125%)	LXP1	05/21/2308:50	
		Uncert:	+/-0.246		+/-8.97						
		TPU:	+/-0.253		+/-21.6						

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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QC Summary

Workorder: 619900

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
----------	-----	-------------	----	-------	------	------	-------	-------	------	------

The Qualifiers in this report are defined as follows:

U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
J	Value is estimated
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
H	Analytical holding time was exceeded
<	Result is less than value reported
>	Result is greater than value reported
UI	Gamma Spectroscopy--Uncertain identification
BD	Results are either below the MDC or tracer recovery is low
h	Preparation or preservation holding time was exceeded
R	Sample results are rejected
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
N/A	RPD or %Recovery limits do not apply.
ND	Analyte concentration is not detected above the detection limit
M	M if above MDC and less than LLD
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
FA	Failed analysis.
UJ	Gamma Spectroscopy--Uncertain identification
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
N1	See case narrative
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
**	Analyte is a Tracer compound
M	REMP Result > MDC/CL and < RDL
J	See case narrative for an explanation

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.



Subcontractor:
GEL Laboratories, LLC
2040 Savage Rd
Charleston, SC 29407

CHAIN-OF-CUSTODY RECORD

TEL: (843) 556-8171
FAX: (843) 766-1178
Acct #: 619900

Date: 19-Apr-23
COC ID: 22699
Due Date: 10-May-23

Page 1 of 2

Customer Information		ALS/SH Account		Project Information		Parameter/Method Request for Analysis									
Purchase Order	23041559	Project Name	23041559	A	Subcontracted Analyses (SUBCONTRACT)	A	B	C	D	E	F	G	H	I	J
Work Order		Project Number		B		B									
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C		C									
Send Report To	Jodi Blouw	Inv Attn	Accounts Payable	D		D									
Address	3352 128th Ave	Address	3352 128th Ave	E		E									
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	F		F									
Phone	(616) 399-6070	Phone	(616) 399-6070	G		G									
Fax	(616) 399-6185	Fax	(616) 399-6185	H		H									
eMail Address	jodi.blouw@alsglobal.com	eMail CC		I		I									
				J		J									

ALS Sample ID	Client Sample ID	Matrix	Collection Date	24hr	Bottle	A	B	C	D	E	F	G	H	I	J
23041559-01E	MW-1	Groundwater	17/Apr/2023	13:00	(2) 1LPNEAT	X									
23041559-02E	MW-2	Groundwater	17/Apr/2023	14:25	(2) 1LPNEAT	X									
23041559-03E	MW-3	Groundwater	17/Apr/2023	15:25	(2) 1LPNEAT	X									
23041559-04E	MW-4	Groundwater	18/Apr/2023	9:45	(2) 1LPNEAT	X									
23041559-05E	MW-5	Groundwater	18/Apr/2023	9:50	(2) 1LPNEAT	X									
23041559-06E	MW-6	Groundwater	18/Apr/2023	10:45	(2) 1LPNEAT	X									
23041559-07E	MW-9	Groundwater	18/Apr/2023	11:50	(2) 1LPNEAT	X									
23041559-08E	P-1	Groundwater	17/Apr/2023	15:20	(2) 1LPNEAT	X									
23041559-09E	P-2	Groundwater	18/Apr/2023	12:45	(2) 1LPNEAT	X									
23041559-10E	MW-10D	Groundwater	17/Apr/2023	10:40	(2) 1LPNEAT	X									
23041559-11E	MW-11S	Groundwater	18/Apr/2023	10:50	(2) 1LPNEAT	X									
23041559-12E	MW-11D	Groundwater	17/Apr/2023	12:25	(2) 1LPNEAT	X									
23041559-13E	MW-12S	Groundwater	18/Apr/2023	11:35	(2) 1LPNEAT	X									
23041559-14E	MW-13BR	Groundwater	17/Apr/2023	14:15	(2) 1LPNEAT	X									

Comments:

Please analyze enclosed samples for Radium 226 and Radium 228. Thank you.

42625445

Relinquished by:

Date/Time

Received by:

Date/Time

Report/QC Level

Relinquished by:

Date/Time

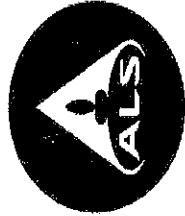
Received by:

Date/Time

Cooler IDs

Std

Report/QC Level



Subcontractor:
GEL Laboratories, LLC
2040 Savage Rd
Charleston, SC 29407

CHAIN-OF-CUSTODY RECORD

TEL: (843) 556-8171
FAX: (843) 766-1178
Acct #:

Date: 19-Apr-23
COC ID: 22699
Due Date: 10-May-23

Page 2 of 2

Customer Information		ALS Account		Project Information		Parameter/Method Request for Analysis										
Purchase Order	23041559	Project Name	23041559	Subcontracted Analyses (SUBCONTRACT)		A										
Work Order		Project Number				B										
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp			C										
Send Report To	Jodi Blouw	Inv Attn	Accounts Payable			D										
Address	3352 128th Ave	Address	3352 128th Ave			E										
						F										
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424			G										
Phone	(616) 399-6070	Phone	(616) 399-6070			H										
Fax	(616) 399-6185	Fax	(616) 399-6185			I										
eMail Address	jodi.blouw@alsglobal.com	eMail CC				J										
ALS Sample ID	Client Sample ID	Matrix	Collection Date	24hr	Bottle	A	B	C	D	E	F	G	H	I	J	
23041559-15E	MW-13S	Groundwater	18/Apr/2023	12:30	(2) 1LPNEAT	X										
23041559-16E	MW-14S	Groundwater	18/Apr/2023	13:25	(2) 1LPNEAT	X										

Comments: Please analyze enclosed samples for Radium 226 and Radium 228. Thank you.

Theresa Todor 4-27-23 925

Relinquished by:	Date/Time	Received by:	Date/Time	Cooler IDs	Report/QC Level
					Std
Relinquished by:	Date/Time	Received by:	Date/Time		

SAMPLE RECEIPT & REVIEW FORM

Client: ALSE		SDG/AR/COC/Work Order: 619900		Date Received: 4-28-23	
Received By: Thyasias Tatum		Carrier and Tracking Number: 5551 4390 7303-110c			
Suspected Hazard Information		Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
A) Shipped as a DOT Hazardous?				Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___	
B) Did the client designate the samples are to be received as radioactive?				COC notation or radioactive stickers on containers equal client designation.	
C) Did the RSO classify the samples as radioactive?				Maximum Net Counts Observed* (Observed Counts - Area Background Counts): _____ CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
D) Did the client designate samples are hazardous?				COC notation or hazard labels on containers equal client designation.	
E) Did the RSO identify possible hazards?				If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	
Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?				Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?				Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*				Preservation Method: Wet Ice Ice Packs Dry ice <u>None</u> Other: _____ *all temperatures are recorded in Celsius TEMP: _____
4	Daily check performed and passed on IR temperature gun?				Temperature Device Serial #: <u>IR2-20</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?				Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?				Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7	Do any samples require Volatile Analysis?				If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8	Samples received within holding time?				ID's and tests affected: _____
9	Sample ID's on COC match ID's on bottles?				ID's and containers affected: _____
10	Date & time on COC match date & time on bottles?				Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?				Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?				
13	COC form is properly signed in relinquished/received sections?				Circle Applicable: Not relinquished Other (describe)
Comments (Use Continuation Form if needed):					

List of current GEL Certifications as of 24 May 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

**Radiochemistry
Technical Case Narrative
ALS Environmental
SDG #: 619900**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2421258

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
619900001	MW-1
619900002	MW-2
619900003	MW-3
619900004	MW-4
619900005	MW-5
619900006	MW-6
619900007	MW-9
619900008	P-1
619900009	P-2
619900010	MW-10D
619900011	MW-11S
619900012	MW-11D
619900013	MW-12S
619900014	MW-13BR
619900015	MW-13S
619900016	MW-14S
1205389308	Method Blank (MB)
1205389309	619900001(MW-1) Sample Duplicate (DUP)
1205389310	619347021(NonSDG) Matrix Spike (MS)
1205389311	619347021(NonSDG) Matrix Spike Duplicate (MSD)
1205389312	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Samples 619900005 (MW-5), 619900010 (MW-10D), 619900011 (MW-11S), 619900012 (MW-11D), 619900013 (MW-12S) and 619900015 (MW-13S) were non-homogenous matrix. Yellow tint 619900005 (MW-5), 619900010 (MW-10D), 619900011 (MW-11S), 619900012 (MW-11D), 619900013 (MW-12S) and 619900015 (MW-13S).

Quality Control (QC) Information

Duplication Criteria between MS and MSD

The Matrix Spike and Matrix Spike Duplicate (See Below) do not meet the duplication requirement; however, they both meet the spiked recovery requirement.

Sample	Analyte	Value
1205389310MS and 1205389311MSD (Non SDG 619347021)	Radium-228	RPD 24.7* (0%-20%)

Technical Information**Recounts**

Sample 1205389308 (MB) was recounted due to a suspected blank false positive. The recount is reported.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2421259

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
619900001	MW-1
619900002	MW-2
619900003	MW-3
619900004	MW-4
619900005	MW-5
619900006	MW-6
619900007	MW-9
619900008	P-1
619900009	P-2
619900010	MW-10D
619900011	MW-11S
619900012	MW-11D
619900013	MW-12S
619900014	MW-13BR
619900015	MW-13S
619900016	MW-14S
1205389313	Method Blank (MB)
1205389314	619900001(MW-1) Sample Duplicate (DUP)
1205389316	619900001(MW-1) Matrix Spike (MS)
1205389318	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Samples 619900005 (MW-5), 619900010 (MW-10D), 619900011 (MW-11S), 619900012 (MW-11D), 619900013 (MW-12S) and 619900015 (MW-13S) were non-homogenous matrix.

Miscellaneous Information**Additional Comments**

The matrix spike, 1205389316 (MW-1MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
ALS Environmental
SDG #: 619900**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2421258

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
619900001	MW-1
619900002	MW-2
619900003	MW-3
619900004	MW-4
619900005	MW-5
619900006	MW-6
619900007	MW-9
619900008	P-1
619900009	P-2
619900010	MW-10D
619900011	MW-11S
619900012	MW-11D
619900013	MW-12S
619900014	MW-13BR
619900015	MW-13S
619900016	MW-14S
1205389308	Method Blank (MB)
1205389309	619900001(MW-1) Sample Duplicate (DUP)
1205389310	619347021(NonSDG) Matrix Spike (MS)
1205389311	619347021(NonSDG) Matrix Spike Duplicate (MSD)
1205389312	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Samples 619900005 (MW-5), 619900010 (MW-10D), 619900011 (MW-11S), 619900012 (MW-11D), 619900013 (MW-12S) and 619900015 (MW-13S) were non-homogenous matrix. Yellow tint 619900005 (MW-5), 619900010 (MW-10D), 619900011 (MW-11S), 619900012 (MW-11D), 619900013 (MW-12S) and 619900015 (MW-13S).

Quality Control (QC) Information

Duplication Criteria between MS and MSD

The Matrix Spike and Matrix Spike Duplicate (See Below) do not meet the duplication requirement; however, they both meet the spiked recovery requirement.

Sample	Analyte	Value
1205389310MS and 1205389311MSD (Non SDG 619347021)	Radium-228	RPD 24.7* (0%-20%)

Technical Information**Recounts**

Sample 1205389308 (MB) was recounted due to a suspected blank false positive. The recount is reported.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2421259

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
619900001	MW-1
619900002	MW-2
619900003	MW-3
619900004	MW-4
619900005	MW-5
619900006	MW-6
619900007	MW-9
619900008	P-1
619900009	P-2
619900010	MW-10D
619900011	MW-11S
619900012	MW-11D
619900013	MW-12S
619900014	MW-13BR
619900015	MW-13S
619900016	MW-14S
1205389313	Method Blank (MB)
1205389314	619900001(MW-1) Sample Duplicate (DUP)
1205389316	619900001(MW-1) Matrix Spike (MS)
1205389318	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Samples 619900005 (MW-5), 619900010 (MW-10D), 619900011 (MW-11S), 619900012 (MW-11D), 619900013 (MW-12S) and 619900015 (MW-13S) were non-homogenous matrix.

Miscellaneous Information**Additional Comments**

The matrix spike, 1205389316 (MW-1MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

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Qualifier Definition Report for

ALSE001 ALS Environmental

Client SDG: 619900 GEL Work Order: 619900

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 25 MAY 2023

Title: Analyst III - Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-1
Sample ID: 619900001
Matrix: Ground Water
Collect Date: 17-APR-23 13:00
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.395	+/-0.882	1.58	3.00	pCi/L		JE1	05/18/23	1153	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.290	+/-0.246	0.347	1.00	pCi/L		LXP1	05/21/23	0746	2421259		2
The following Analytical Methods were performed:													
Method	Description								Analyst Comments				
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer Recovery	Test					Result	Nominal	Recovery%	Acceptable Limits				
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"							85.2	(15%-125%)				

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-2
Sample ID: 619900002
Matrix: Ground Water
Collect Date: 17-APR-23 14:25
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.960	+/-0.878	1.40	3.00	pCi/L		JE1	05/18/23	1153	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.331	+/-0.380	0.633	1.00	pCi/L		LXP1	05/21/23	0746	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			74.3	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration

Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-3
Sample ID: 619900003
Matrix: Ground Water
Collect Date: 17-APR-23 15:25
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-1.06	+/-0.867	1.91	3.00	pCi/L		JE1	05/18/23	1153	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.276	+/-0.287	0.463	1.00	pCi/L		LXP1	05/21/23	0746	2421259		2
The following Analytical Methods were performed:													
Method	Description								Analyst Comments				
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer Recovery	Test					Result	Nominal	Recovery%	Acceptable Limits				
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"							83.2	(15%-125%)				

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-4
Sample ID: 619900004
Matrix: Ground Water
Collect Date: 18-APR-23 09:45
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.136	+/-1.37	2.49	3.00	pCi/L		JE1	05/18/23	1153	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		5.56	+/-0.864	0.264	1.00	pCi/L		LXP1	05/21/23	0746	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			83.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Contact: Holland, Michigan 49424
Project: Jodi Blouw
Holland - Blouw L4

Client Sample ID: MW-5 Project: ALSE01023
Sample ID: 619900005 Client ID: ALSE001
Matrix: Ground Water
Collect Date: 18-APR-23 09:50
Receive Date: 27-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228		3.96	+/-1.70	2.36	3.00	pCi/L		JE1	05/18/23	1320	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.20	+/-0.451	0.372	1.00	pCi/L		LXP1	05/21/23	0746	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			79	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-6
Sample ID: 619900006
Matrix: Ground Water
Collect Date: 18-APR-23 10:45
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.834	+/-1.49	2.60	3.00	pCi/L		JE1	05/18/23	1320	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.402	+/-0.315	0.445	1.00	pCi/L		LXP1	05/21/23	0747	2421259		2
The following Analytical Methods were performed:													
Method	Description							Analyst Comments					
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer Recovery	Test					Result	Nominal	Recovery%	Acceptable Limits				
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"							82.7	(15%-125%)				

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Contact: Holland, Michigan 49424
Project: Jodi Blouw
Holland - Blouw L4

Client Sample ID: MW-9 Project: ALSE01023
Sample ID: 619900007 Client ID: ALSE001
Matrix: Ground Water
Collect Date: 18-APR-23 11:50
Receive Date: 27-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228		1.78	+/-1.19	1.77	3.00	pCi/L		JE1	05/18/23	1319	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.170	+/-0.221	0.376	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			75.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration

Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: P-1
Sample ID: 619900008
Matrix: Ground Water
Collect Date: 17-APR-23 15:20
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.46	+/-1.07	1.61	3.00	pCi/L		JE1	05/18/23	1319	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.506	+/-0.317	0.400	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			73.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration

Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: P-2
Sample ID: 619900009
Matrix: Ground Water
Collect Date: 18-APR-23 12:45
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228		3.11	+/-1.66	2.45	3.00	pCi/L		JE1	05/18/23	1319	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.543	+/-0.357	0.477	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			79.1	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration

Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-10D Project: ALSE01023
Sample ID: 619900010 Client ID: ALSE001
Matrix: Ground Water
Collect Date: 17-APR-23 10:40
Receive Date: 27-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	2.60	+/-1.69	2.66	3.00	pCi/L		JE1	05/18/23	1321	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		3.35	+/-0.742	0.391	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2
The following Analytical Methods were performed:													
Method	Description							Analyst Comments					
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer Recovery	Test					Result	Nominal	Recovery%	Acceptable Limits				
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"							90.5	(15%-125%)				

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-11S
Sample ID: 619900011
Matrix: Ground Water
Collect Date: 18-APR-23 10:50
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.597	+/-1.62	2.85	3.00	pCi/L		JE1	05/18/23	1321	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.591	+/-0.288	0.251	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			79.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-11D Project: ALSE01023
Sample ID: 619900012 Client ID: ALSE001
Matrix: Ground Water
Collect Date: 17-APR-23 12:25
Receive Date: 27-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	2.51	+/-1.75	2.77	3.00	pCi/L		JE1	05/18/23	1321	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.515	+/-0.288	0.281	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2
The following Analytical Methods were performed:													
Method	Description							Analyst Comments					
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer Recovery	Test					Result	Nominal	Recovery%	Acceptable Limits				
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"							69.8	(15%-125%)				

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-12S Project: ALSE01023
Sample ID: 619900013 Client ID: ALSE001
Matrix: Ground Water
Collect Date: 18-APR-23 11:35
Receive Date: 27-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.0584	+/-1.02	2.00	3.00	pCi/L		JE1	05/18/23	1319	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.532	+/-0.319	0.392	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			77	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration

Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-13BR
Sample ID: 619900014
Matrix: Ground Water
Collect Date: 17-APR-23 14:15
Receive Date: 27-APR-23
Collector: Client

Project: ALSE01023
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.70	+/-1.61	2.67	3.00	pCi/L		JE1	05/18/23	1321	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.08	+/-0.471	0.477	1.00	pCi/L		LXP1	05/21/23	0819	2421259		2
The following Analytical Methods were performed:													
Method	Description							Analyst Comments					
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer Recovery	Test					Result	Nominal	Recovery%	Acceptable Limits				
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"							90.9	(15%-125%)				

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-13S Project: ALSE01023
Sample ID: 619900015 Client ID: ALSE001
Matrix: Ground Water
Collect Date: 18-APR-23 12:30
Receive Date: 27-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.817	+/-1.34	2.34	3.00	pCi/L		JE1	05/18/23	1320	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	-0.0377	+/-0.221	0.505	1.00	pCi/L		LXP1	05/21/23	0850	2421259		2
The following Analytical Methods were performed:													
Method	Description								Analyst Comments				
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer Recovery	Test					Result	Nominal	Recovery%	Acceptable Limits				
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"							78.9	(15%-125%)				

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 25, 2023

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L4

Client Sample ID: MW-14S Project: ALSE01023
Sample ID: 619900016 Client ID: ALSE001
Matrix: Ground Water
Collect Date: 18-APR-23 13:25
Receive Date: 27-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.53	+/-1.35	2.18	3.00	pCi/L		JE1	05/18/23	1320	2421258		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.359	+/-0.248	0.313	1.00	pCi/L		LXP1	05/21/23	0850	2421259		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			78.8	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: May 25, 2023

Page 1 of 2

ALS Group USA, Corp
3352 128th Ave
Holland, Michigan
Contact: Jodi Blouw

Workorder: 619900

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2421258										
QC1205389309	619900001	DUP									
Radium-228	U	0.395	U	1.33	pCi/L	N/A		N/A	JE1	05/18/23	13:20
	Uncertainty	+/-0.882		+/-1.51							
QC1205389312	LCS										
Radium-228	80.8			81.6	pCi/L		101	(75%-125%)		05/18/23	13:58
	Uncertainty			+/-5.36							
QC1205389308	MB										
Radium-228			U	1.89	pCi/L					05/18/23	15:26
	Uncertainty			+/-1.58							
QC1205389310	619347021	MS									
Radium-228	468 U	0.573		383	pCi/L		81.8	(75%-125%)		05/18/23	13:58
	Uncertainty	+/-1.46		+/-27.5							
QC1205389311	619347021	MSD									
Radium-228	487 U	0.573		491	pCi/L	24.7*	101	(0%-20%)		05/18/23	13:58
	Uncertainty	+/-1.46		+/-35.0							
Rad Ra-226											
Batch	2421259										
QC1205389314	619900001	DUP									
Radium-226	U	0.290		0.574	pCi/L	65.7		(0% - 100%)	LXP1	05/21/23	08:50
	Uncertainty	+/-0.246		+/-0.341							
QC1205389318	LCS										
Radium-226	26.4			21.3	pCi/L		80.7	(75%-125%)		05/21/23	08:50
	Uncertainty			+/-1.85							
QC1205389313	MB										
Radium-226			U	0.291	pCi/L					05/21/23	08:50
	Uncertainty			+/-0.304							
QC1205389316	619900001	MS									
Radium-226	131 U	0.290		123	pCi/L		94	(75%-125%)		05/21/23	08:50
	Uncertainty	+/-0.246		+/-8.97							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 619900

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.										
J	Value is estimated										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
H	Analytical holding time was exceeded										
<	Result is less than value reported										
>	Result is greater than value reported										
UI	Gamma Spectroscopy--Uncertain identification										
BD	Results are either below the MDC or tracer recovery is low										
h	Preparation or preservation holding time was exceeded										
R	Sample results are rejected										
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.										
N/A	RPD or %Recovery limits do not apply.										
ND	Analyte concentration is not detected above the detection limit										
M	M if above MDC and less than LLD										
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
FA	Failed analysis.										
UJ	Gamma Spectroscopy--Uncertain identification										
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.										
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.										
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.										
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.										
N1	See case narrative										
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.										
**	Analyte is a Tracer compound										
M	REMP Result > MDC/CL and < RDL										
J	See case narrative for an explanation										

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2421258 Check-list

This check-list was completed on 18-MAY-23 by Nat Long

This batch was reviewed by Nat Long on 18-MAY-23 and Kenshalla Oston on 22-MAY-23.

Batch ID:
2421258

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?		No	
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID:	2421258	Due Dates for Lab:	19-MAY-2023	Package:	21-MAY-2023	SDG:	22-MAY-2023	
Analyst:	Jacqueline Winston (JE1)	Type	Sample Id	Description		Serial Number	Spike Amount	Spike Units
Method:	EPA 904.0/SW846 9320 Modified	MS	1205389310	228		2051-B	.1	mL
Lab SOP:	GL-RAD-A-063 REV# 5	LCS	1205389312	228		2051-B	.1	mL
Instrument:	LUCAS-C202389980	MSD	1205389311	228		2051-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	619347021	11-MAY-2023	3	302.14	302.14	05/12/23 16:53	05/18/23 08:56
2	619347022	11-MAY-2023	3	304.46	304.46	05/12/23 16:53	05/18/23 08:56
3	619900001	11-MAY-2023	3	305.83	305.83	05/12/23 16:53	05/18/23 08:56
4	619900002	11-MAY-2023	3	307.62	307.62	05/12/23 16:53	05/18/23 08:56
5	619900003	11-MAY-2023	3	304.84	304.84	05/12/23 16:53	05/18/23 08:56
6	619900004	11-MAY-2023	3	303.17	303.17	05/12/23 16:53	05/18/23 08:56
7	619900005	11-MAY-2023	3	300.52	300.52	05/12/23 16:53	05/18/23 08:56
8	619900006	11-MAY-2023	3	300.79	300.79	05/12/23 16:53	05/18/23 08:56
9	619900007	11-MAY-2023	3	301.23	301.23	05/12/23 16:53	05/18/23 08:56
10	619900008	11-MAY-2023	3	300.42	300.42	05/12/23 16:53	05/18/23 08:56
11	619900009	11-MAY-2023	3	306.64	306.64	05/12/23 16:53	05/18/23 08:56
12	619900010	11-MAY-2023	3	304.61	304.61	05/12/23 16:53	05/18/23 08:56
13	619900011	11-MAY-2023	3	308.12	308.12	05/12/23 16:53	05/18/23 08:56
14	619900012	11-MAY-2023	3	305.93	305.93	05/12/23 16:53	05/18/23 08:56
15	619900013	11-MAY-2023	3	307.47	307.47	05/12/23 16:53	05/18/23 08:56
16	619900014	11-MAY-2023	3	305.95	305.95	05/12/23 16:53	05/18/23 08:56
17	619900015	11-MAY-2023	3	306.22	306.22	05/12/23 16:53	05/18/23 08:56
18	619900016	11-MAY-2023	3	303.75	303.75	05/12/23 16:53	05/18/23 08:56
19	1205389308 MB	11-MAY-2023	3		308.12	05/12/23 16:53	05/18/23 08:56
20	1205389309 DUP (619900001)	11-MAY-2023	3	306.26	306.26	05/12/23 16:53	05/18/23 08:56
21	1205389310 MS (619347021)	11-MAY-2023	3	53.6	53.6	05/12/23 16:53	05/18/23 08:56
22	1205389311 MSD (619347021)	11-MAY-2023	3	51.48	51.48	05/12/23 16:53	05/18/23 08:56
23	1205389312 LCS	11-MAY-2023	3		308.12	05/12/23 16:53	05/18/23 08:56

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419
REGNT 3908878	RGF-1.5M Ammonium Sulfate	10 mL	Data Entry Date2: 11-MAY-2023 00:00
REGNT 3906586	RGF-1M Citric Acid	5 mL	
REGNT 3903767	2M HCl	20 mL	
REGNT 3907858	RGF-50% Potassium Carbonate	2 mL	
REGNT 3903777	RGF-7M Nitric Acid	25 mL	
REGNT DGA042223	2418797	2 g	
REGNT 3885305.13	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3887517	RGF-Neodymium Substrate	5 mL	
REGNT 3904766.5	Nitric Acid	5 mL	

Analytical Logbook version 1 11-04-2002

GEL Laboratories LLC

Prep Logbook

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
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Reagent/Solvent Lot ID	Description	Amount	Comments:
REGNT 3902934	Barium Carrier Ra228 REG	1 mL	
REGNT 3907855	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.3

Tracer S/N : 1951-E
Tracer Exp Date : 1/10/2024
Tracer Volume Added: 0.10

Batch : 2421258
Analyst : JAC02417
Prep Date : 5/11/2023
Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 3 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Ref.		Tracer Samp.	
	Sample	Sample	Sample		Tracer Ref.	Count	Tracer Samp.	Count	Tracer	Tracer
Pos.	ID	Aliquot	StDev.	Sample	Activity	Uncertainty	Activity	Uncertainty	Aliquot	Aliquot
		L	L	Date/Time	(CPM)	(%)	(CPM)	(%)	(mL)	StDev. (mL)
1	619347021.1	0.3021	1.8495E-05	4/19/2023 14:35	1147.3	1.70%	940.8	1.88%	0.1	0.000200
2	619347022.1	0.3045	1.8534E-05	4/19/2023 15:30	1147.3	1.70%	963.2	1.86%	0.1	0.000200
3	619900001.1	0.3058	1.8556E-05	4/17/2023 13:00	1147.3	1.70%	977.6	1.85%	0.1	0.000200
4	619900002.1	0.3076	1.8585E-05	4/17/2023 14:25	1147.3	1.70%	852.3	1.98%	0.1	0.000200
5	619900003.1	0.3048	1.8540E-05	4/17/2023 15:25	1147.3	1.70%	954.4	1.87%	0.1	0.000200
6	619900004.1	0.3032	1.8512E-05	4/18/2023 9:45	1147.3	1.70%	959.4	1.86%	0.1	0.000200
7	619900005.1	0.3005	1.8468E-05	4/18/2023 9:50	1147.3	1.70%	906.9	1.92%	0.1	0.000200
8	619900006.1	0.3008	1.8472E-05	4/18/2023 10:45	1147.3	1.70%	949.0	1.87%	0.1	0.000200
9	619900007.1	0.3012	1.8480E-05	4/18/2023 11:50	1147.3	1.70%	865.0	1.96%	0.1	0.000200
10	619900008.1	0.3004	1.8466E-05	4/17/2023 15:20	1147.3	1.70%	839.6	1.99%	0.1	0.000200
11	619900009.1	0.3066	1.8569E-05	4/18/2023 12:45	1147.3	1.70%	907.7	1.92%	0.1	0.000200
12	619900010.1	0.3046	1.8536E-05	4/17/2023 10:40	1147.3	1.70%	1038.8	1.79%	0.1	0.000200
13	619900011.1	0.3081	1.8593E-05	4/18/2023 10:50	1147.3	1.70%	910.7	1.91%	0.1	0.000200
14	619900012.1	0.3059	1.8558E-05	4/17/2023 12:25	1147.3	1.70%	800.8	2.04%	0.1	0.000200
15	619900013.1	0.3075	1.8583E-05	4/18/2023 11:35	1147.3	1.70%	883.3	1.94%	0.1	0.000200
16	619900014.1	0.3060	1.8558E-05	4/17/2023 14:15	1147.3	1.70%	1043.4	1.79%	0.1	0.000200
17	619900015.1	0.3062	1.8563E-05	4/18/2023 12:30	1147.3	1.70%	905.6	1.92%	0.1	0.000200
18	619900016.1	0.3038	1.8522E-05	4/18/2023 13:25	1147.3	1.70%	904.1	1.92%	0.1	0.000200
19	1205389308.1	0.3081	1.8593E-05	5/11/2023 0:00	1147.3	1.70%	883.2	1.94%	0.1	0.000200
20	1205389309.1	0.3063	1.8563E-05	4/17/2023 13:00	1147.3	1.70%	972.9	1.85%	0.1	0.000200
21	1205389310.1	0.0536	8.1217E-06	4/19/2023 14:35	1147.3	1.70%	995.6	1.83%	0.1	0.000200
22	1205389311.1	0.0515	7.9527E-06	4/19/2023 14:35	1147.3	1.70%	837.2	2.00%	0.1	0.000200
23	1205389312.1	0.3081	1.8593E-05	5/11/2023 0:00	1147.3	1.70%	970.8	1.85%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data														Calculated	
Counting						Count	Ac-228	Ac-228				Ac-228	Sample	Sample	
Pos.	Detector ID	Time (min.)	Gross Alpha	Counts Beta	Beta cpm	Start Date/Time	Ingrowth Date/Time	Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Count Correction	Recovery %	Recovery Error %	
1	2C	60	14	89	1.483	5/18/2023 11:53	5/12/2023 16:53	5/18/2023 8:56	0.991	0.717	1.000	1.057	82.0%	2.55%	
2	4A	60	6	59	0.983	5/18/2023 11:53	5/12/2023 16:53	5/18/2023 8:56	0.991	0.717	1.000	1.057	84.0%	2.54%	
3	7A	60	8	39	0.650	5/18/2023 11:53	5/12/2023 16:53	5/18/2023 8:56	0.990	0.717	1.000	1.057	85.2%	2.53%	
4	7C	60	7	32	0.533	5/18/2023 11:53	5/12/2023 16:53	5/18/2023 8:56	0.990	0.716	1.000	1.057	74.3%	2.62%	
5	8A	60	9	35	0.583	5/18/2023 11:53	5/12/2023 16:53	5/18/2023 8:56	0.990	0.716	1.000	1.057	83.2%	2.54%	
6	8D	60	10	91	1.517	5/18/2023 11:53	5/12/2023 16:53	5/18/2023 8:56	0.990	0.716	1.000	1.057	83.6%	2.54%	
7	6B	60	3	91	1.517	5/18/2023 13:20	5/12/2023 16:53	5/18/2023 8:56	0.990	0.608	1.000	1.057	79.0%	2.58%	
8	5A	60	10	75	1.250	5/18/2023 13:20	5/12/2023 16:53	5/18/2023 8:56	0.990	0.608	1.000	1.057	82.7%	2.54%	
9	11A	60	11	42	0.700	5/18/2023 13:19	5/12/2023 16:53	5/18/2023 8:56	0.990	0.609	1.000	1.057	75.4%	2.61%	
10	11B	60	8	33	0.550	5/18/2023 13:19	5/12/2023 16:53	5/18/2023 8:56	0.990	0.609	1.000	1.057	73.2%	2.63%	
11	14C	60	21	83	1.383	5/18/2023 13:19	5/12/2023 16:53	5/18/2023 8:56	0.990	0.609	1.000	1.057	79.1%	2.58%	
12	3C	60	14	121	2.017	5/18/2023 13:21	5/12/2023 16:53	5/18/2023 8:56	0.990	0.608	1.000	1.057	90.5%	2.48%	
13	8D	70	7	112	1.600	5/18/2023 13:21	5/12/2023 16:53	5/18/2023 8:56	0.990	0.608	1.000	1.067	79.4%	2.57%	
14	8B	70	9	105	1.500	5/18/2023 13:21	5/12/2023 16:53	5/18/2023 8:56	0.990	0.607	1.000	1.067	69.8%	2.67%	
15	12A	60	9	29	0.483	5/18/2023 13:19	5/12/2023 16:53	5/18/2023 8:56	0.990	0.609	1.000	1.057	77.0%	2.59%	
16	6A	60	16	110	1.833	5/18/2023 13:21	5/12/2023 16:53	5/18/2023 8:56	0.990	0.607	1.000	1.057	90.9%	2.48%	
17	13A	60	10	58	0.967	5/18/2023 13:20	5/12/2023 16:53	5/18/2023 8:56	0.990	0.609	1.000	1.057	78.9%	2.58%	
18	13D	60	5	58	0.967	5/18/2023 13:20	5/12/2023 16:53	5/18/2023 8:56	0.990	0.609	1.000	1.057	78.8%	2.58%	
19	3B	60	9	48	0.800	5/18/2023 15:26	5/12/2023 16:53	5/18/2023 8:56	0.997	0.480	1.000	1.057	77.0%	2.59%	
20	2D	60	15	77	1.283	5/18/2023 13:20	5/12/2023 16:53	5/18/2023 8:56	0.990	0.608	1.000	1.057	84.8%	2.53%	
21	1A	60	163	816	13.600	5/18/2023 13:58	5/12/2023 16:53	5/18/2023 8:56	0.990	0.567	1.000	1.057	86.8%	2.51%	
22	1B	60	27	824	13.733	5/18/2023 13:58	5/12/2023 16:53	5/18/2023 8:56	0.990	0.566	1.000	1.057	73.0%	2.64%	
23	1C	60	30	982	16.367	5/18/2023 13:58	5/12/2023 16:53	5/18/2023 8:56	0.997	0.566	1.000	1.057	84.6%	2.53%	

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6022	0.01274	1.356	5/12/2023 18:58	500
2	PIC	6/1/2022	5/31/2023	0.6013	0.01123	0.540	5/12/2023 18:59	500
3	PIC	6/1/2022	5/31/2023	0.6257	0.00594	0.554	5/12/2023 19:00	500
4	PIC	6/1/2022	5/31/2023	0.6407	0.00790	0.324	5/12/2023 19:00	500
5	PIC	6/1/2022	5/31/2023	0.6398	0.01579	0.840	5/12/2023 19:00	500
6	PIC	6/1/2022	5/31/2023	0.6347	0.00609	1.484	5/12/2023 19:00	500
7	PIC	6/1/2022	5/31/2023	0.6280	0.00851	0.770	5/12/2023 18:59	500
8	PIC	6/1/2022	5/31/2023	0.6332	0.00851	1.084	5/12/2023 18:59	500
9	PIC	6/1/2022	5/31/2023	0.6371	0.01317	0.374	5/12/2023 18:59	500
10	PIC	6/1/2022	5/31/2023	0.6481	0.00697	0.286	5/12/2023 18:59	500
11	PIC	6/1/2022	5/31/2023	0.6029	0.01828	0.808	5/12/2023 19:00	500
12	PIC	6/1/2022	5/31/2023	0.6365	0.00988	1.440	5/12/2023 18:58	500
13	PIC	6/1/2022	5/31/2023	0.6347	0.00609	1.484	5/12/2023 19:00	500
14	PIC	6/1/2022	5/31/2023	0.6437	0.02148	1.068	5/12/2023 19:00	500
15	PIC	6/1/2022	5/31/2023	0.6090	0.01964	0.494	5/12/2023 18:59	500
16	PIC	6/1/2022	5/31/2023	0.6328	0.02228	1.456	5/12/2023 18:59	500
17	PIC	6/1/2022	5/31/2023	0.6349	0.00714	0.808	5/12/2023 19:00	500
18	PIC	6/1/2022	5/31/2023	0.6348	0.01144	0.672	5/12/2023 19:00	500
19	PIC	6/1/2022	5/31/2023	0.6245	0.01614	0.518	5/12/2023 18:58	500
20	PIC	6/1/2022	5/31/2023	0.6046	0.00745	1.020	5/12/2023 18:58	500
21	PIC	6/1/2022	5/31/2023	0.6209	0.00738	0.572	5/12/2023 18:58	500
22	PIC	6/1/2022	5/31/2023	0.6068	0.00711	0.552	5/12/2023 18:58	500
23	PIC	6/1/2022	5/31/2023	0.6190	0.00847	0.744	5/12/2023 18:58	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

* - RPD changed to 0% due to sample & dup activity below MDA

Spike S/N : 2051-B
Spike Exp Date : 3/27/2024
Spike Activity (dpm/ml): 552.82
Spike Volume Added: 0.10

LCS S/N : 2051-B
LCS Exp Date : 3/27/2024
LCS Activity (dpm/ml): 552.82
LCS Volume Added: 0.10

Results																	
	Decision	Critical	Required		Sample Act.	Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA							
Pos.	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.		Sample	Sample	RPD	RER	Nominal	
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	Uncertainty	Uncertainty		QC	Type			pCi/L	Recovery
1	1.6668	1.1768	3	2.5784	0.5725	130.11%	0.1273	0.1656	1.4597	1.4670			SAMPLE				
2	1.0213	0.7210	3	1.6603	1.9355	29.94%	0.4433	0.1322	1.1310	1.2335			SAMPLE				
3	0.9758	0.6889	3	1.5838	0.3954	113.86%	0.0960	0.1093	0.8821	0.8878			SAMPLE				
4	0.8312	0.5869	3	1.4031	0.9603	46.73%	0.2093	0.0977	0.8780	0.9114			SAMPLE				
5	1.2081	0.8529	3	1.9129	-1.0628	41.71%	-0.2567	0.1068	0.8666	0.8668			SAMPLE				
6	1.6187	1.1428	3	2.4943	0.1364	514.49%	0.0327	0.1681	1.3750	1.3754			SAMPLE				
7	1.4817	1.0461	3	2.3573	3.9604	22.10%	0.7467	0.1638	1.7025	1.9778			SAMPLE				
8	1.6647	1.1753	3	2.6017	0.8338	91.40%	0.1660	0.1517	1.4930	1.5080			SAMPLE				
9	1.0621	0.7499	3	1.7725	1.7785	34.30%	0.3260	0.1114	1.1914	1.2749			SAMPLE				
10	0.9435	0.6661	3	1.6093	1.4631	37.48%	0.2640	0.0987	1.0719	1.1346			SAMPLE				
11	1.5445	1.0905	3	2.4508	3.1055	27.48%	0.5753	0.1571	1.6617	1.8423			SAMPLE				
12	1.7232	1.2166	3	2.6588	2.6013	33.23%	0.5767	0.1910	1.6890	1.8136			SAMPLE				
13	1.8646	1.3164	3	2.8534	0.5971	138.56%	0.1160	0.1607	1.6214	1.6284			SAMPLE				
14	1.7871	1.2617	3	2.7727	2.5125	35.70%	0.4320	0.1535	1.7499	1.8656			SAMPLE				
15	1.2256	0.8653	3	2.0044	-0.0584	891.55%	-0.0107	0.0951	1.0210	1.0213			SAMPLE				
16	1.7287	1.2205	3	2.6660	1.6981	48.60%	0.3773	0.1829	1.6137	1.6716			SAMPLE				
17	1.4728	1.0398	3	2.3370	0.8166	83.96%	0.1587	0.1331	1.3432	1.3591			SAMPLE				
18	1.3567	0.9579	3	2.1757	1.5320	44.93%	0.2947	0.1321	1.3463	1.4016			SAMPLE				
19	1.5371	1.0852	3	2.5059	1.8919	42.62%	0.2820	0.1199	1.5762	1.6488			MB				
20	1.6201	1.1438	3	2.5396	1.3270	58.19%	0.2633	0.1531	1.5118	1.5488	619900001.1	DUP	*	0.0%			
21	7.0764	4.9960	3	11.4617	382.9180	4.50%	13.0280	0.4773	27.4961	100.9912	619347021.1	MS				467.8775	81.8%
22	8.8081	6.2186	3	14.2992	490.8860	4.55%	13.1813	0.4796	35.0054	129.6192	619347021.1	MSD		24.7%		487.1452	100.8%
23	1.4347	1.0129	3	2.2871	81.6295	4.28%	15.6227	0.5237	5.3633	21.4134		LCS				80.8185	101.0%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
619347021	2C	60	14	89	5/18/2023 11:53	5/18/2023 12:53	PIC	2421258
619347022	4A	60	6	59	5/18/2023 11:53	5/18/2023 12:53	PIC	2421258
619900001	7A	60	8	39	5/18/2023 11:53	5/18/2023 12:53	PIC	2421258
619900002	7C	60	7	32	5/18/2023 11:53	5/18/2023 12:53	PIC	2421258
619900003	8A	60	9	35	5/18/2023 11:53	5/18/2023 12:53	PIC	2421258
619900004	8D	60	10	91	5/18/2023 11:53	5/18/2023 12:53	PIC	2421258
619900005	6B	60	3	91	5/18/2023 13:20	5/18/2023 14:20	PIC	2421258
619900006	5A	60	10	75	5/18/2023 13:20	5/18/2023 14:20	PIC	2421258
619900007	11A	60	11	42	5/18/2023 13:19	5/18/2023 14:19	PIC	2421258
619900008	11B	60	8	33	5/18/2023 13:19	5/18/2023 14:19	PIC	2421258
619900009	14C	60	21	83	5/18/2023 13:19	5/18/2023 14:19	PIC	2421258
619900010	3C	60	14	121	5/18/2023 13:21	5/18/2023 14:21	PIC	2421258
619900011	8D	70	7	112	5/18/2023 13:21	5/18/2023 14:31	PIC	2421258
619900012	8B	70	9	105	5/18/2023 13:21	5/18/2023 14:31	PIC	2421258
619900013	12A	60	9	29	5/18/2023 13:19	5/18/2023 14:19	PIC	2421258
619900014	6A	60	16	110	5/18/2023 13:21	5/18/2023 14:21	PIC	2421258
619900015	13A	60	10	58	5/18/2023 13:20	5/18/2023 14:20	PIC	2421258
619900016	13D	60	5	58	5/18/2023 13:20	5/18/2023 14:20	PIC	2421258
1205389308	3B	60	9	48	5/18/2023 15:26	5/18/2023 16:26	PIC	2421258
1205389309	2D	60	15	77	5/18/2023 13:20	5/18/2023 14:20	PIC	2421258
1205389310	1A	60	163	816	5/18/2023 13:58	5/18/2023 14:58	PIC	2421258
1205389311	1B	60	27	824	5/18/2023 13:58	5/18/2023 14:58	PIC	2421258
1205389312	1C	60	30	982	5/18/2023 13:58	5/18/2023 14:58	PIC	2421258

ASSAY 18-May-23 9:30:01
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 5/18/2023
 Run id. 6664

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	95	1	180	3442	1147.25	1.7	09:30:01
619347021	2	95	2	180	2823	940.75	1.88	82.00	09:33:15
619347022	3	95	3	180	2890	963.18	1.86	83.96	09:36:29
619900001	4	95	4	180	2933.28	977.61	1.85	85.21	09:39:43
619900002	5	95	5	180	2557.28	852.28	1.98	74.29	09:42:57
619900003	1	21	1	180	2863.57	954.36	1.87	83.19	09:46:33
619900004	2	21	2	180	2879	959.42	1.86	83.63	09:49:47
619900005	3	21	3	180	2721	906.85	1.92	79.05	09:53:01
619900006	4	21	4	180	2847.28	948.97	1.87	82.72	09:56:15
619900007	5	21	5	180	2595.28	864.96	1.96	75.39	09:59:29
619900008	1	14	1	180	2519.28	839.62	1.99	73.19	10:03:05
619900009	2	14	2	180	2723.57	907.71	1.92	79.12	10:06:19
619900010	3	14	3	180	3116.85	1038.79	1.79	90.55	10:09:33
619900011	4	14	4	180	2732.57	910.72	1.91	79.38	10:12:47
619900012	5	14	5	180	2402.57	800.77	2.04	69.80	10:16:01
619900013	1	2	1	180	2650.57	883.33	1.94	77.00	10:19:48
619900014	2	2	2	180	3130.57	1043.35	1.79	90.94	10:23:02
619900015	3	2	3	180	2717.28	905.56	1.92	78.93	10:26:16
619900016	4	2	4	180	2713	904.14	1.92	78.81	10:29:30
1205389308	5	2	5	180	2650	883.19	1.94	76.98	10:32:44
1205389309	1	15	1	180	2919.28	972.86	1.85	84.80	10:36:33
1205389310	2	15	2	180	2987.28	995.61	1.83	86.78	10:39:47
1205389311	3	15	3	180	2512	837.2	2	72.97	10:43:01
1205389312	4	15	4	180	2913	970.76	1.85	84.62	10:46:14

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 18-May-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 GA1 through OD4

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Alpha eff	18-May 05:08	5	9870	6589	9855	+3.03
LB4100E2	Above	Beta bkg	18-May 04:01	60	2.367	1.385	3.072	+0.49
LB4100E2	Below	Beta eff	18-May 05:16	5	13986	14120	15200	-3.74
LB4100F2	Above	Beta bkg	18-May 04:01	60	45.767	1.173	1.833	+402.40
LB4100F2	Below	Beta eff	18-May 05:16	5	14956	15040	15710	-3.75
LB4100F3	Above	Alpha bkg	18-May 04:01	60	0.350	0.059	0.442	+1.56
LB4100F3	Above	Beta bkg	18-May 04:01	60	2.067	0.185	2.570	+1.73
LB4100G1	need 2nd	Alpha XTalk	18-May 05:02	5	0.280	0.088	0.447	+0.21
LB4100G1	Above	Beta bkg	18-May 04:01	60	5274	0.380	1.675	+24,432.76
LB4100G1	need 2nd	Beta eff	18-May 05:09	5	14447	12880	18320	-1.27
LB4100G2	Above	Beta bkg	18-May 04:01	60	2.533	1.168	2.328	+4.06
LB4100G3	Above	Beta bkg	18-May 04:01	60	2.800	0.987	2.738	+3.21
LB4100H1	Above	Beta bkg	18-May 04:01	60	2.950	0.216	2.462	+4.30
LB4100H2	Above	Beta bkg	18-May 04:01	60	2.967	0.680	2.184	+6.12
LB4200GA1	Above	Alpha bkg	18-May 03:03	60	0.150	-2.18E-2	0.066	+8.78
LB4200GA1	Below	Alpha eff	18-May 05:18	5	11366	711420	11700	+3.00
LB4200GA1	Below	Alpha XTalk	18-May 05:18	5	0.202	0.208	0.219	-6.08
LB4200GA1	Below	Beta XTalk	18-May 05:26	5	8.58E-4	0.006	0.001	+3.87
LB4200GA2	Below	Beta eff	18-May 05:26	5	14836	14850	15230	-3.21
LB4200GA3	Below	Alpha XTalk	18-May 05:18	5	0.238	0.238	0.250	-3.10
LB4200GB1	need 2nd	Alpha bkg	18-May 03:03	60	0.033	-1.85E-2	0.070	+0.51
LB4200GB1	Below	Beta eff	18-May 05:26	5	35268	35450	36050	-4.82
LB4200GB1	Below	Beta XTalk	18-May 05:26	5	1.70E-4	1.71E-4	3.78E-4	-3.02
LB4200GB2	need 2nd	Alpha XTalk	18-May 05:18	5	0.219	0.218	0.230	-2.59
LB4200GB2	Below	Beta eff	18-May 05:26	5	14297	14400	14700	-5.06
LB4200GB3	Above	Alpha bkg	18-May 03:03	60	0.150	-2.44E-2	0.094	+5.84
LB4200GB4	Above	Alpha bkg	18-May 03:03	60	0.117	-5.02E-2	0.104	+3.50
LB4200GC1	Above	Alpha bkg	18-May 03:03	60	0.133	-2.38E-2	0.103	+4.42
LB4200GC1	Below	Alpha eff	18-May 05:10	5	11125	11200	11580	-4.19
LB4200GC1	Below	Beta eff	18-May 05:18	5	14034	14180	14540	-5.44

LB4200GC1	need 2nd	Beta XTalk	18-May 05:18	5	5.70E-4	2.68E-4	8.59E-4	+0.07
LB4200GC2	Above	Alpha bkg	18-May 03:03	60	0.133	-1.31E-2	0.073	+7.19
LB4200GC3	Above	Alpha bkg	18-May 03:03	60	0.133	-4.69E-2	0.094	+4.70
LB4200GC3	Above	Alpha eff	18-May 05:10	5	9850	9658	9832	+3.61
LB4200GC4	Below	Beta eff	18-May 05:18	5	16682	16910	17300	-6.51
LB4200GD1	Above	Alpha bkg	18-May 03:03	60	0.183			#NUM!
LB4200GD1	Above	Alpha eff	18-May 05:10	5	11081			#NUM!
LB4200GD1	Above	Alpha XTalk	18-May 05:10	5	0.237			#NUM!
LB4200GD1	Above	Beta bkg	18-May 03:03	60	0.617			#NUM!
LB4200GD1	Above	Beta eff	18-May 05:18	5	36551			#NUM!
LB4200GD1	Above	Beta XTalk	18-May 05:18	5	1.48E-4			#NUM!
LB4200GD2	Below	Beta eff	18-May 05:18	5	14503	14720	15050	-6.95
LB4200GD3	Below	Beta eff	18-May 05:18	5	17721	17820	18140	-4.86
LB4200GD4	Above	Alpha eff	18-May 05:10	5	17932	700	900	+513.96
LB4200GD4	Above	Alpha XTalk	18-May 05:10	5	0.211			#NUM!
LB4200GD4	Above	Beta eff	18-May 05:18	5	28316	5000	7000	+66.95
LB4200GD4	Above	Beta XTalk	18-May 05:18	5	6.57E-4			#NUM!
LB4200OA2	Above	Alpha bkg	18-May 03:03	60	0.333	-2.03E-1	0.528	+1.40
LB4200OA2	Below	Alpha XTalk	18-May 05:33	5	0.197	0.199	0.220	-3.72
LB4200OA2	need 2nd	Beta XTalk	18-May 05:42	5	0.001	9.09E-4	0.002	+1.03
LB4200OA3	Above	Alpha bkg	18-May 03:03	60	0.317	0.014	0.814	-0.73
LB4200OA4	need 2nd	Alpha XTalk	18-May 05:33	5	0.194	0.193	0.207	-2.71
LB4200OB2	Above	Alpha bkg	18-May 03:03	60	0.400	0.048	0.499	+1.68
LB4200OB2	need 2nd	Alpha XTalk	18-May 05:33	5	0.196	0.192	0.214	-2.02
LB4200OB2	need 2nd	Beta XTalk	18-May 05:42	5	0.004	0.002	0.004	+1.85
LB4200OB3	need 2nd	Alpha bkg	18-May 03:03	60	0.250	-3.18E-1	0.972	-0.36
LB4200OB3	need 2nd	Beta eff	18-May 05:42	5	17530	17170	17840	+0.23
LB4200OB3	need 2nd	Beta XTalk	18-May 05:42	5	0.003	0.001	0.003	+1.94
LB4200OB4	Above	Alpha bkg	18-May 03:03	60	0.350	-1.84E-1	0.661	+0.79
LB4200OB4	Below	Beta eff	18-May 05:42	5	27558	28020	29450	-4.94
LB4200OB4	need 2nd	Beta XTalk	18-May 05:42	5	0.003	0.001	0.003	+1.51
LB4200OC1	Above	Alpha bkg	18-May 03:03	60	0.367	-3.34E-1	1.090	-0.05
LB4200OC1	Above	Beta XTalk	18-May 05:34	5	0.002	0.001	0.002	+3.34
LB4200OC2	need 2nd	Alpha bkg	18-May 03:03	60	0.183	-2.21E-1	0.664	-0.26
LB4200OC2	need 2nd	Alpha XTalk	18-May 05:25	5	0.184	0.183	0.205	-2.68
LB4200OC2	Above	Beta XTalk	18-May 05:34	5	0.003	0.001	0.002	+3.97

LB4200OC3	Above	Alpha bkg	18-May 03:03	60	0.567	-3.32E-1	1.159	+0.62
LB4200OC3	Above	Beta XTalk	18-May 05:34	5	0.002	0.001	0.002	+4.05
LB4200OC4	need 2nd	Alpha XTalk	18-May 05:25	5	0.193	0.189	0.209	-1.89
LB4200OC4	need 2nd	Beta eff	18-May 05:34	5	17114	16880	17510	-0.77
LB4200OC4	need 2nd	Beta XTalk	18-May 05:34	5	0.002	0.001	0.002	+0.78
LB4200OD1	need 2nd	Beta XTalk	18-May 05:34	5	0.002	7.13E-4	0.002	+2.26
LB4200OD2	Above	Alpha bkg	18-May 03:03	60	0.367	-3.05E-1	0.885	+0.39
LB4200OD2	Below	Alpha XTalk	18-May 05:25	5	0.188	0.191	0.206	-4.42
LB4200OD2	Above	Beta XTalk	18-May 05:34	5	0.003	0.001	0.003	+4.96
LB4200OD3	Above	Alpha bkg	18-May 03:03	60	0.483	-4.32E-1	1.246	+0.27
LB4200OD3	need 2nd	Alpha XTalk	18-May 05:25	5	0.189	0.188	0.203	-2.92
LB4200OD3	Above	Beta XTalk	18-May 05:34	5	0.002	9.70E-4	0.002	+3.82
LB4200OD4	need 2nd	Alpha XTalk	18-May 05:25	5	0.190	0.188	0.204	-2.29
LB4200OD4	Above	Beta XTalk	18-May 05:34	5	0.002	7.35E-4	0.001	+3.88
PIC4B	Above	Alpha bkg	18-May 04:39	60	1.150	0.127	0.391	+20.29
PIC4B	Above	Alpha eff	18-May 04:23	5	10191	8257	9322	+7.90
PIC4B	Above	Alpha XTalk	18-May 04:23	5	0.464	0.258	0.280	+52.14
PIC4B	Below	Beta eff	18-May 04:31	5	16527	18830	21590	-8.01
PIC4B	Above	Beta XTalk	18-May 04:31	5	0.269	0.004	0.012	+205.01
PIC4C	Above	Alpha bkg	18-May 04:39	60	0.483	-7.46E-2	0.393	+4.16
PIC4D	Above	Alpha bkg	18-May 04:39	60	0.333	-3.06E-2	0.375	+2.39
PIC4D	need 2nd	Alpha XTalk	18-May 04:23	5	0.278	0.243	0.292	+1.28
PIC7B	Above	Alpha bkg	18-May 04:50	60	0.317	-1.02E-1	0.431	+1.71
PIC7B	Above	Alpha eff	18-May 04:35	5	12884	11640	12810	+3.38
PIC7B	Above	Beta bkg	18-May 04:50	60	11.850	0.146	1.265	+59.73
PIC7D	Above	Alpha bkg	18-May 08:40	60	0.383	-5.73E-2	0.244	+5.79
PIC8C	Above	Alpha bkg	18-May 04:51	60	0.550	-4.67E-2	0.410	+4.84
PIC8C	Above	Beta bkg	18-May 04:51	60	3.117	0.192	2.560	+4.41
PIC9C	Below	Alpha eff	18-May 04:41	5	7003	8902	9847	-15.06
PIC9C	Above	Alpha XTalk	18-May 04:41	5	0.546	0.245	0.271	+64.75
PIC9C	Below	Beta eff	18-May 04:50	5	18748	20720	21580	-16.76
PIC10B	Above	Alpha bkg	18-May 08:34	60	0.350	-5.44E-2	0.429	+2.02
PIC10C	Above	Alpha bkg	18-May 04:58	60	0.483	-1.05E-1	0.324	+5.23
PIC10C	Above	Alpha XTalk	18-May 04:41	5	0.396	0.259	0.349	+6.15
PIC10D	Above	Alpha eff	18-May 06:13	5	15778	14450	15710	+3.32
PIC11C	need 2nd	Alpha bkg	18-May 09:14	60	0.117	-7.26E-3	0.365	-1.00

PIC11C	Above	Alpha eff	18-May 09:00	5	9286	8610	9087	+5.50
PIC11D	Above	Alpha bkg	18-May 09:03	60	0.450	-4.15E-2	0.378	+4.03
PIC12B	Above	Alpha bkg	18-May 05:00	60	0.350	-8.27E-2	0.413	+2.23
PIC12B	Below	Alpha eff	18-May 04:46	5	7632	8099	9637	-4.82
PIC12B	Above	Alpha XTalk	18-May 04:46	5	0.536	0.227	0.345	+12.74
PIC12B	Below	Beta eff	18-May 04:54	5	16464	19640	22740	-9.15
PIC12C	Below	Alpha eff	18-May 07:39	5	14931	19230	21210	-16.03
PIC12C	Above	Alpha XTalk	18-May 07:39	5	0.544	0.250	0.299	+32.86
PIC12C	Below	Beta eff	18-May 04:54	5	20407	24580	26780	-14.38
PIC12D	Above	Alpha eff	18-May 09:00	5	18377	14510	17270	+5.41
PIC14A	Above	Alpha bkg	18-May 05:07	60	0.700	-2.48E-2	0.292	+10.72
PIC14B	Above	Beta bkg	18-May 07:36	60	6.567	-7.38E-1	2.727	+9.65
PIC14D	Above	Beta bkg	18-May 05:08	60	2.917	-2.45E-1	2.368	+4.26

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

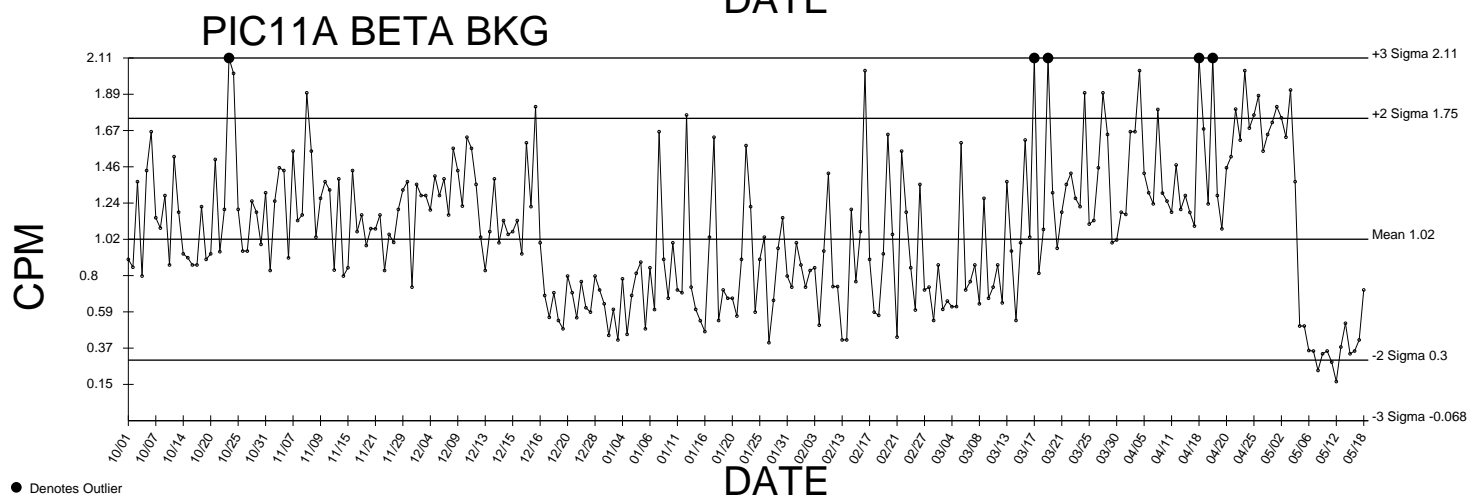
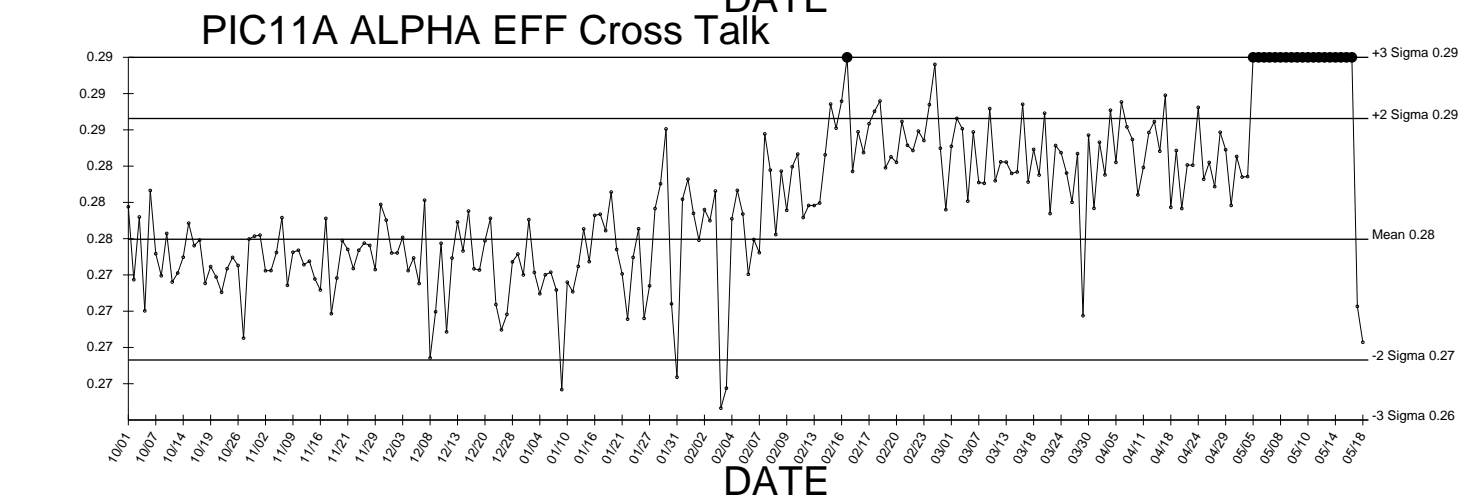
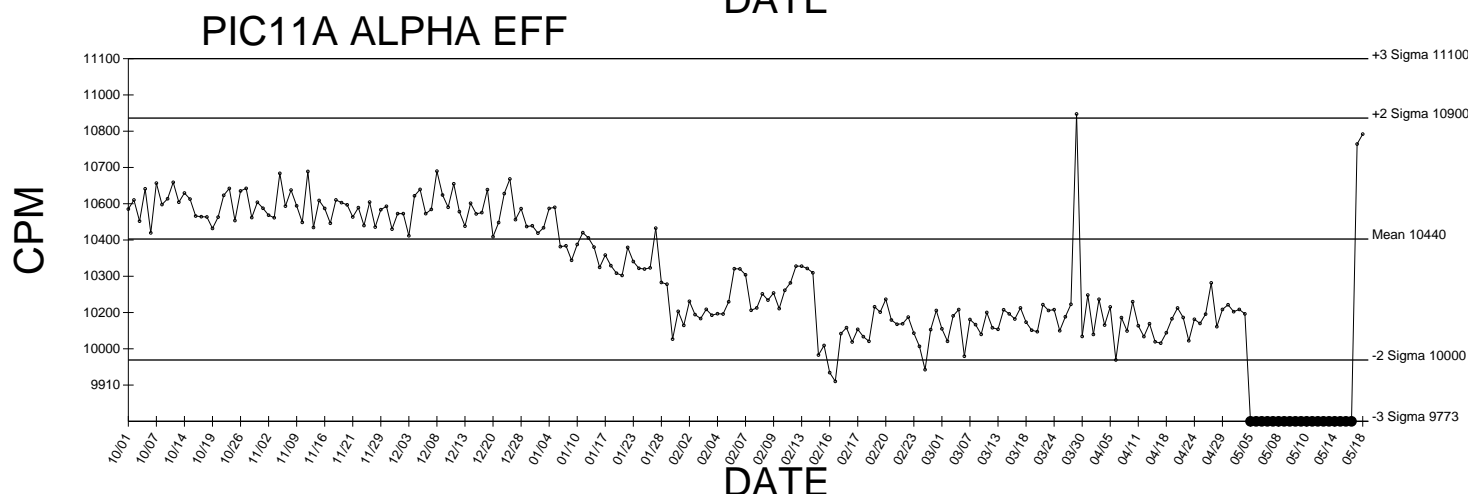
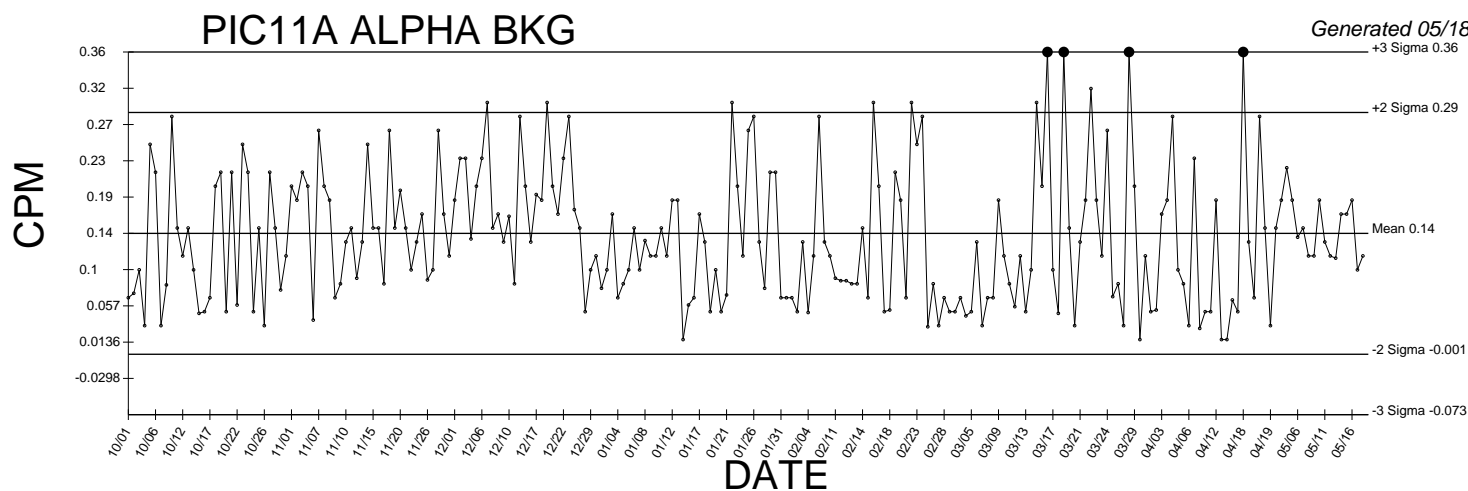
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LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC5C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

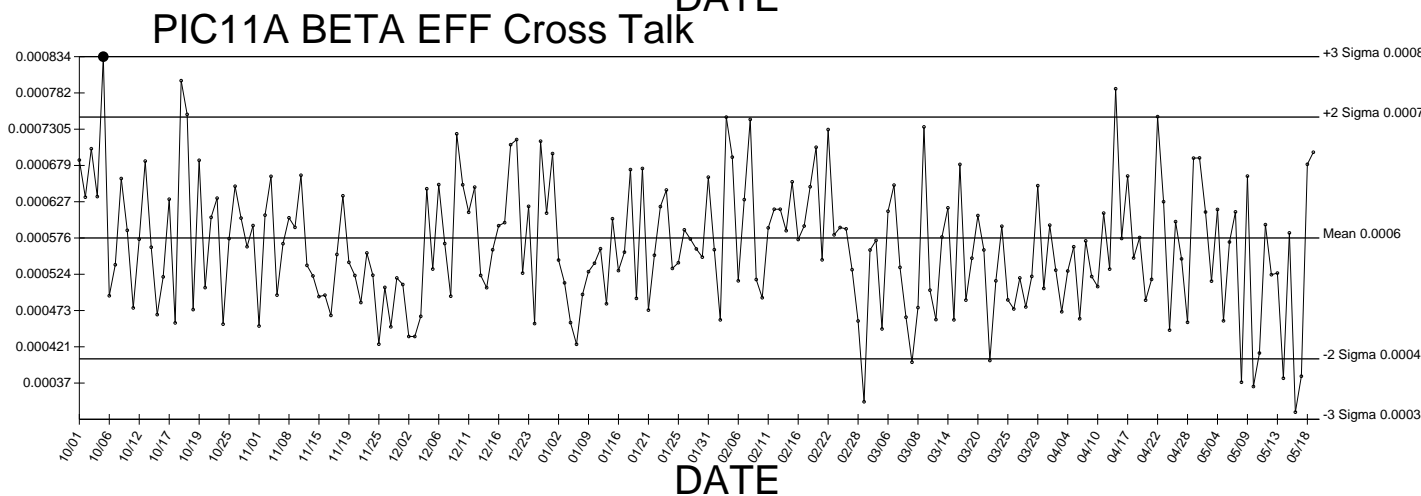
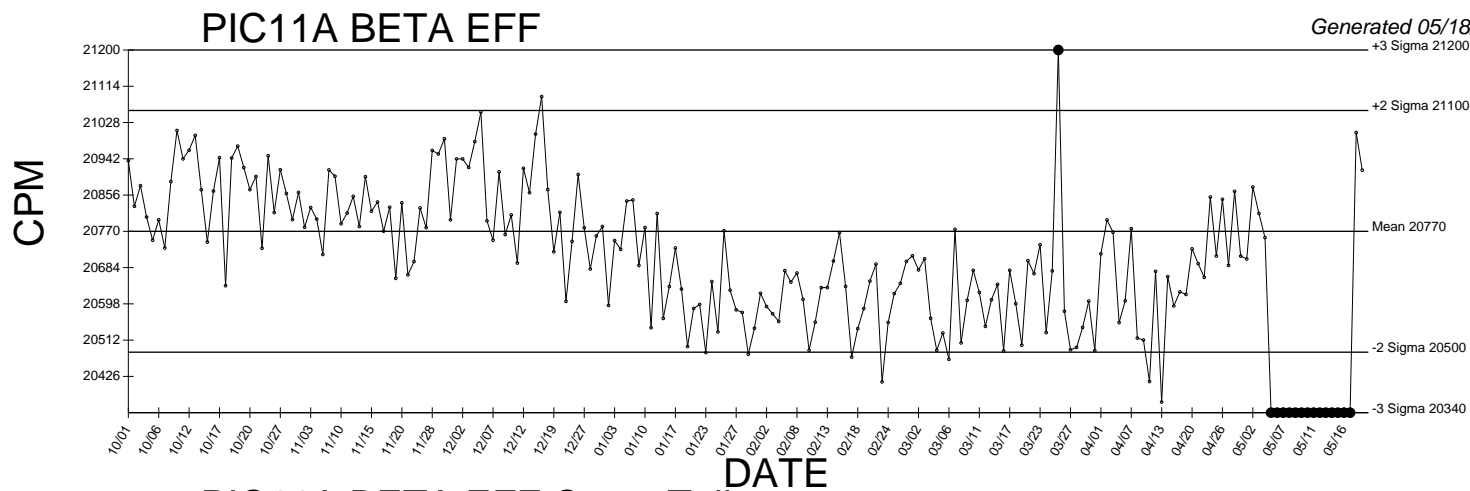
Reviewed by R. Birch-Harmer

Date 5-18-23

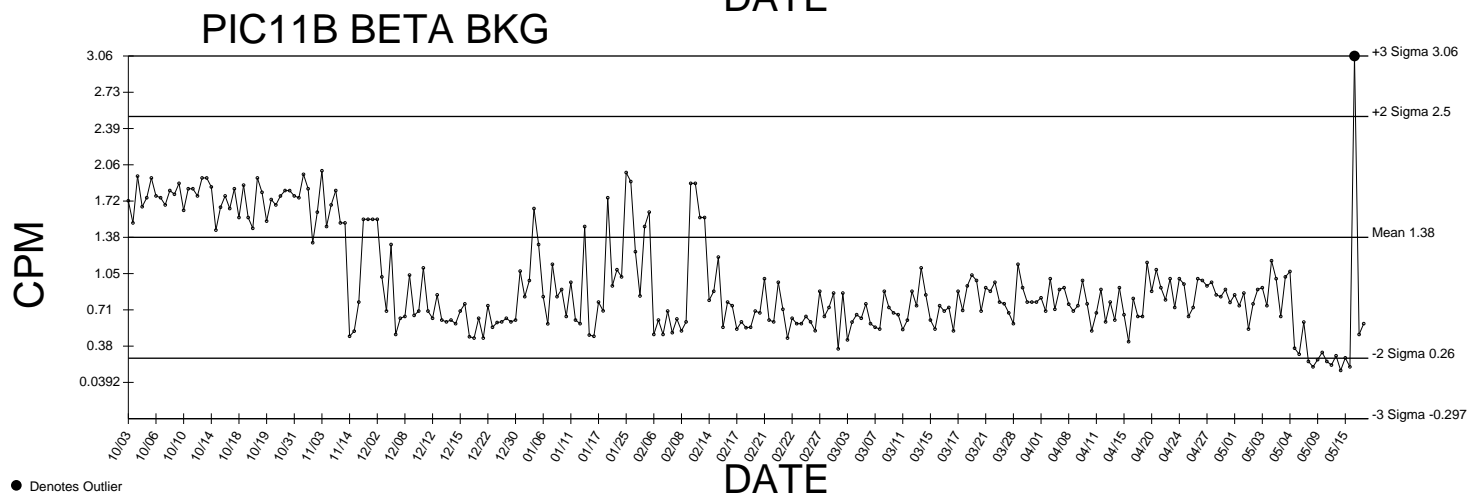
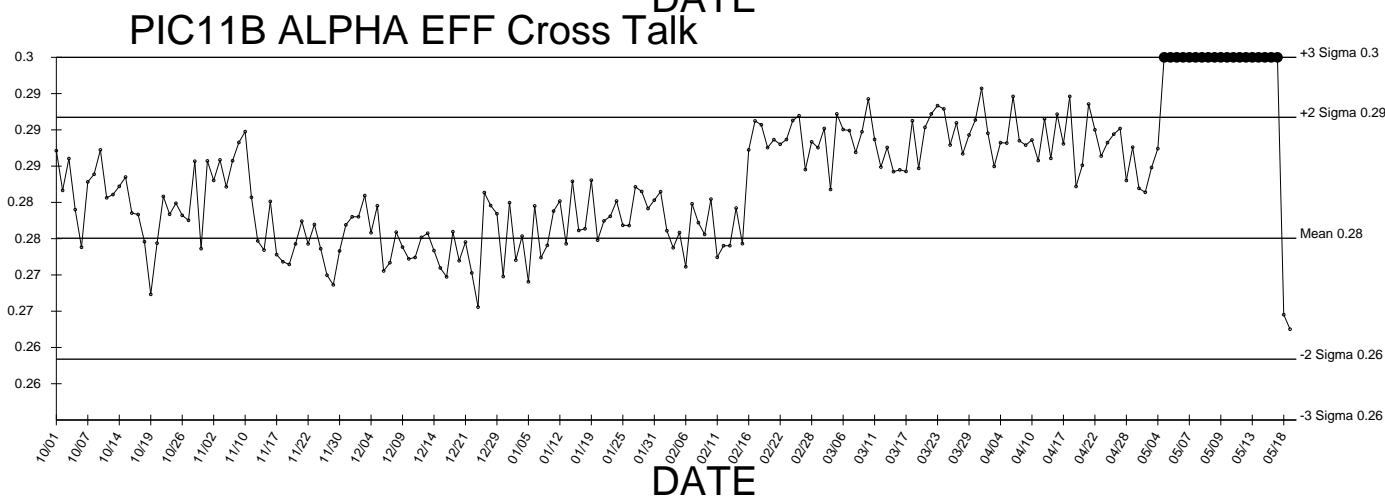
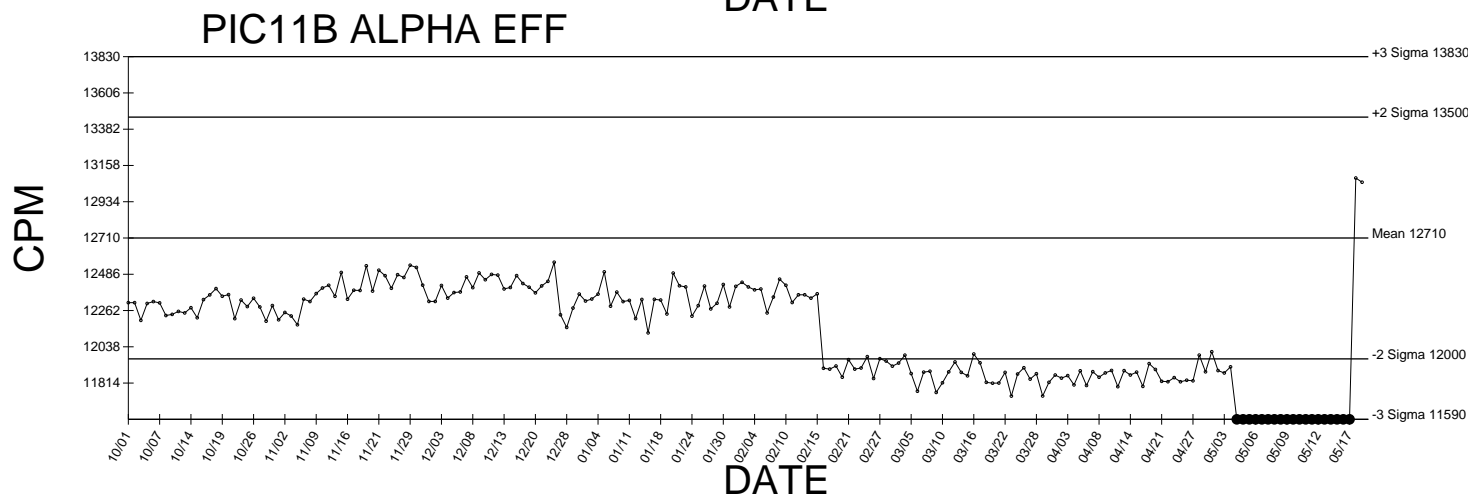
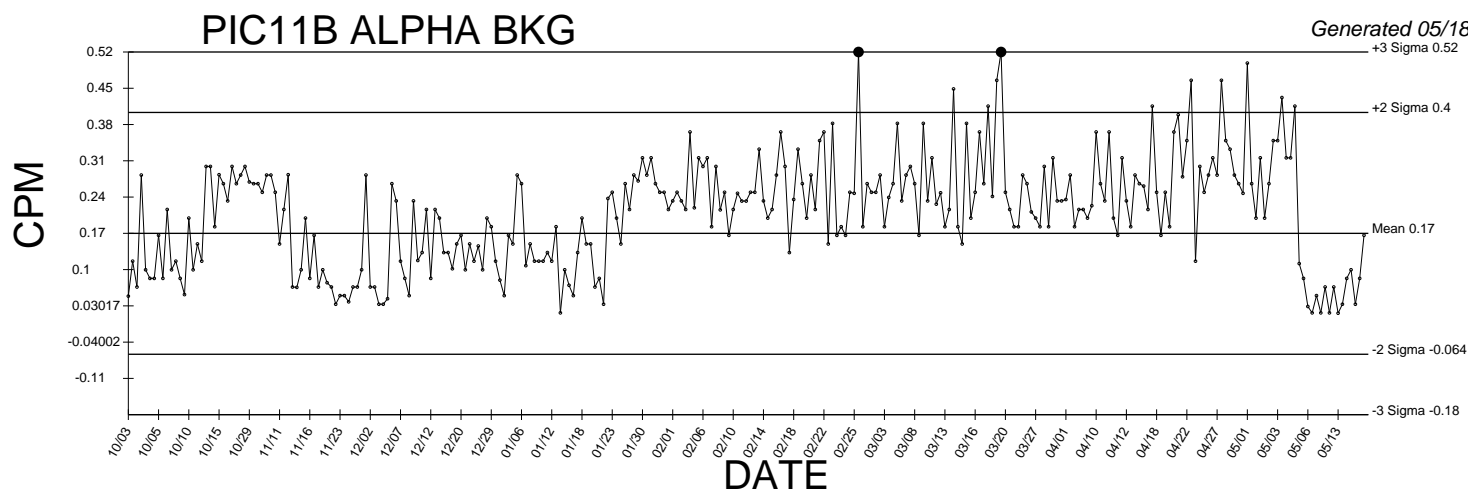
GEL Laboratories LLC

Background and Efficiency Data





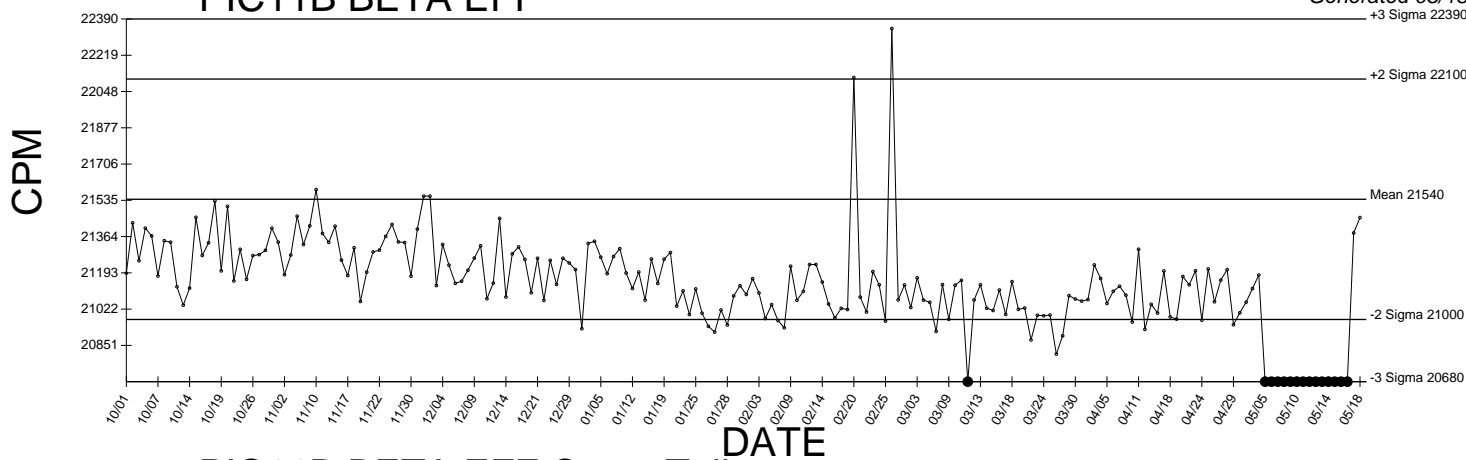
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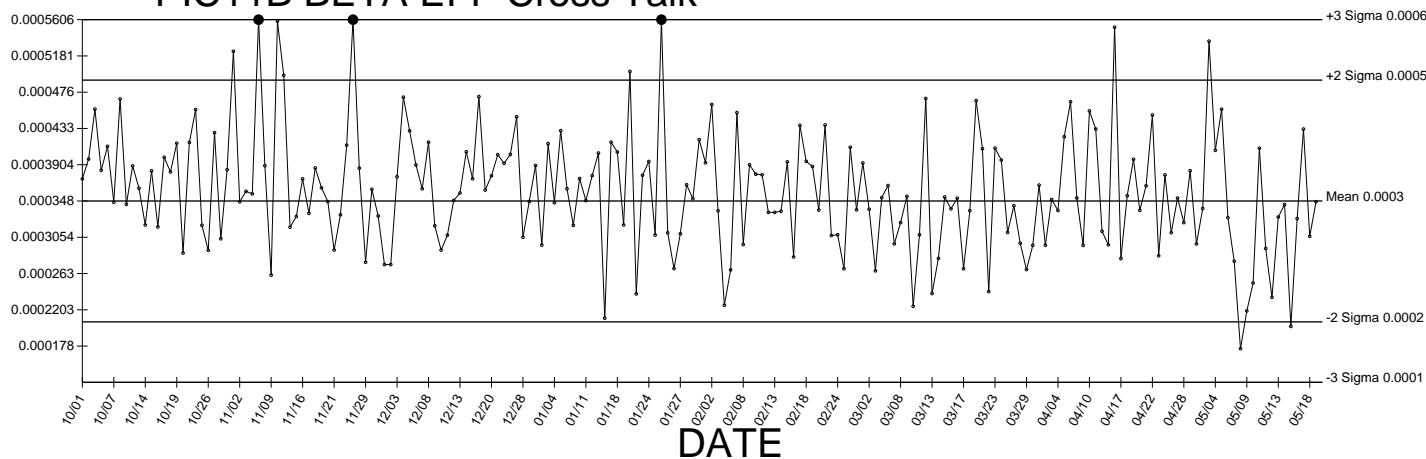
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PIC11B BETA EFF

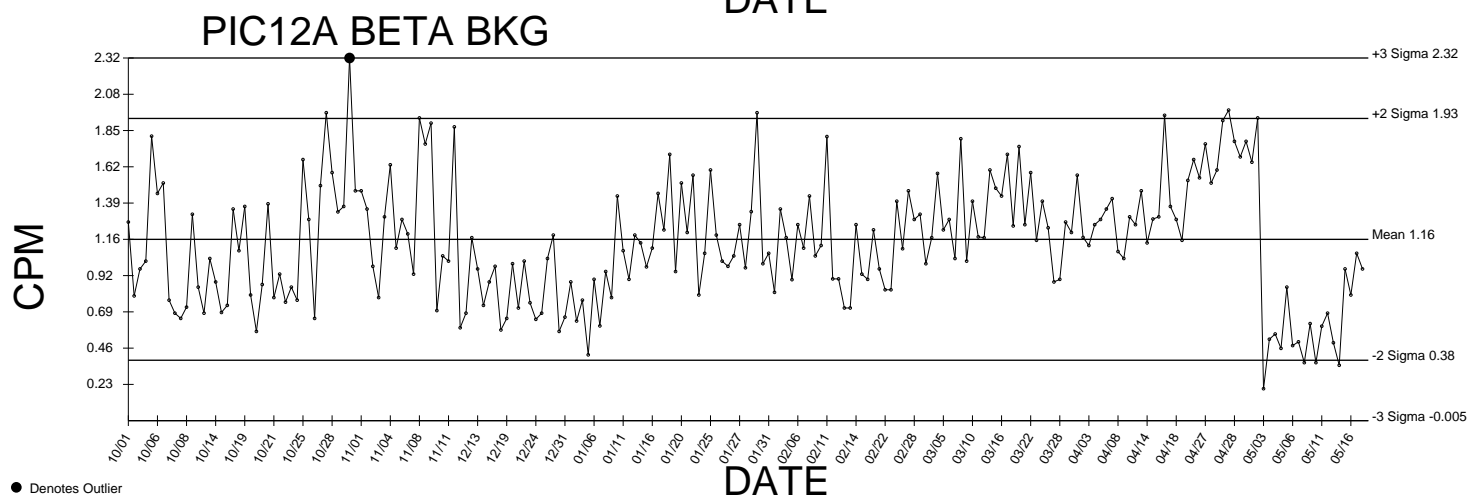
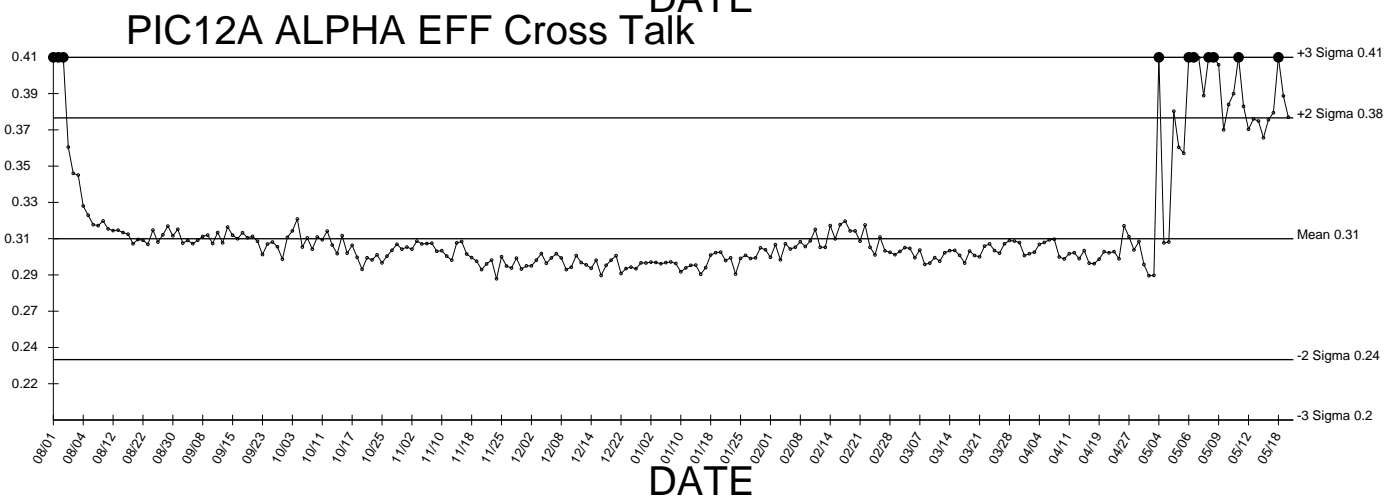
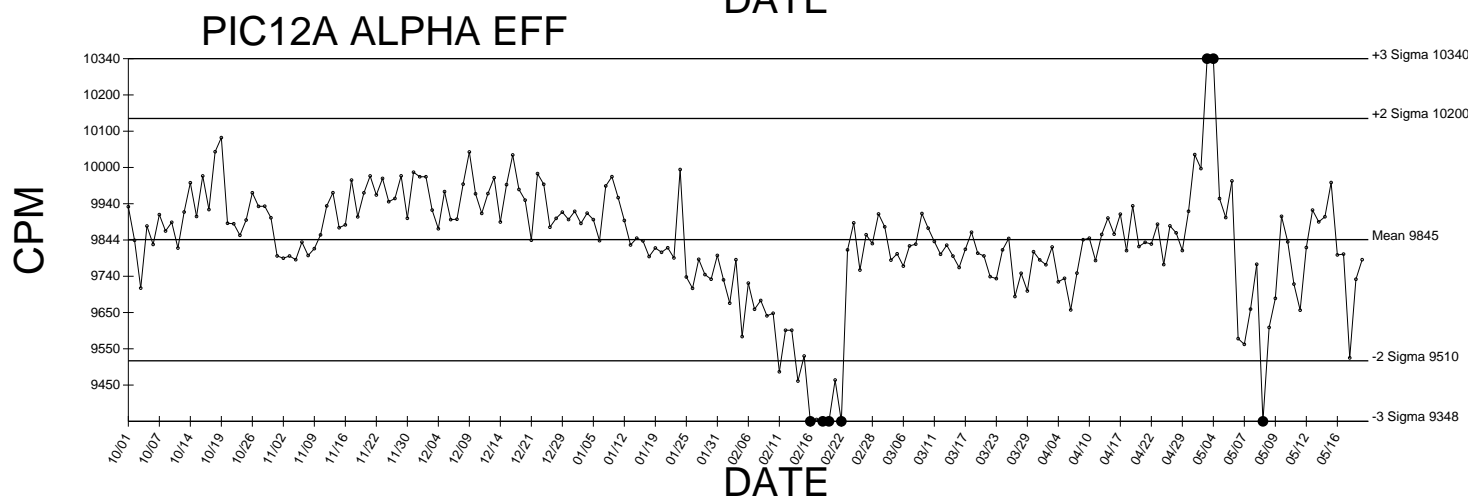
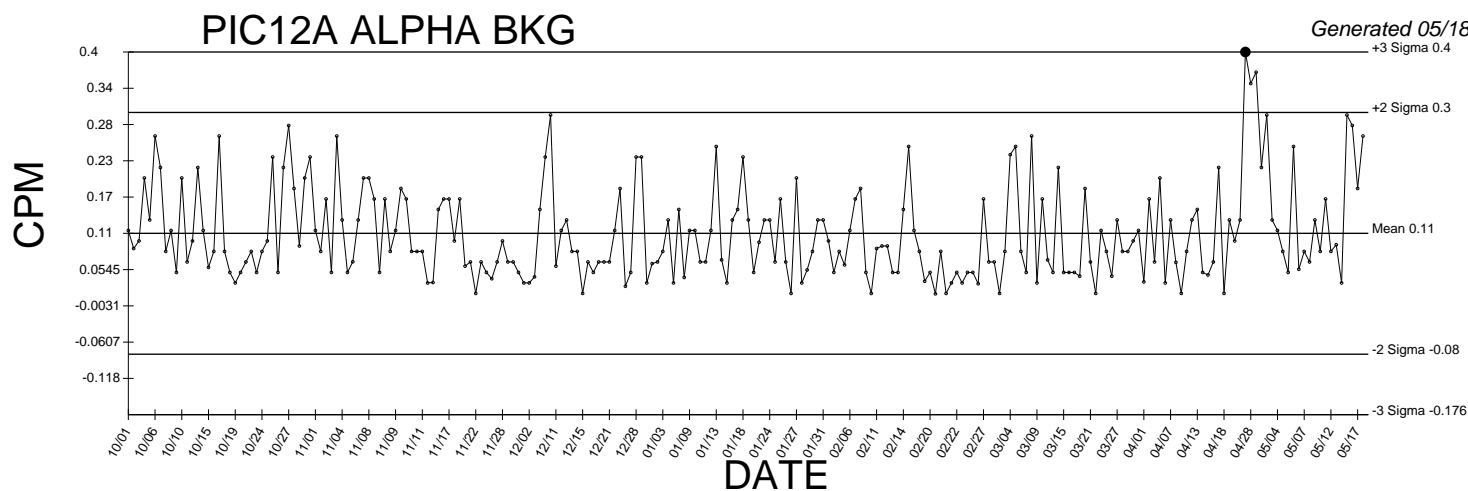
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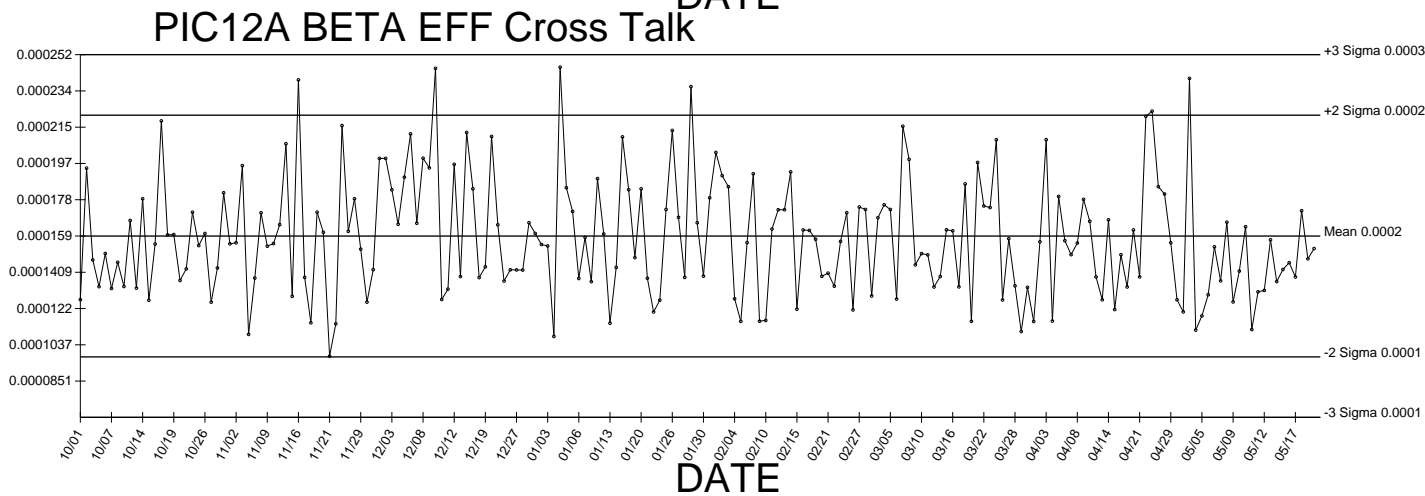
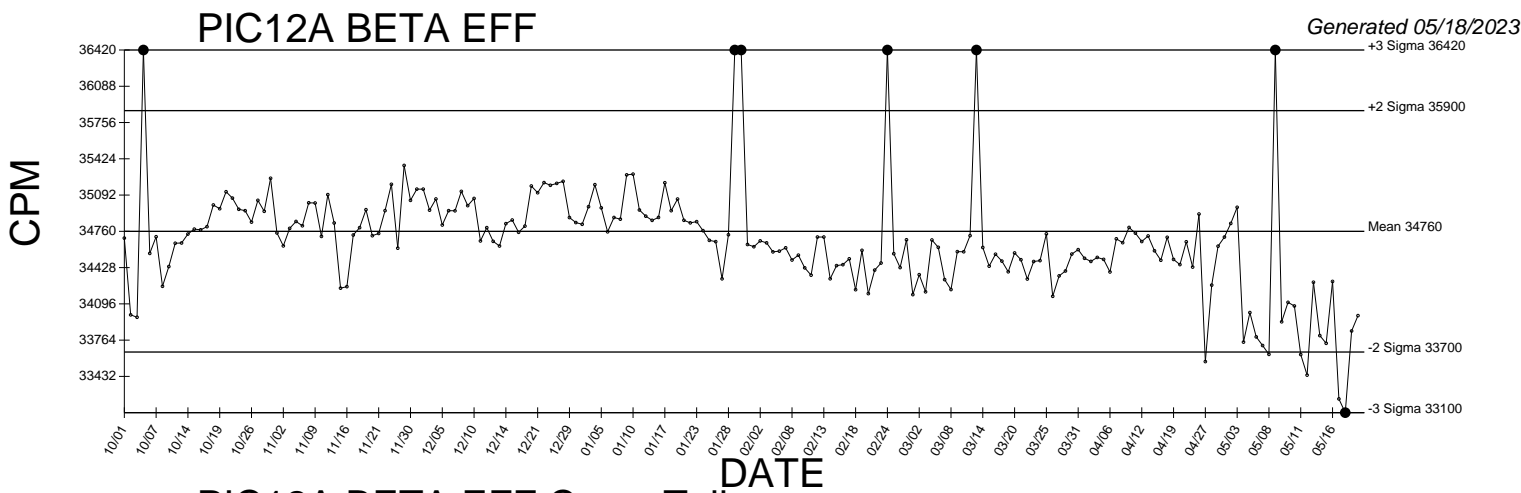
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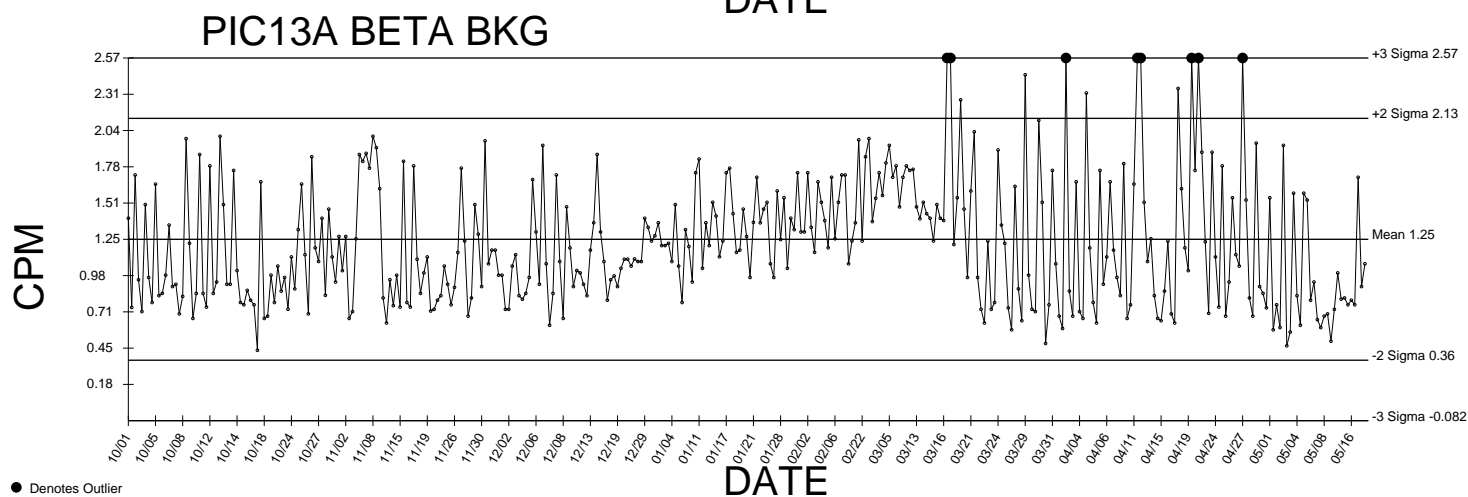
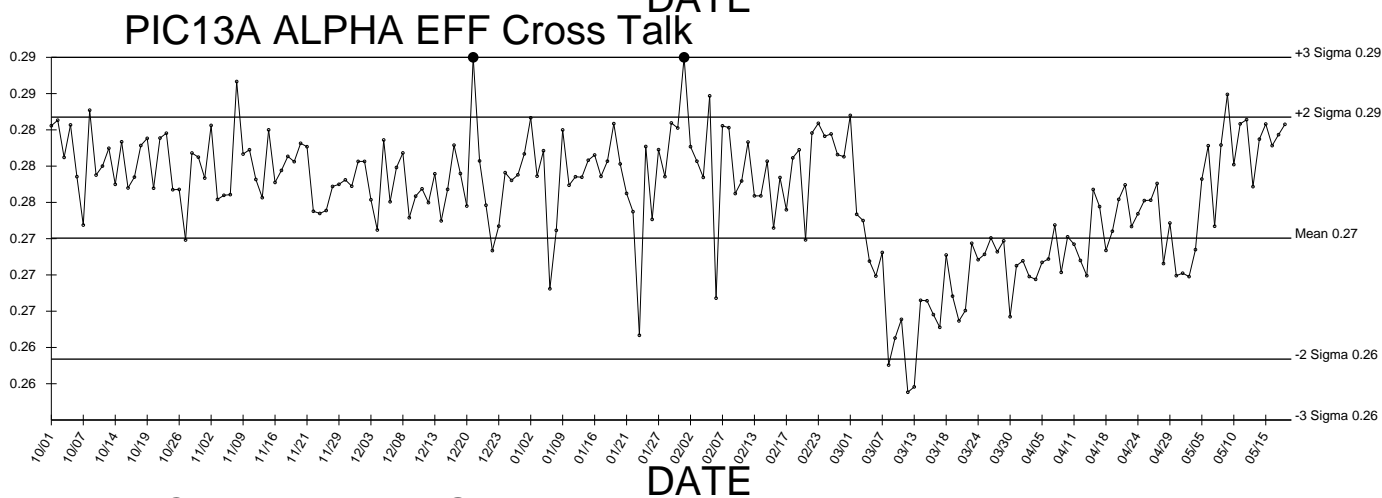
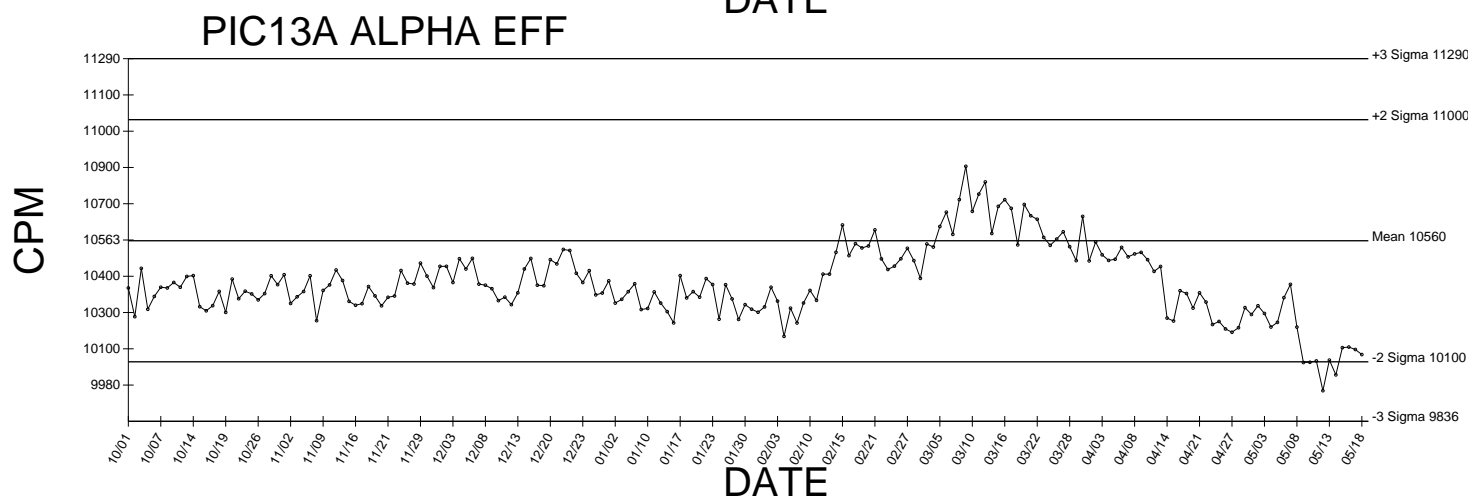
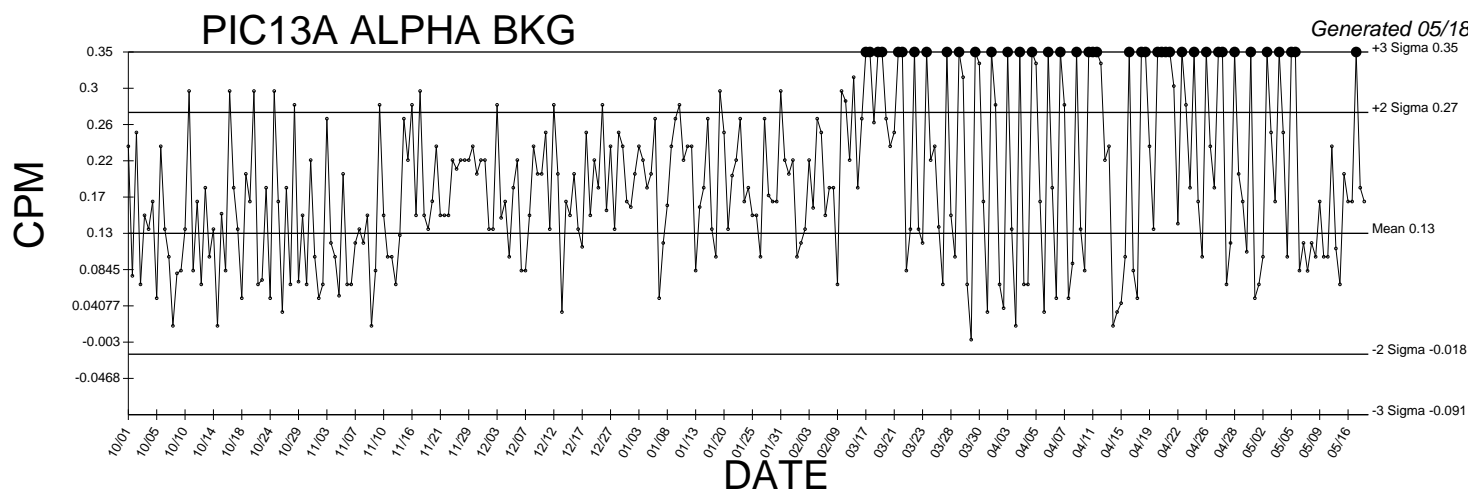
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● Denotes Outlier



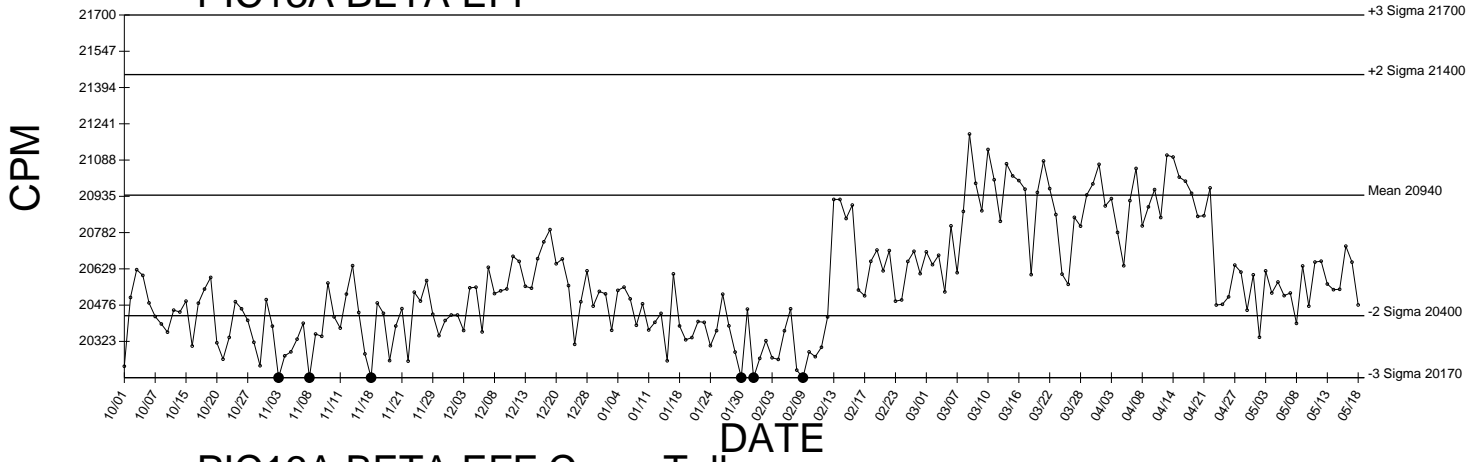
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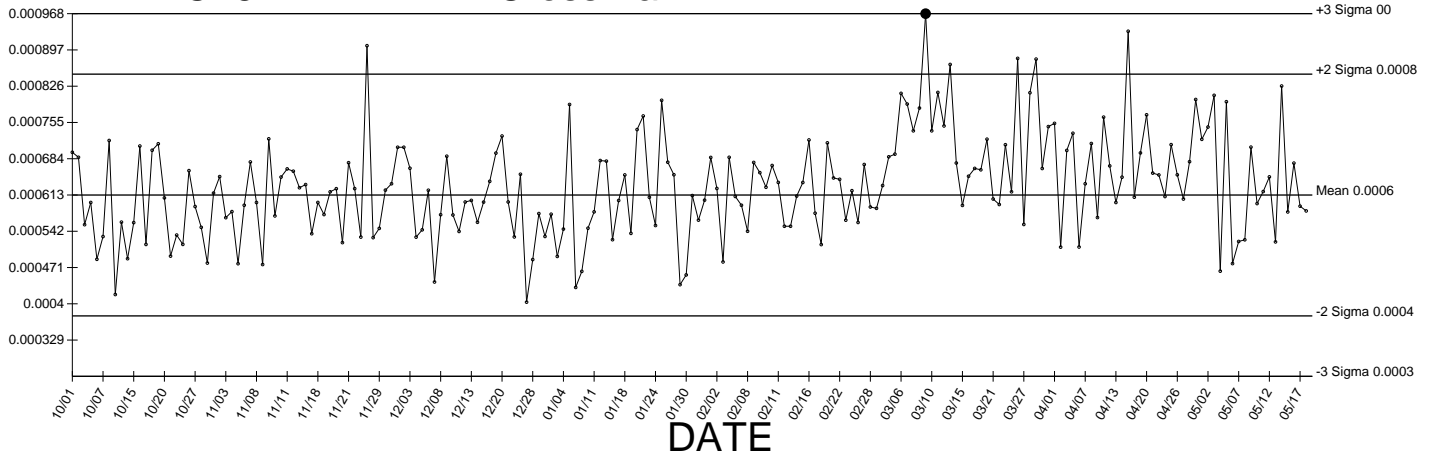
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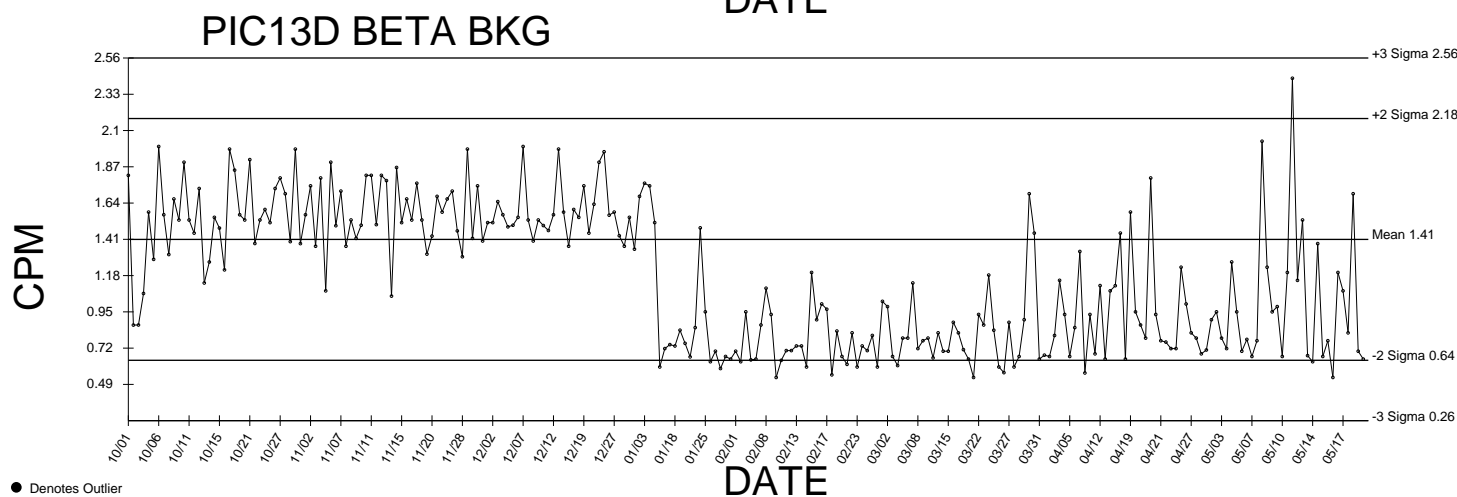
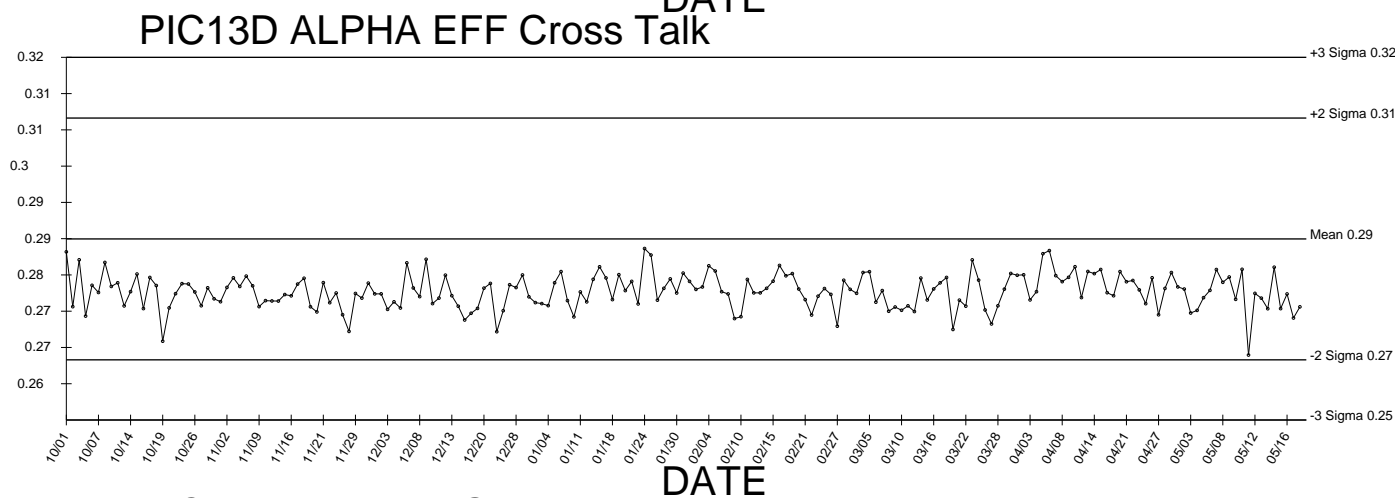
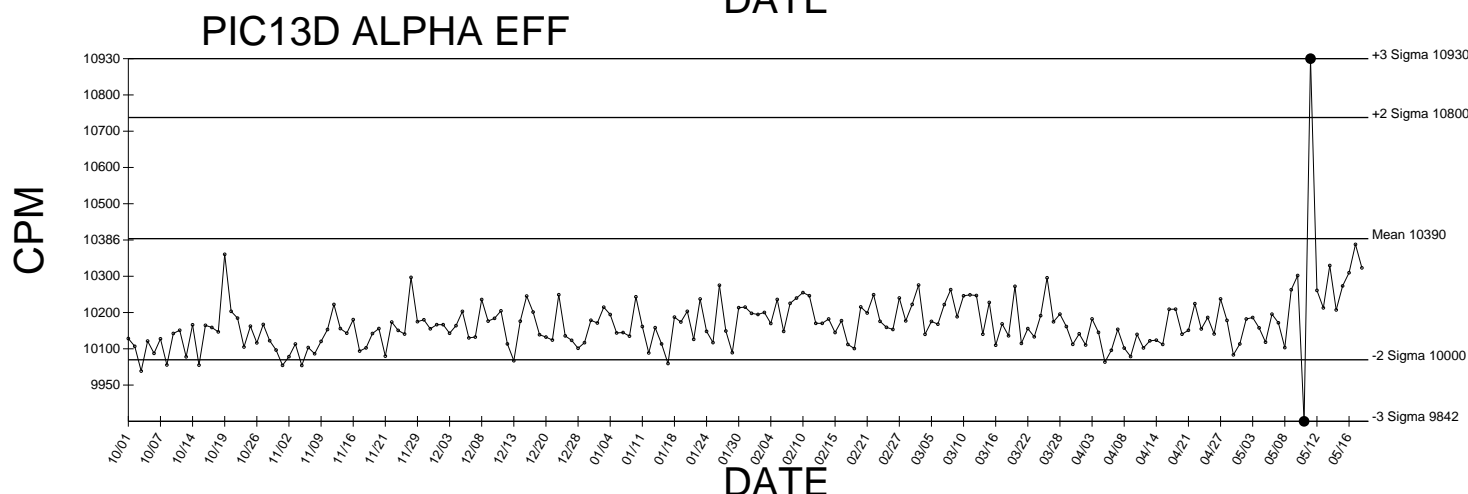
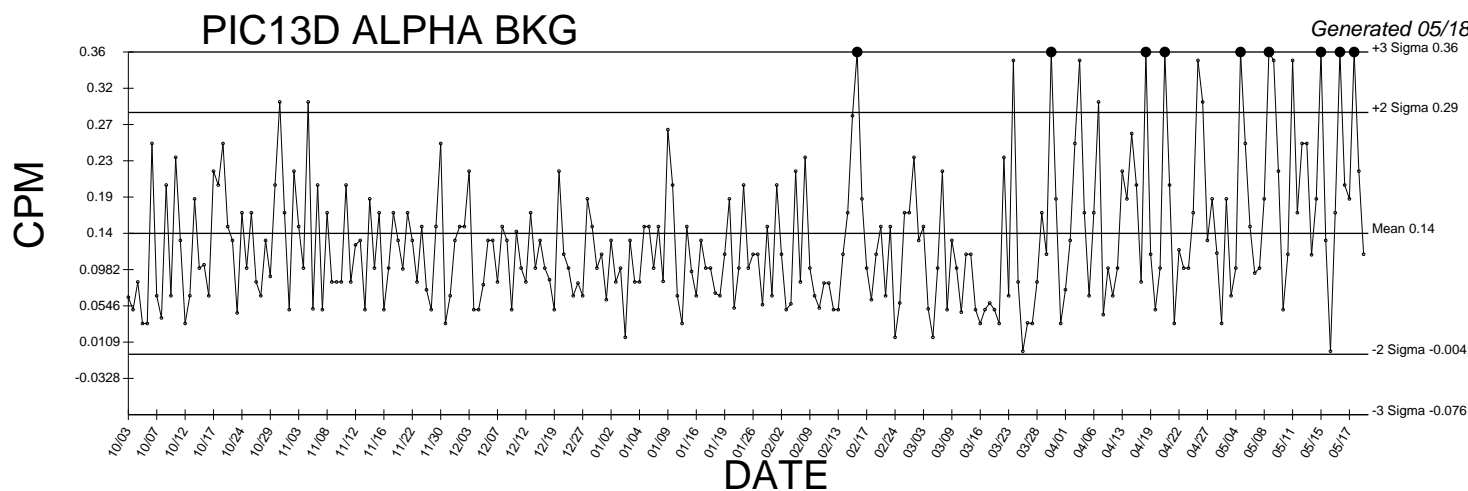
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PIC13A BETA EFF Cross Talk

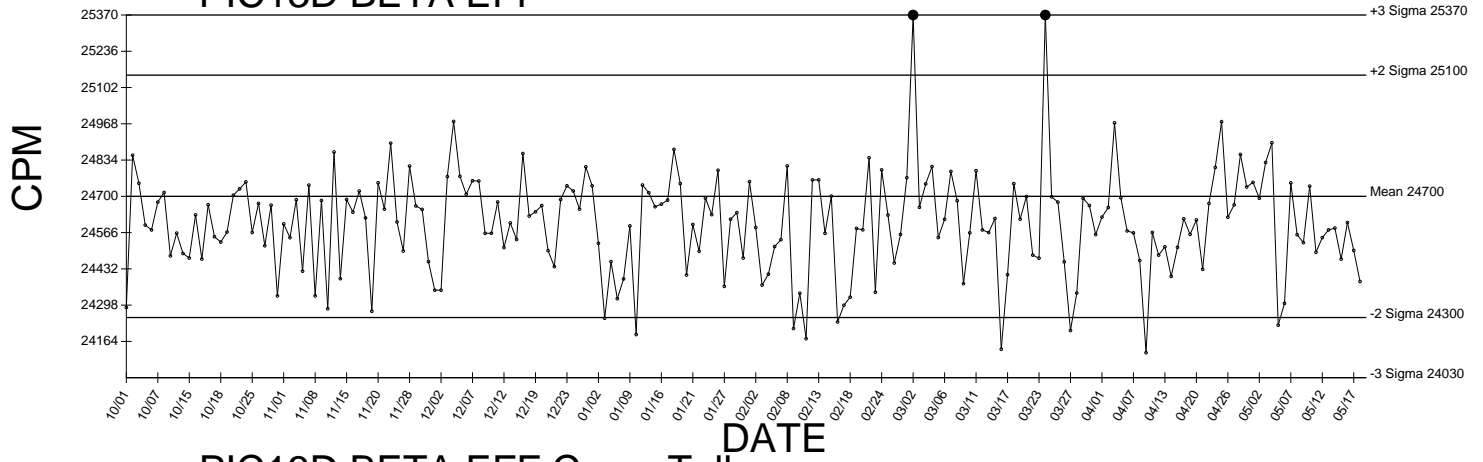


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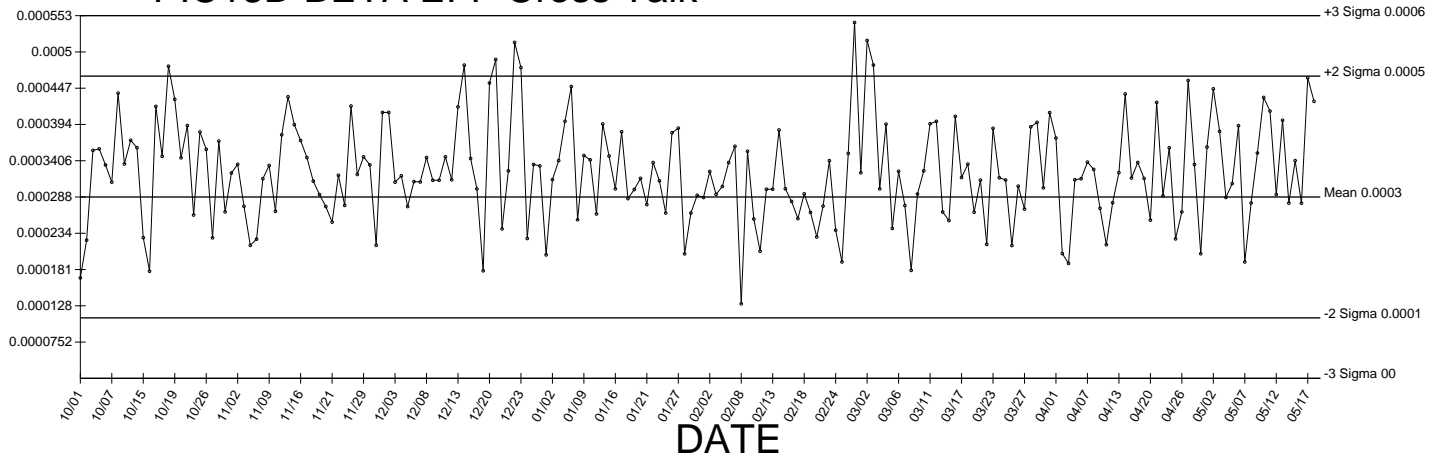


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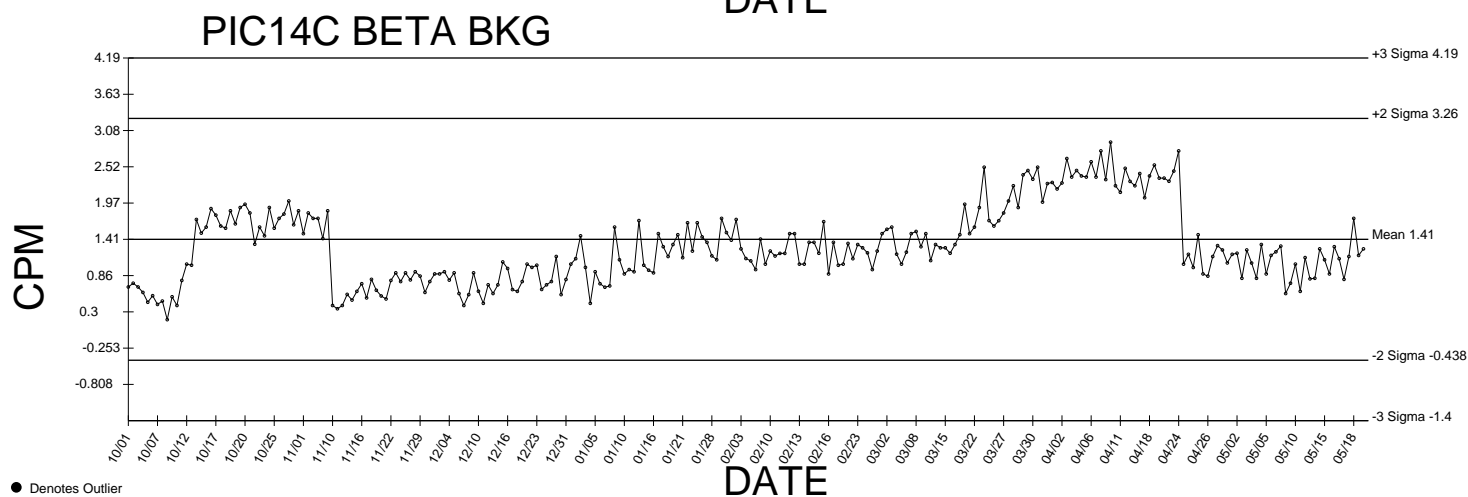
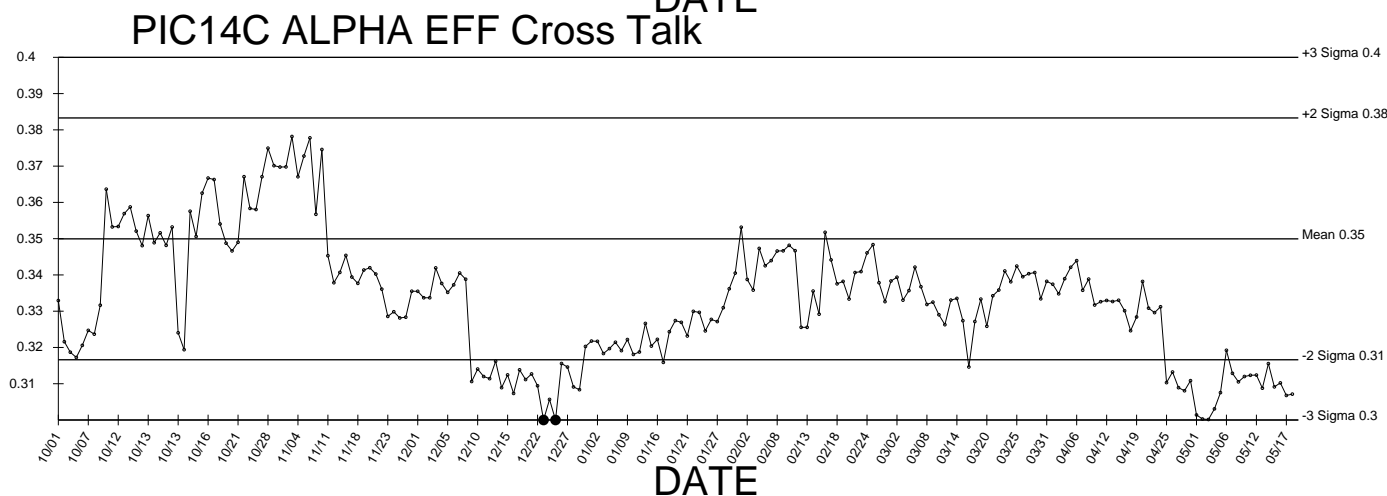
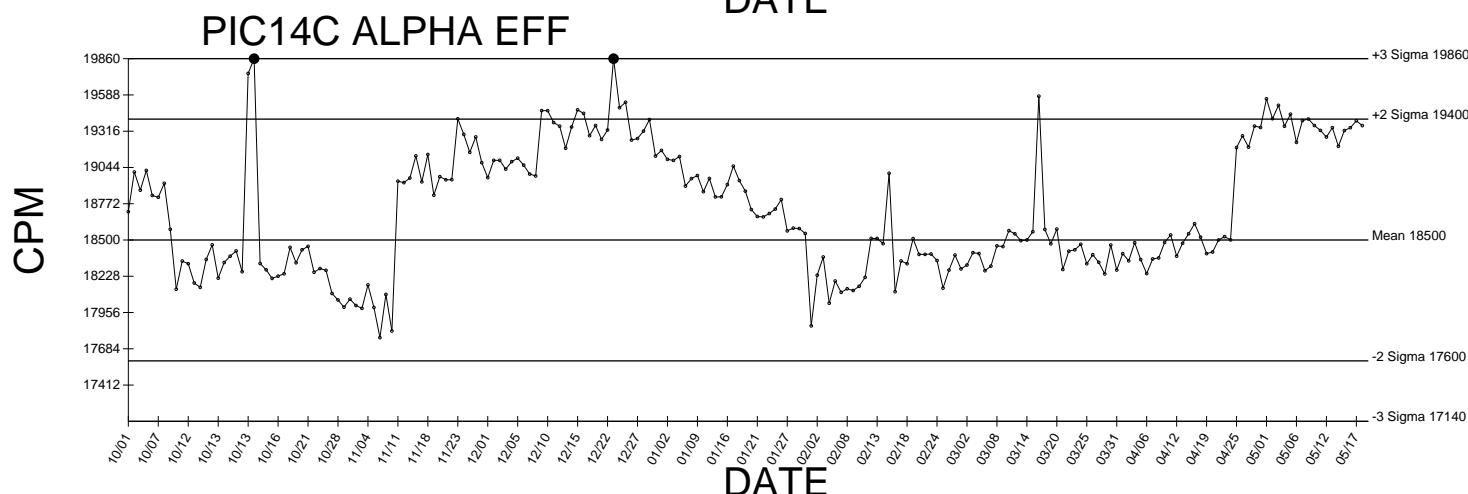
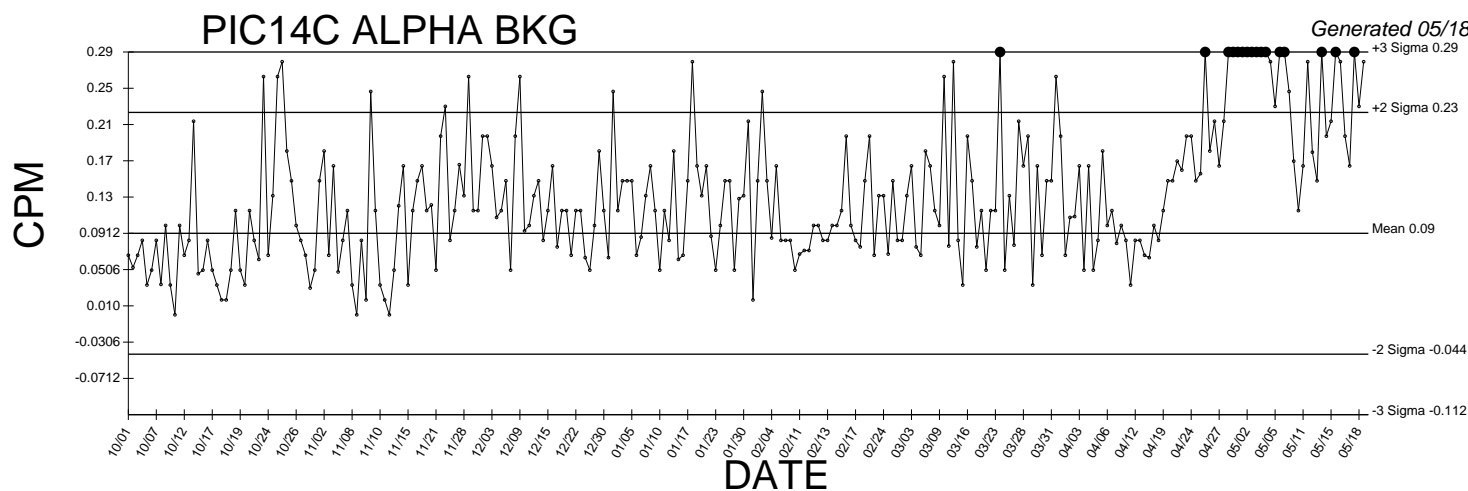
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PIC13D BETA EFF Cross Talk



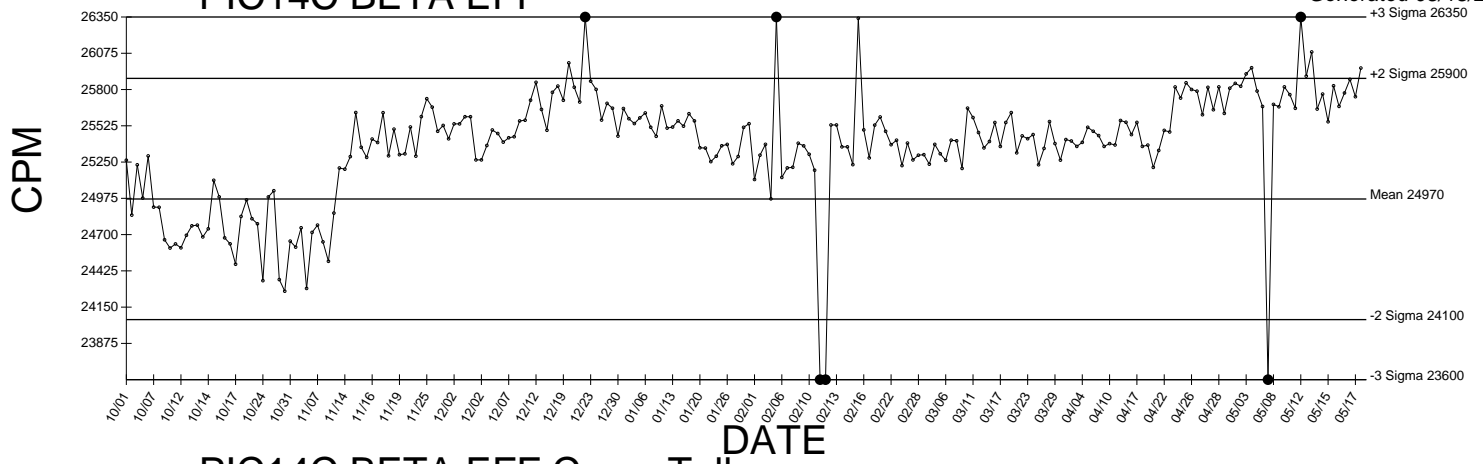
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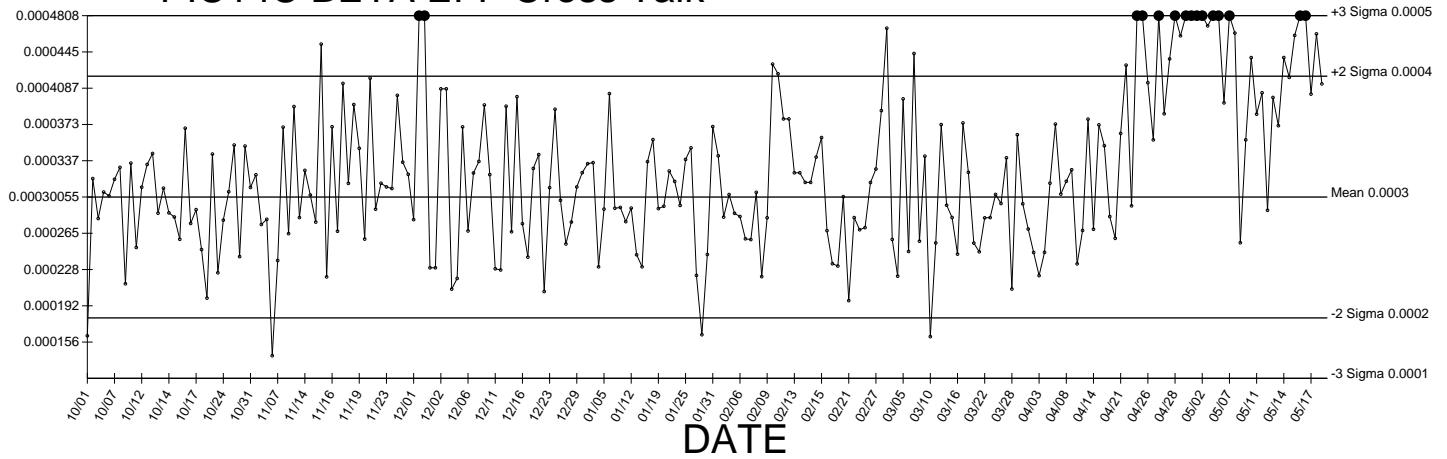
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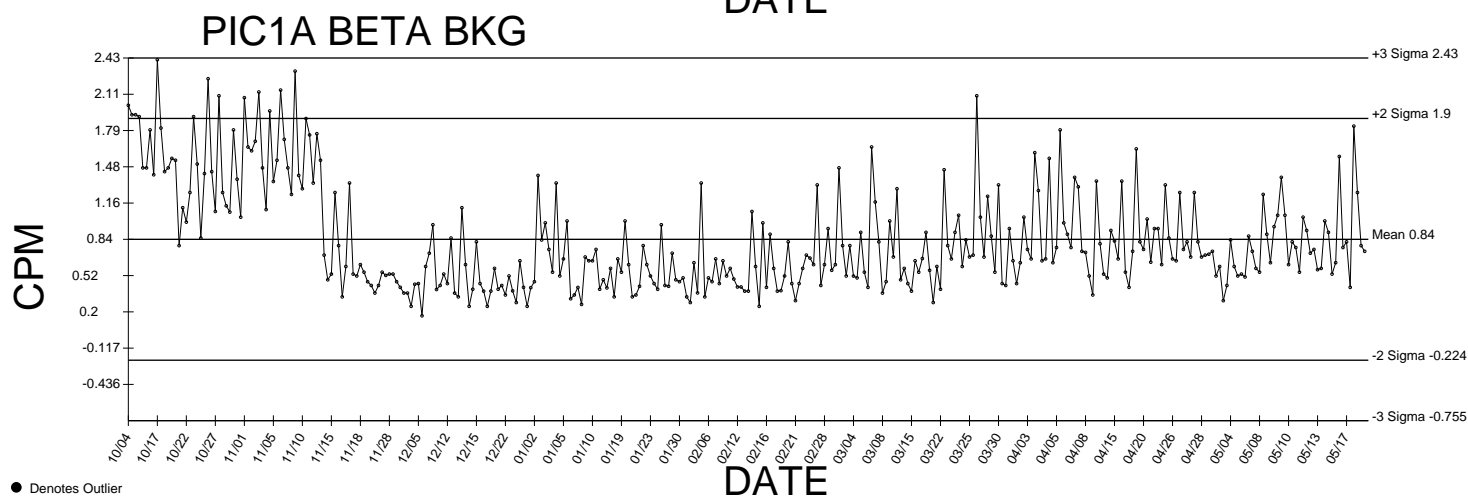
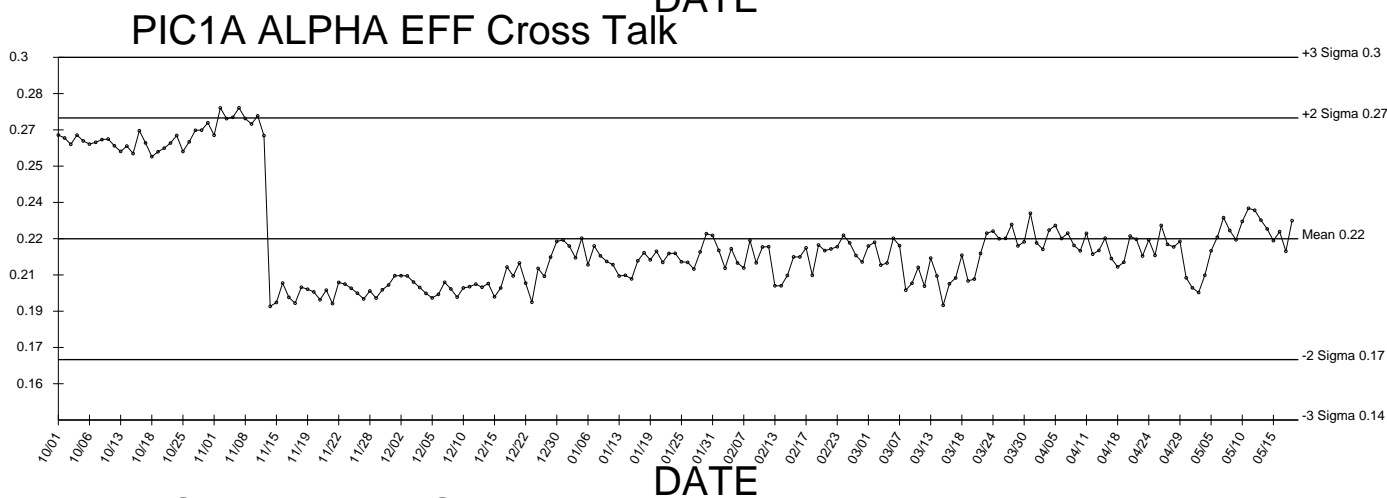
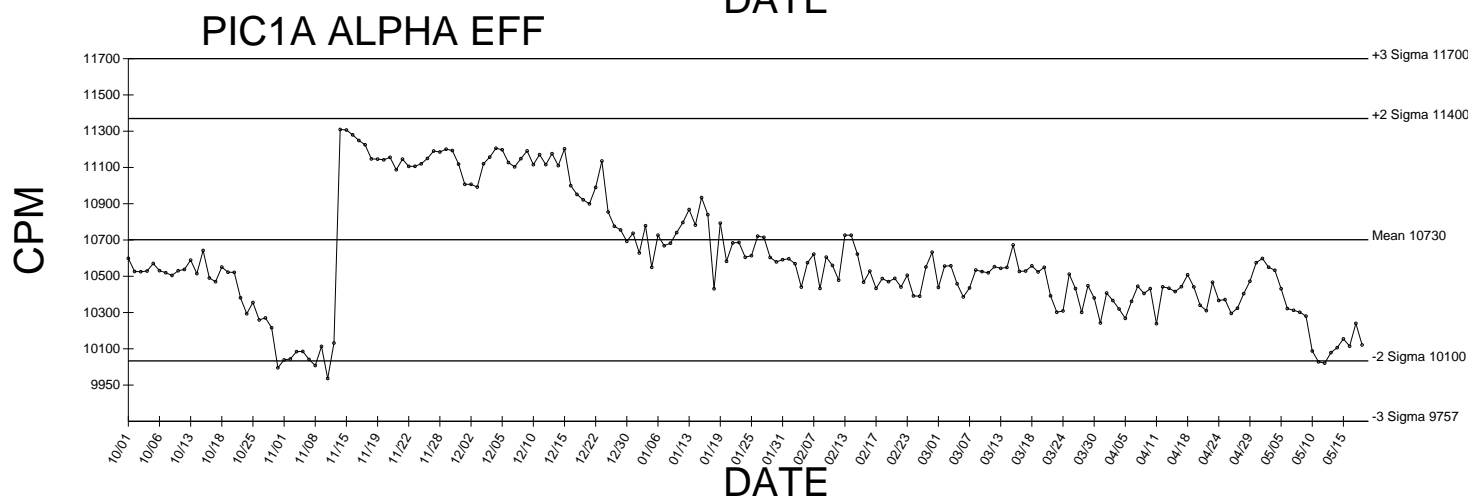
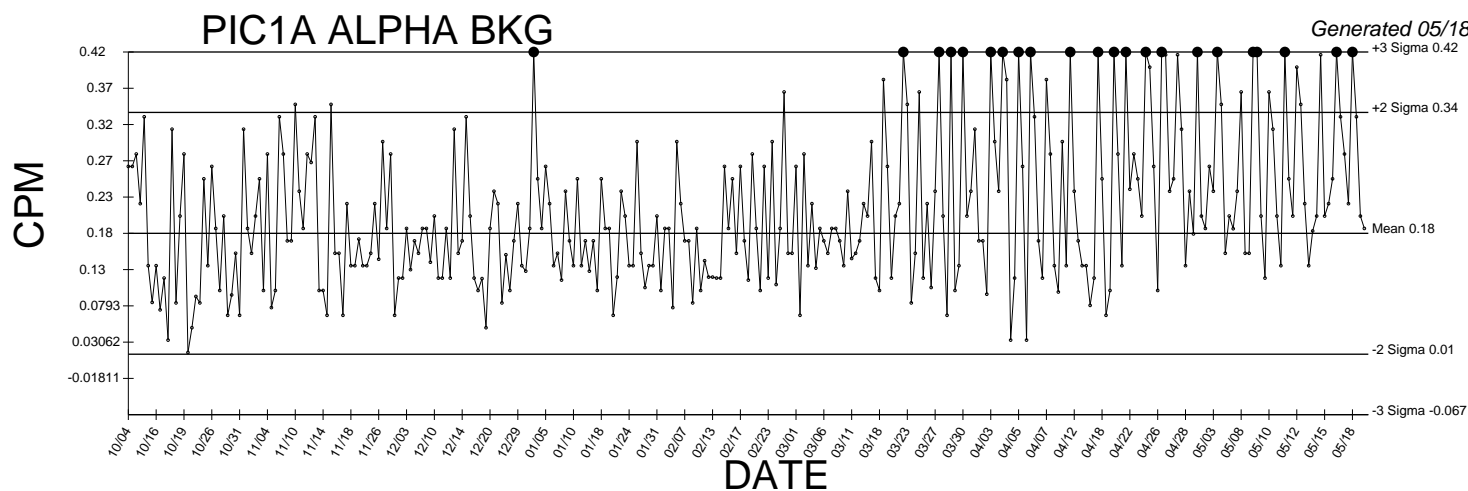
PIC14C BETA EFF

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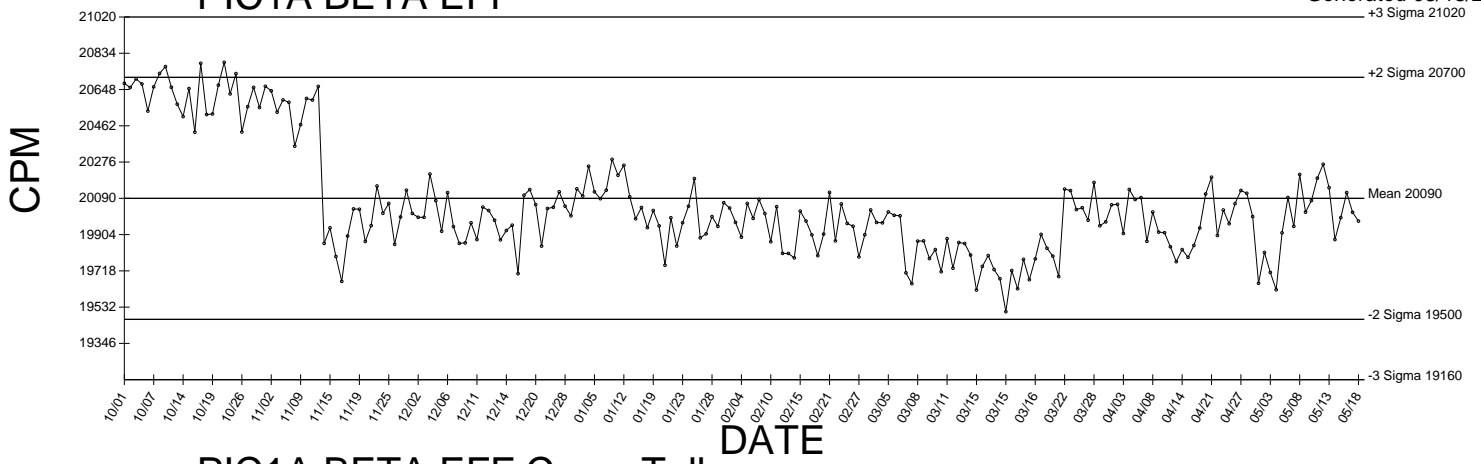




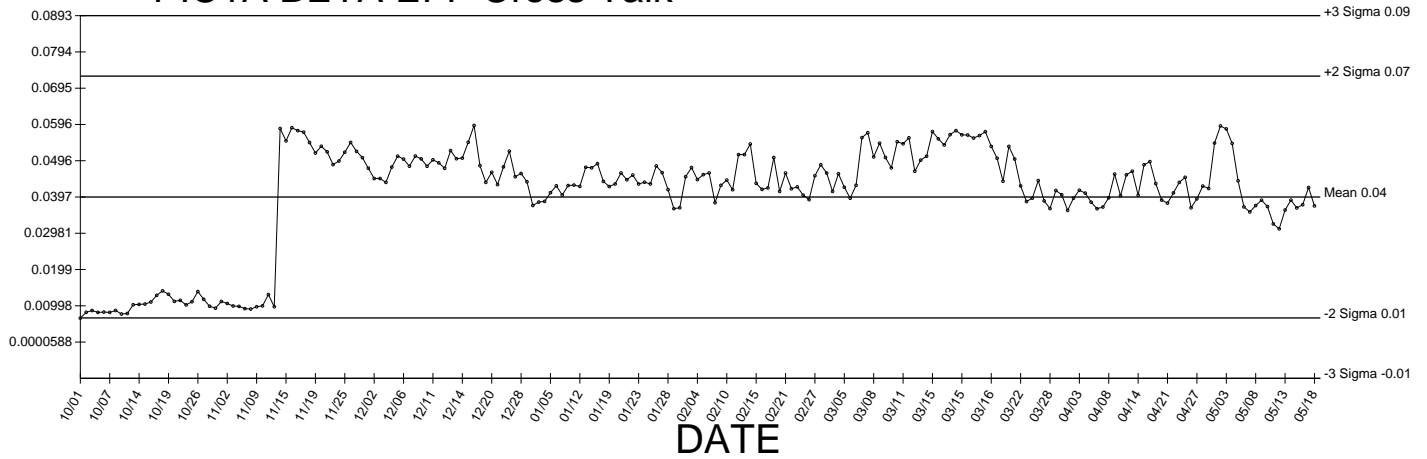
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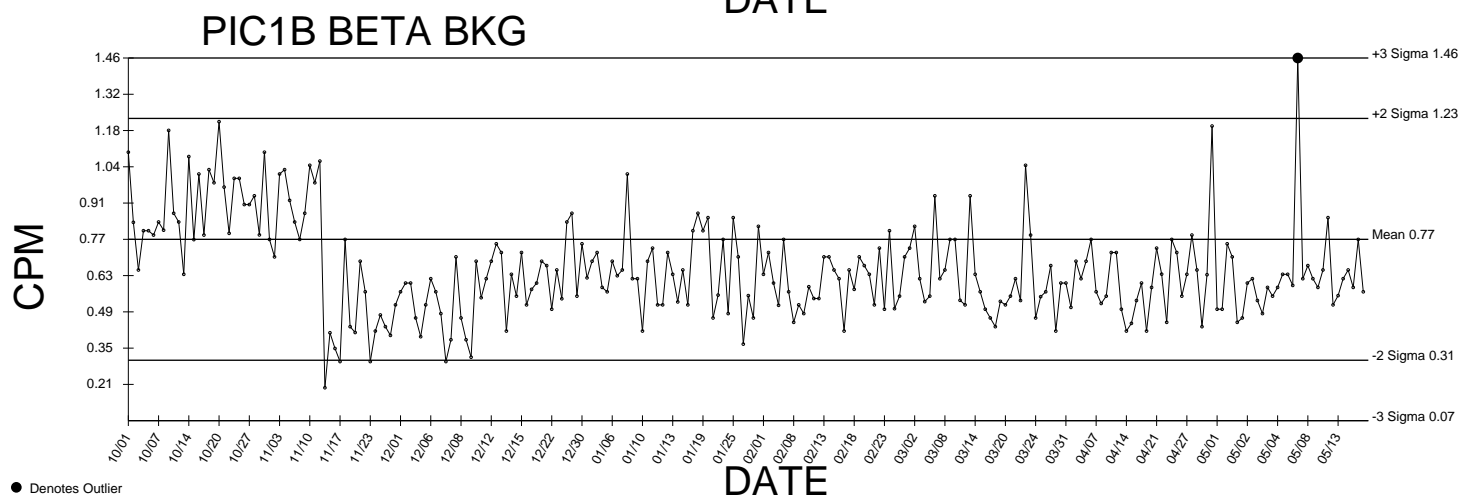
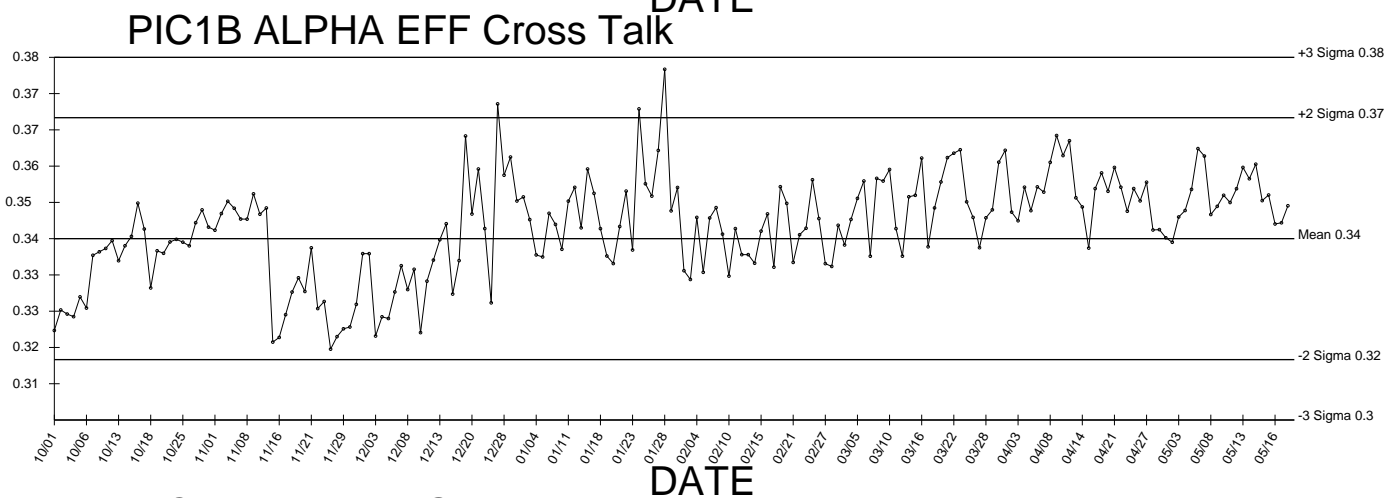
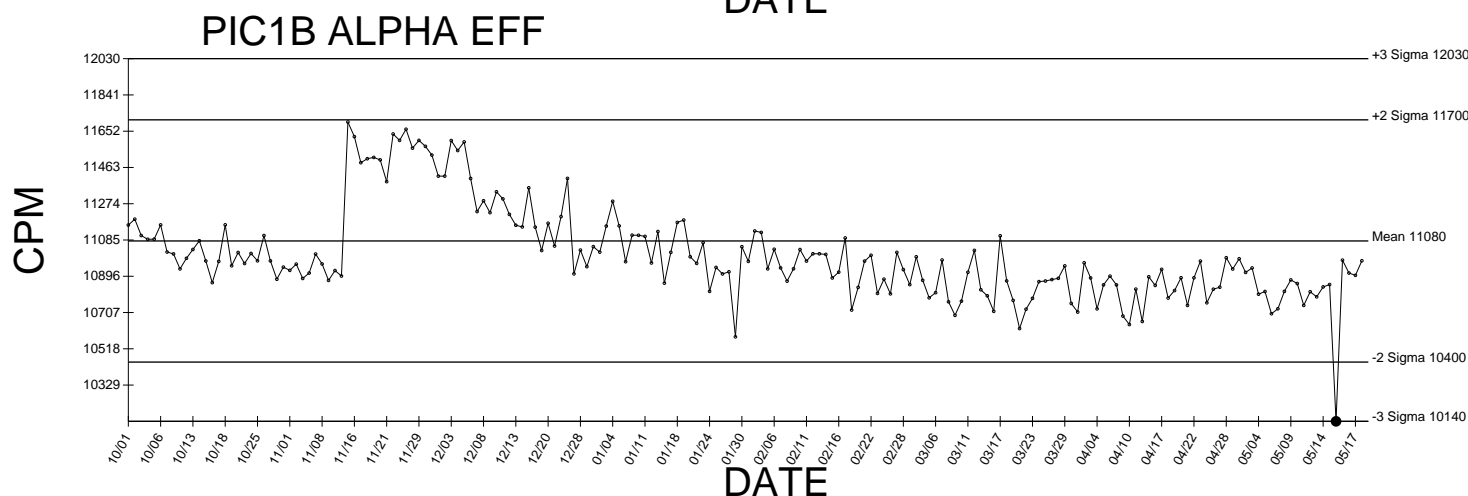
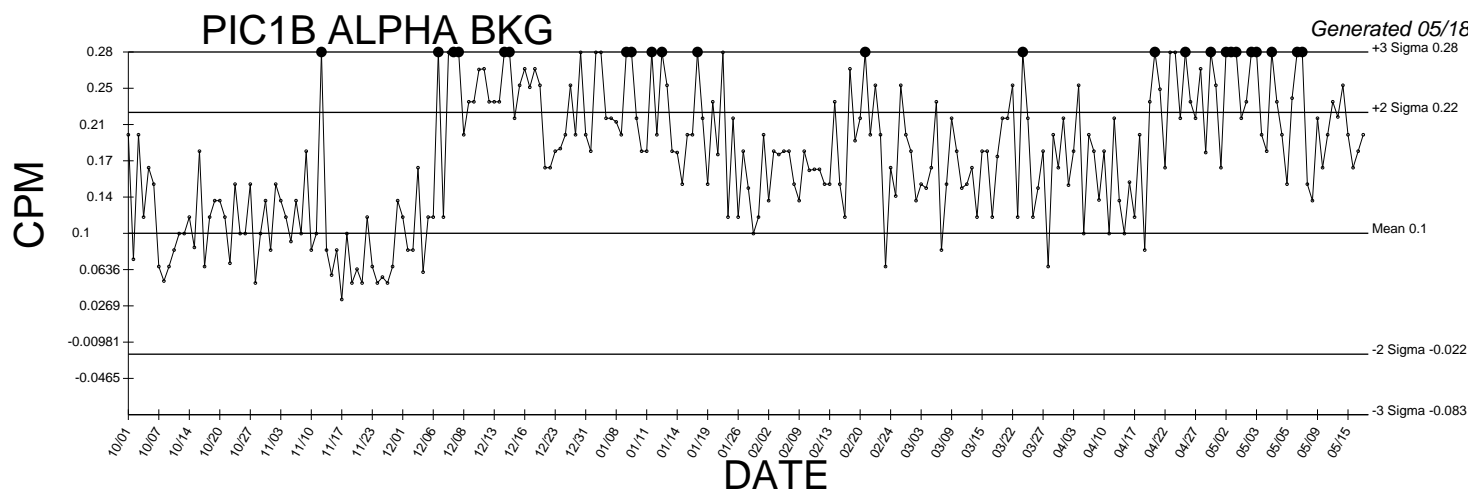
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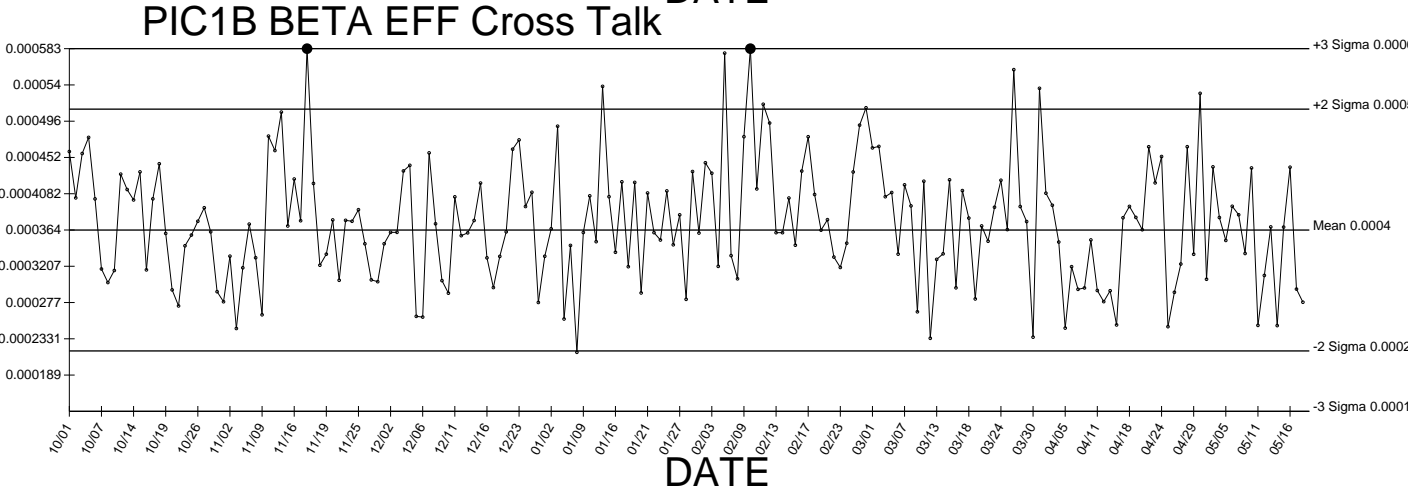
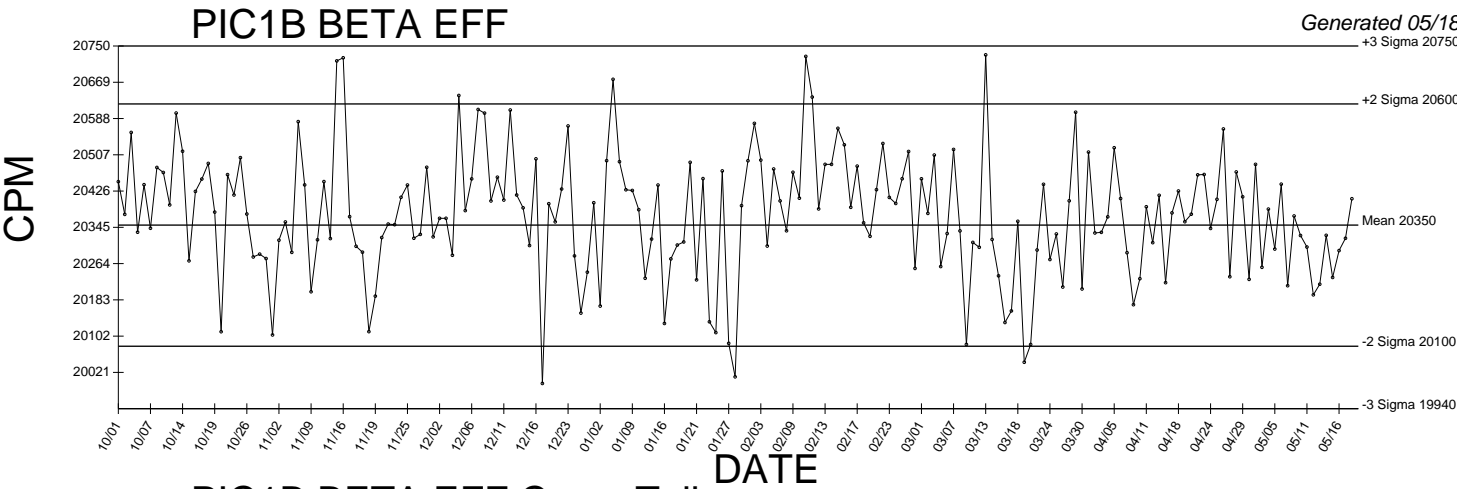


PIC1A BETA EFF Cross Talk

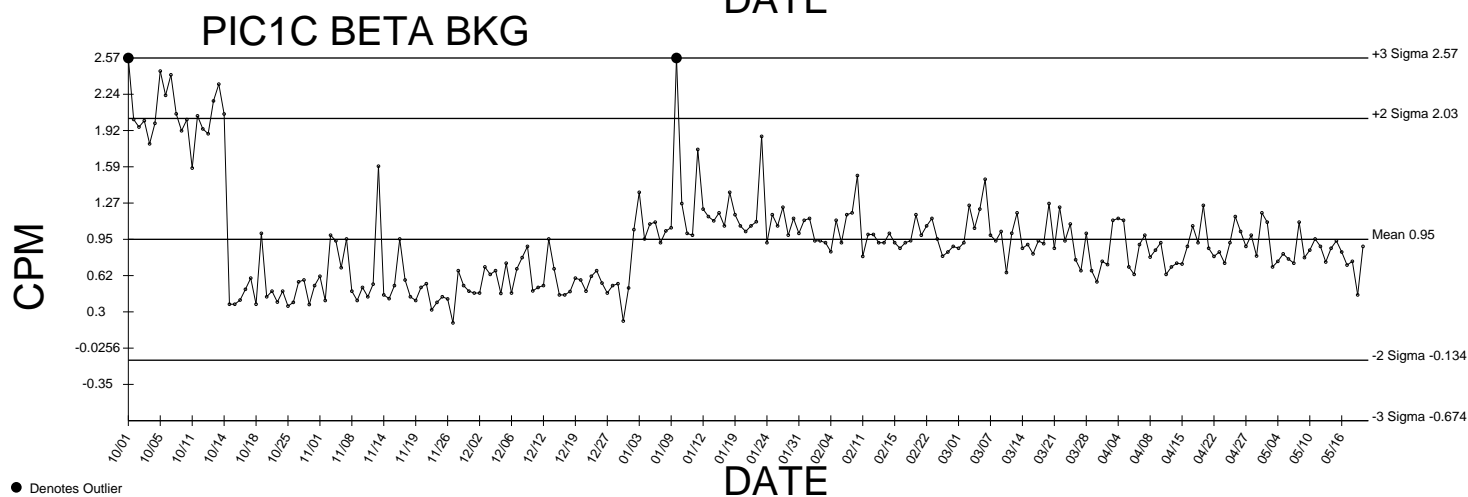
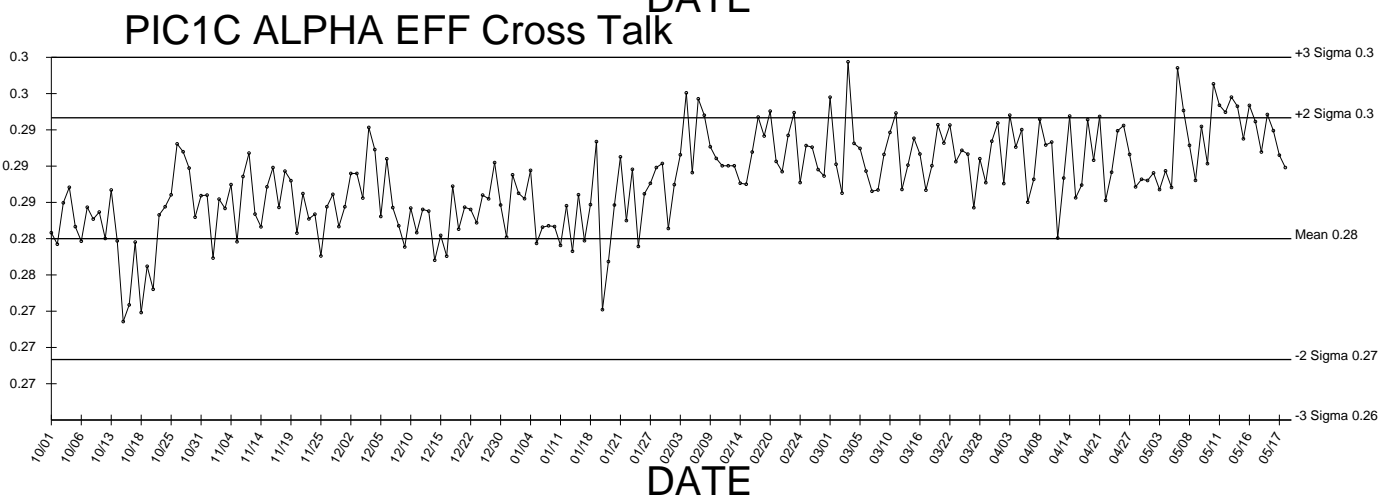
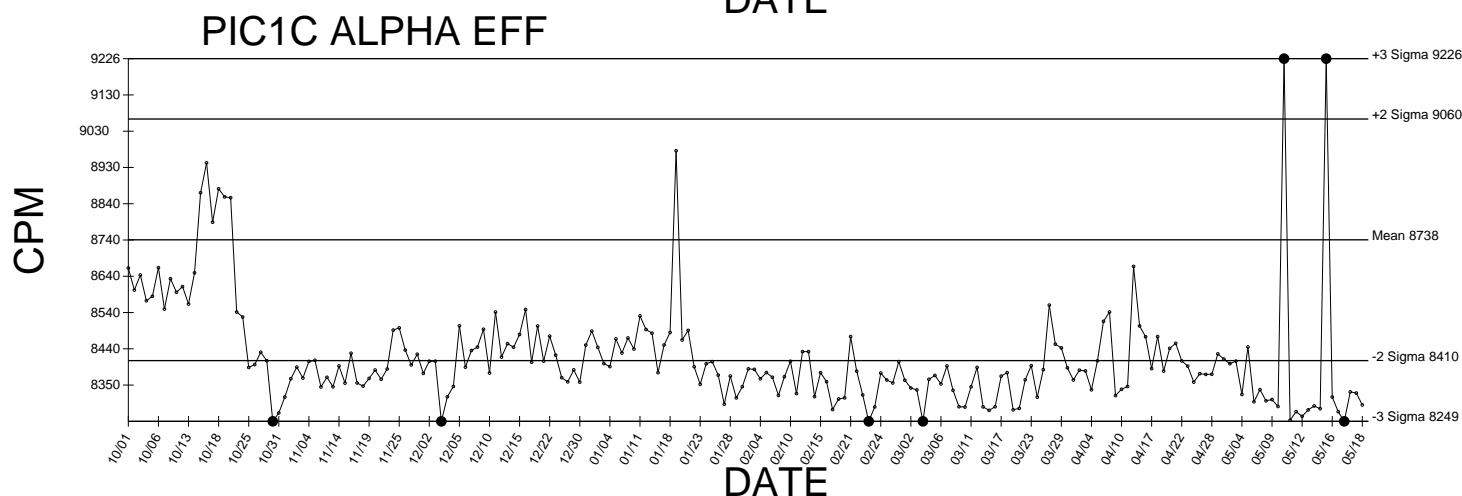
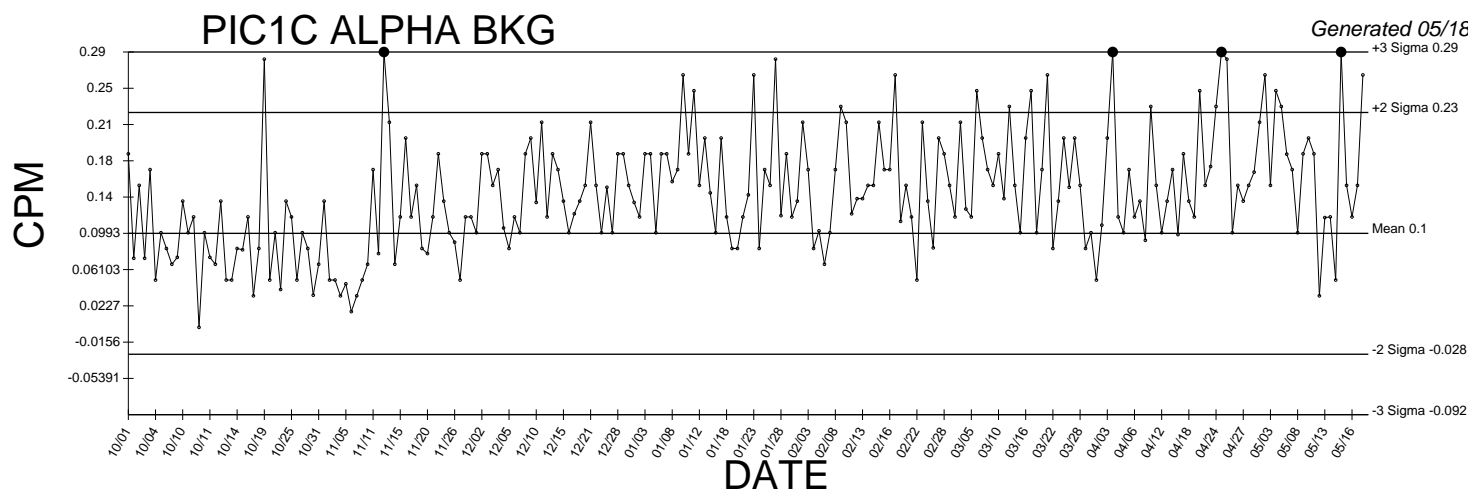


● Denotes Outlier

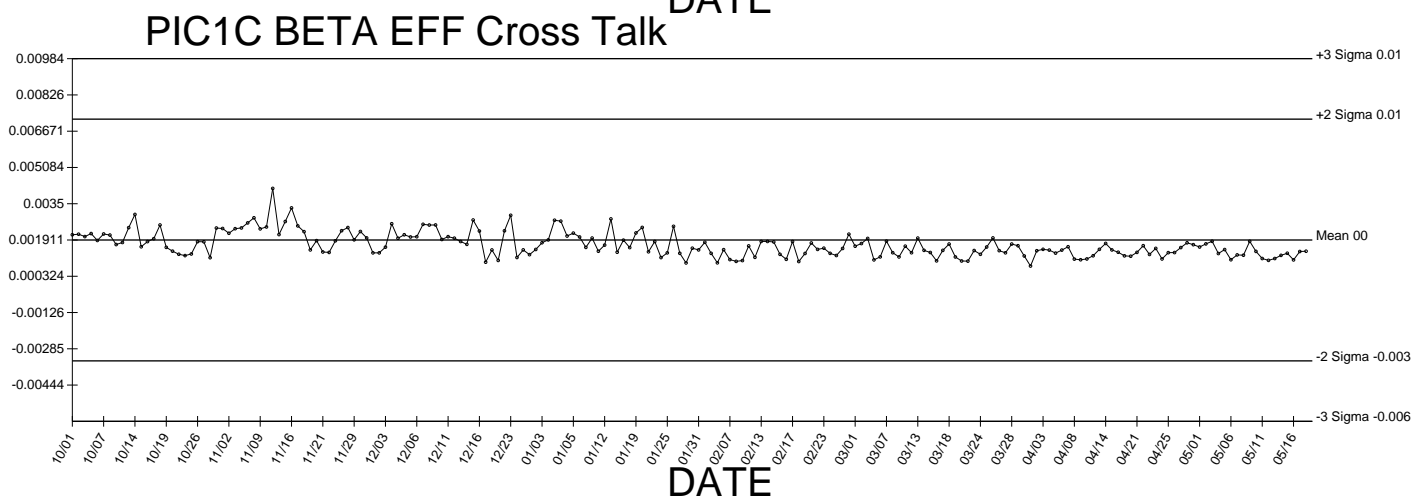
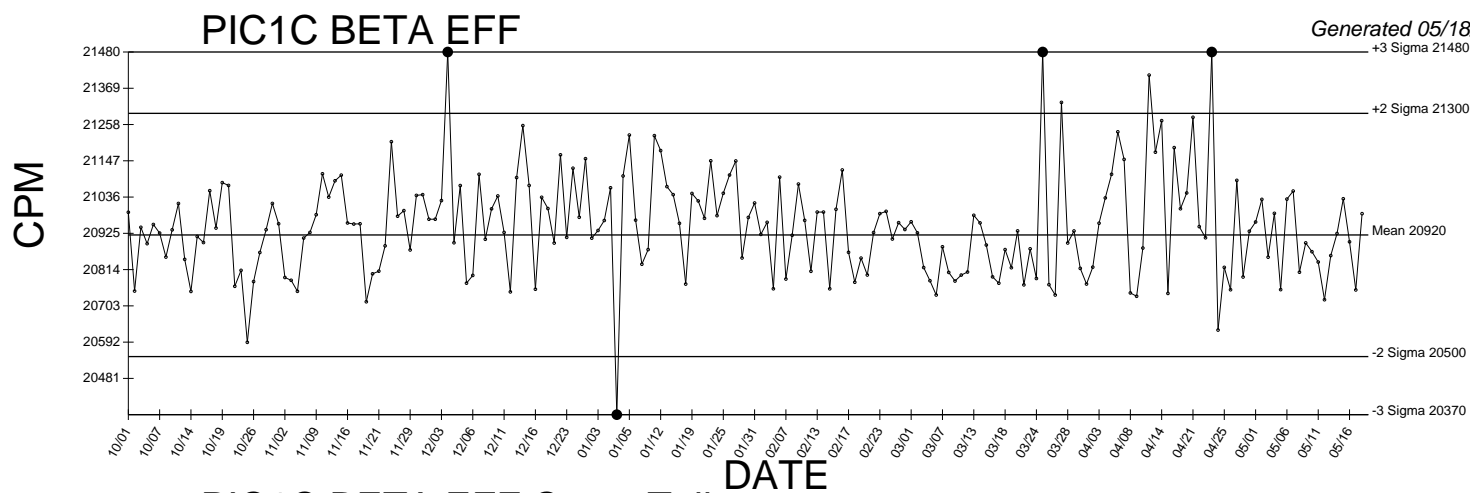




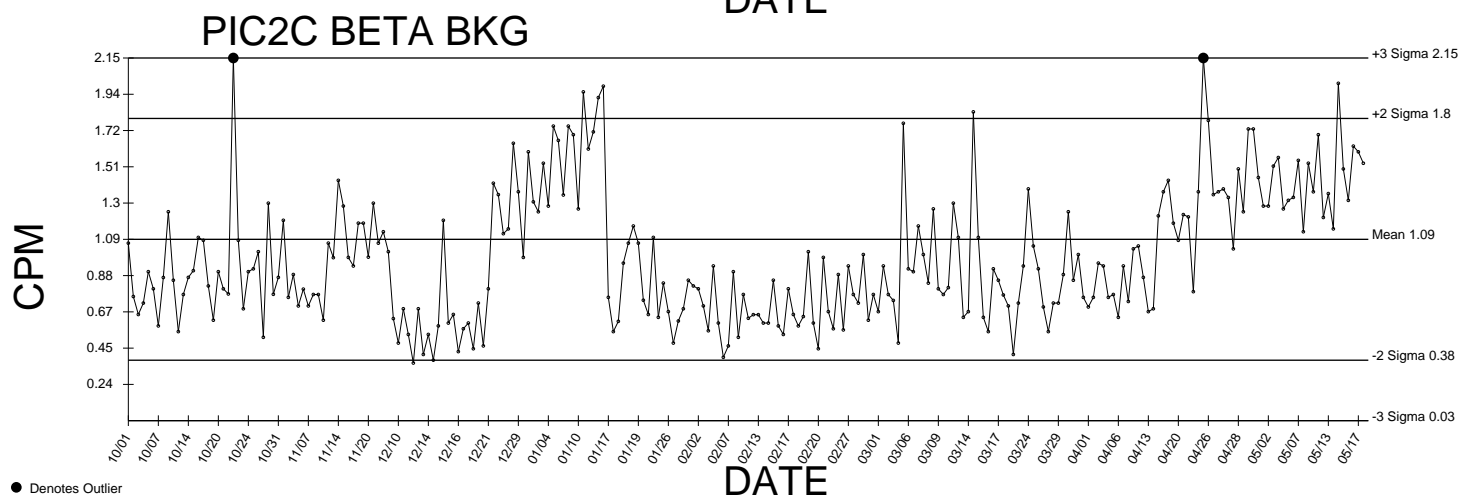
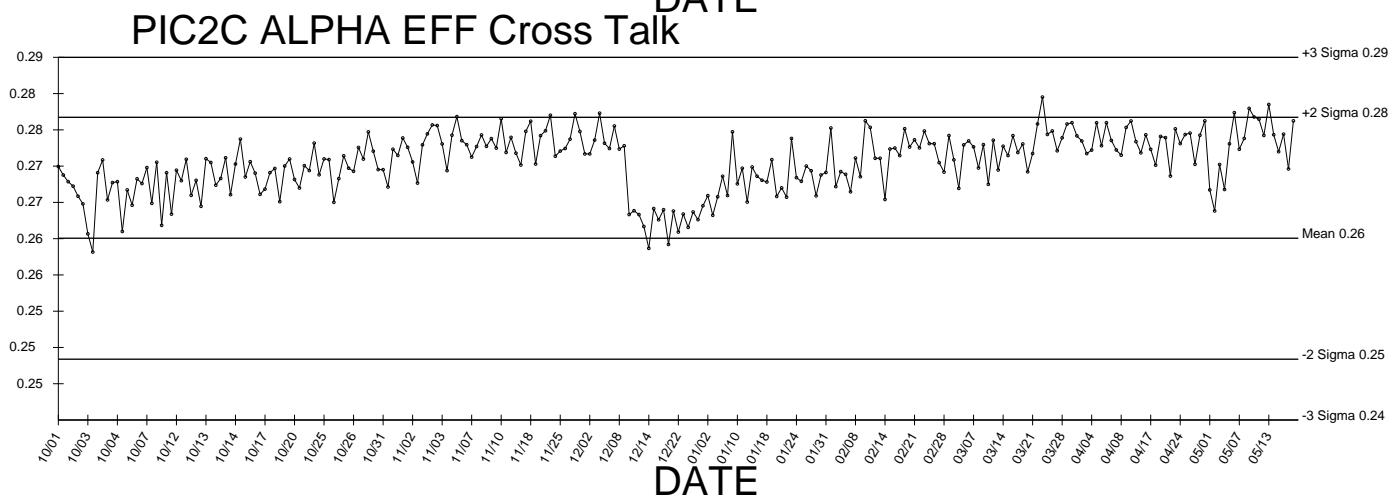
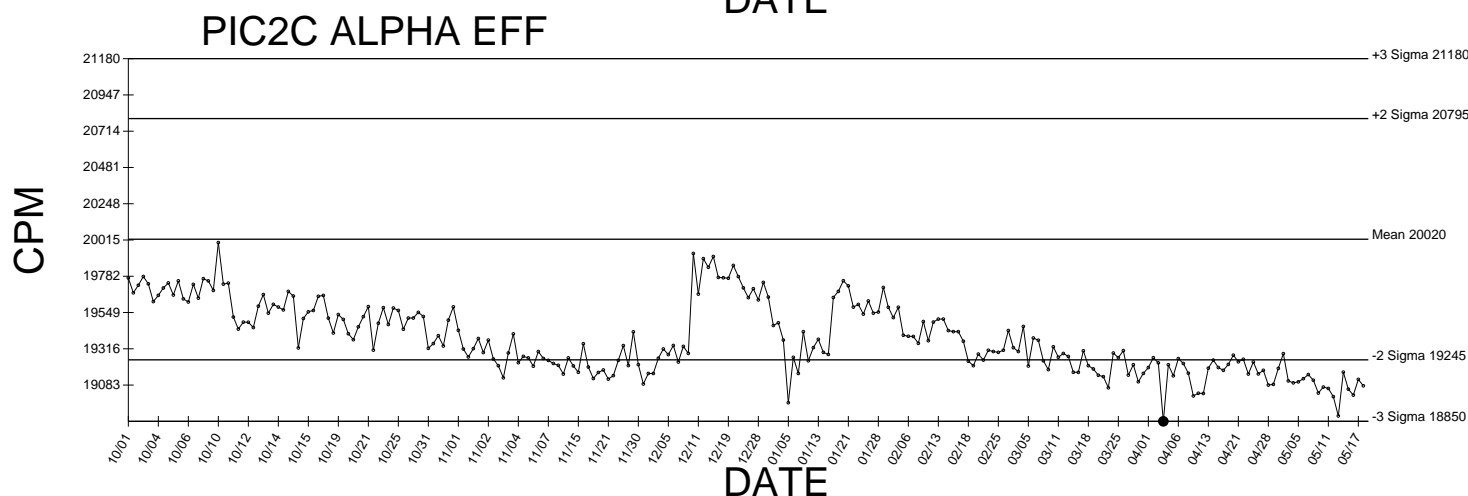
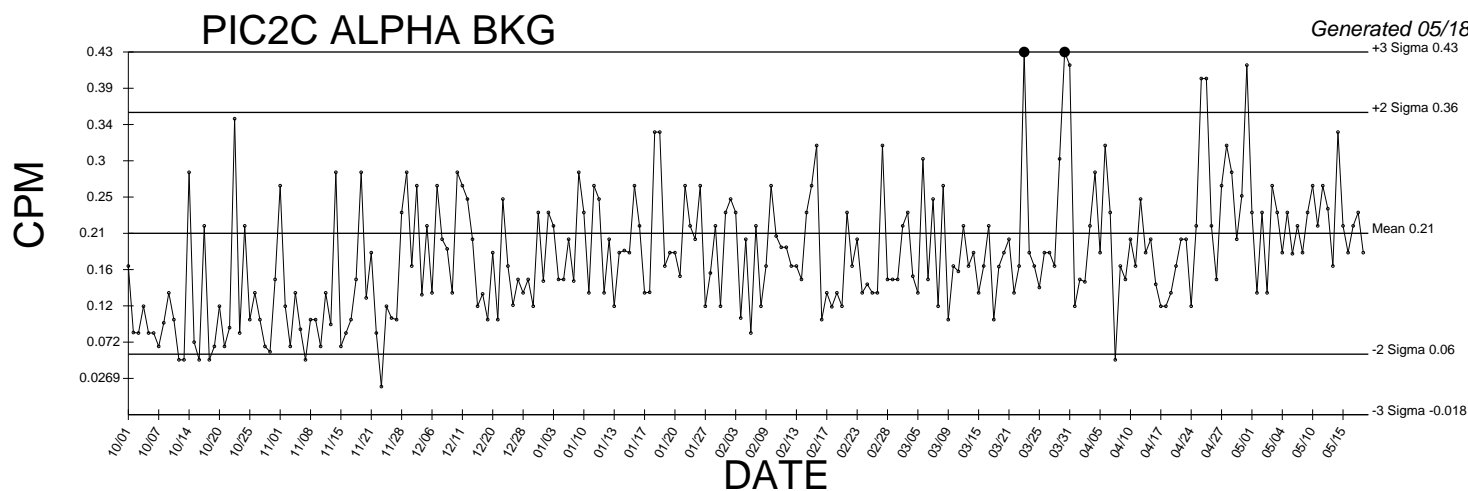
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● Denotes Outlier



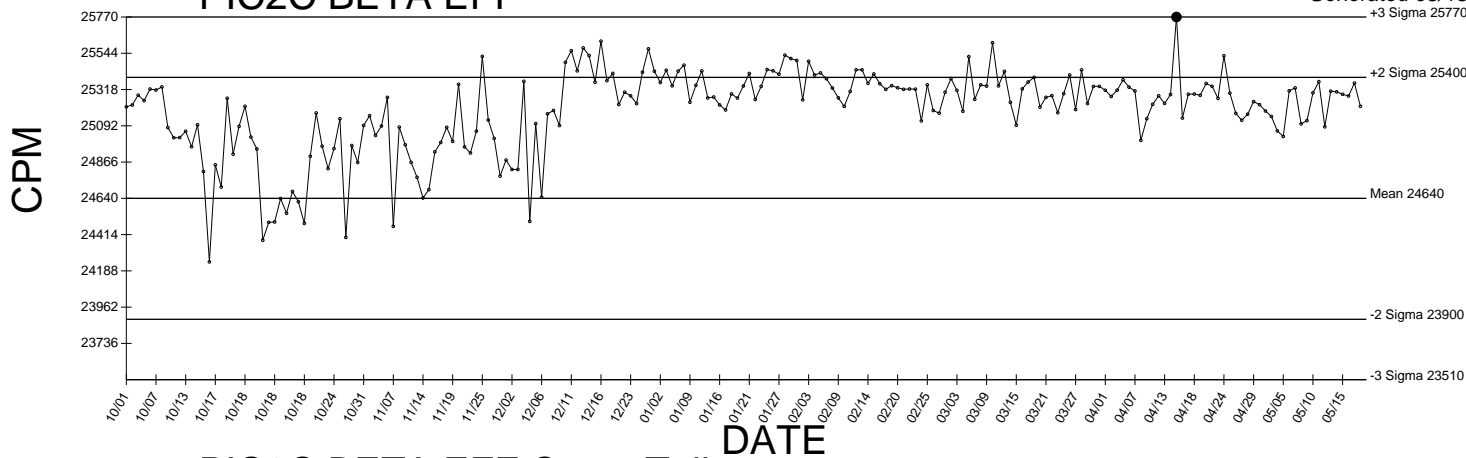
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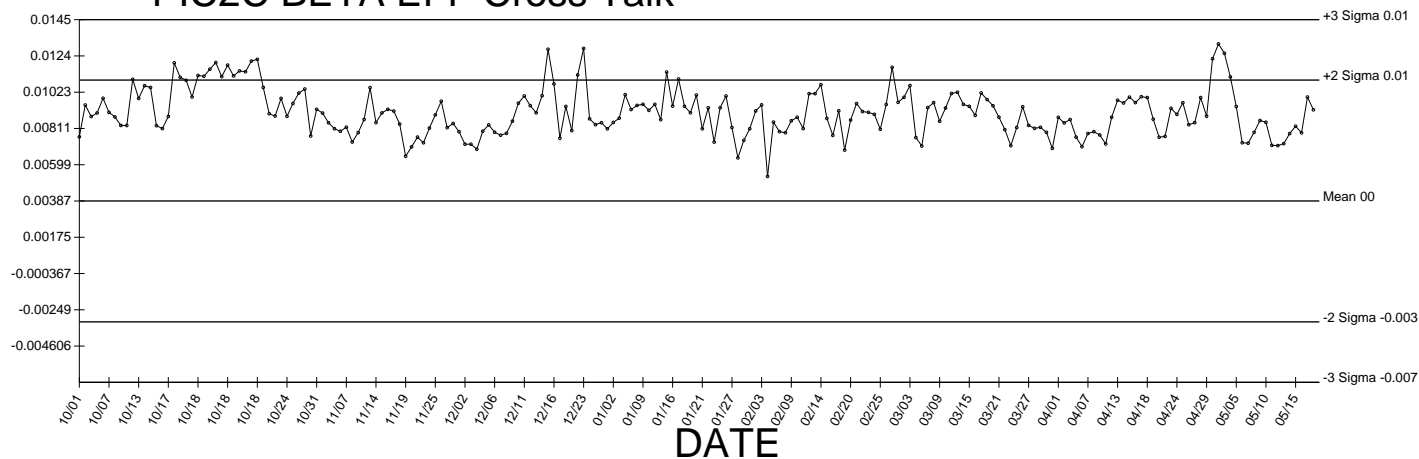
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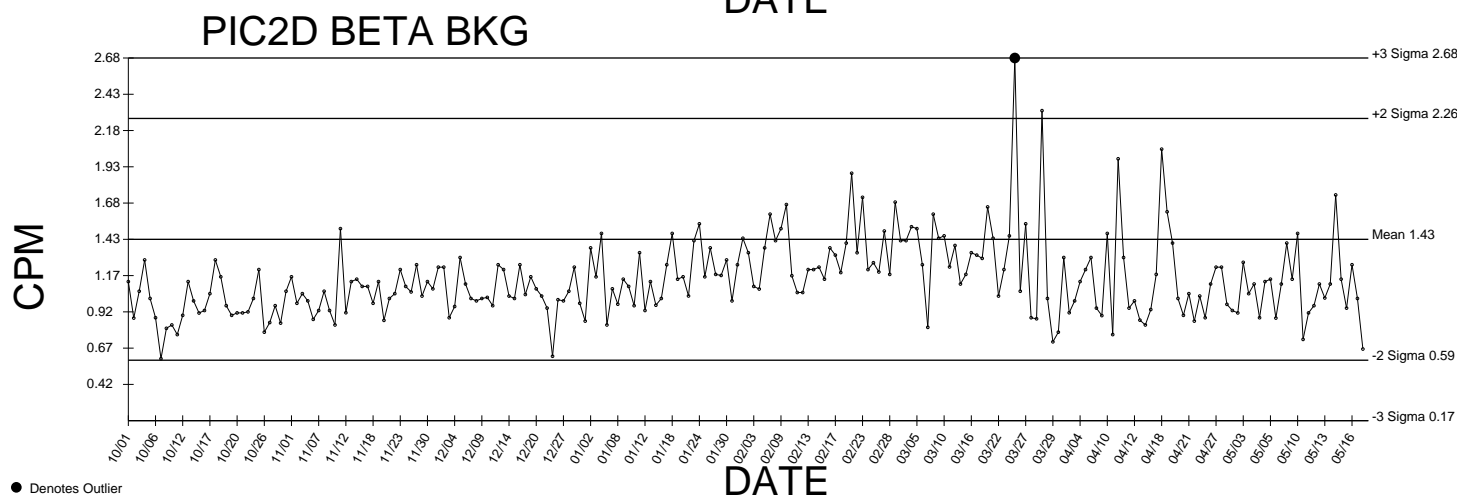
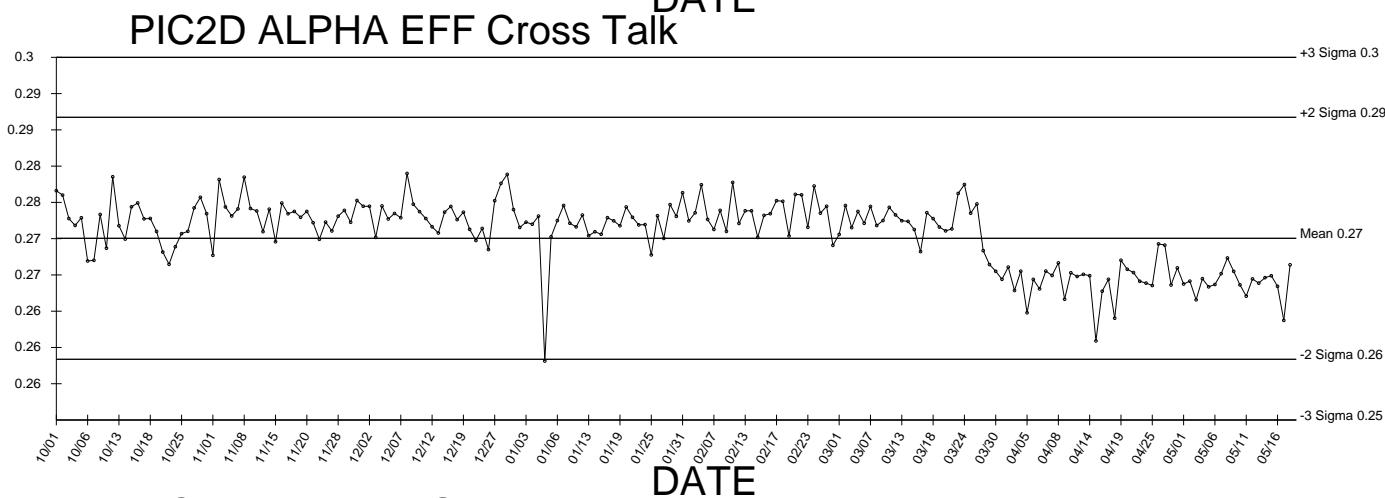
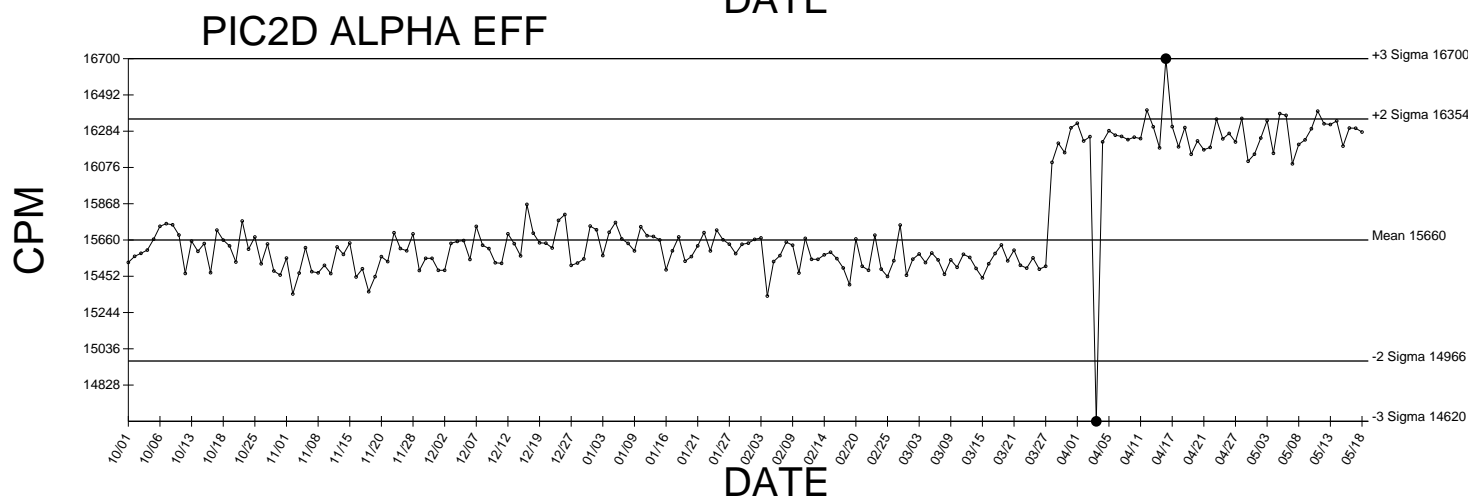
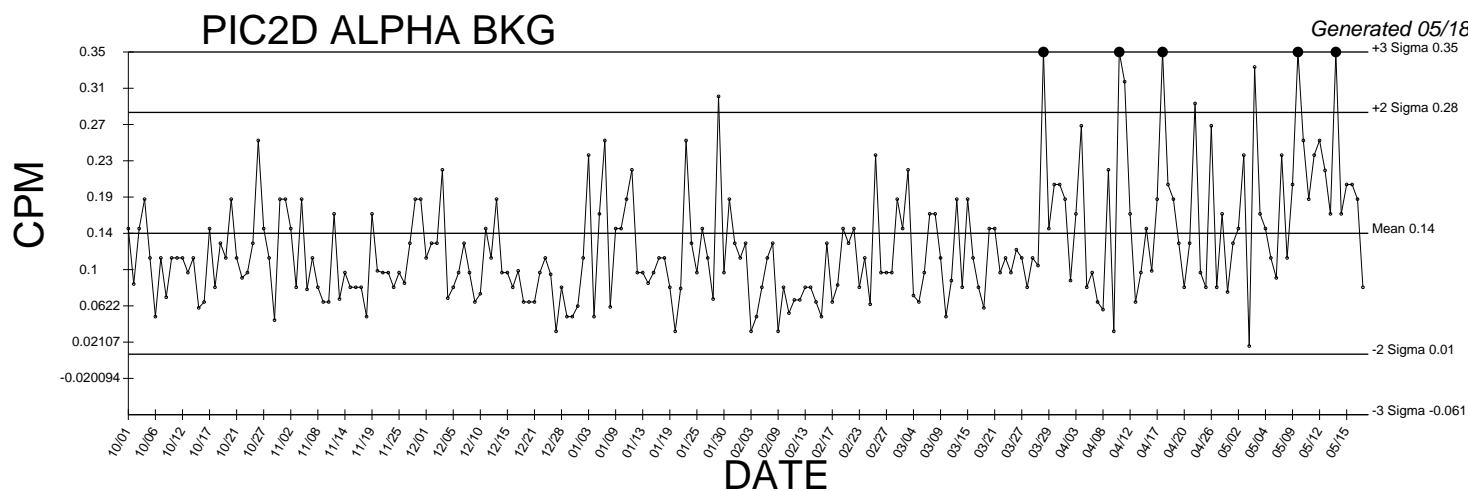
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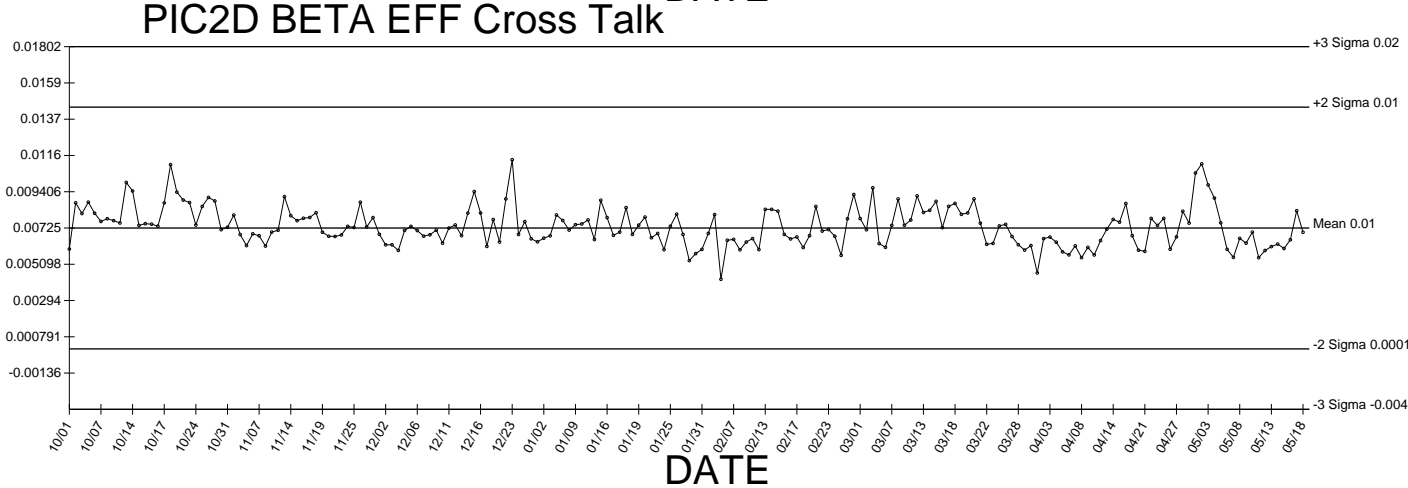
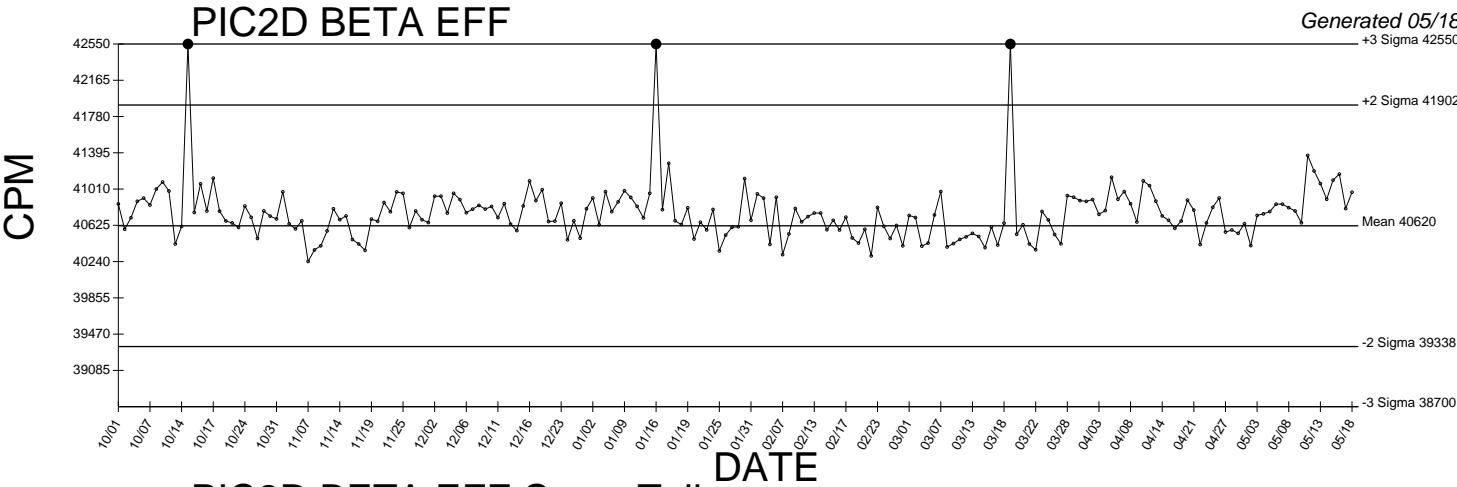
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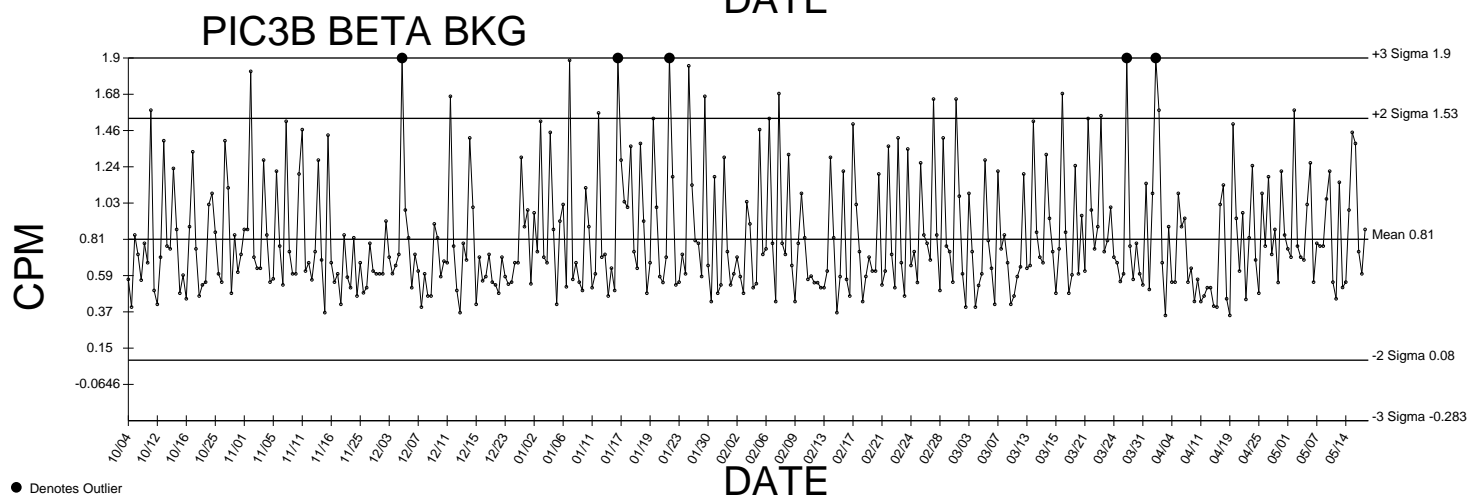
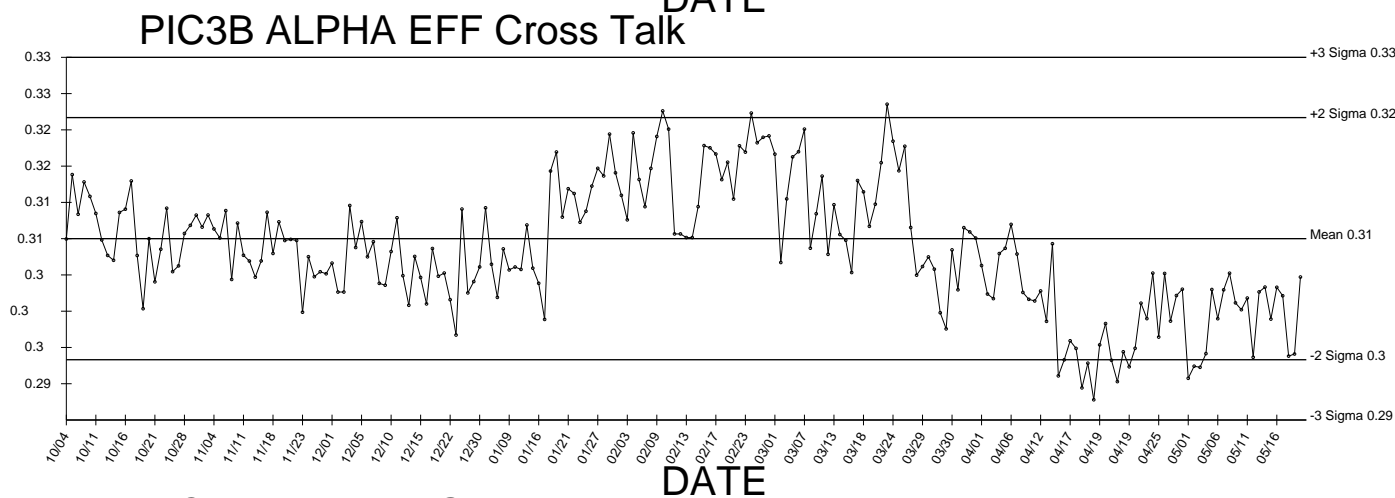
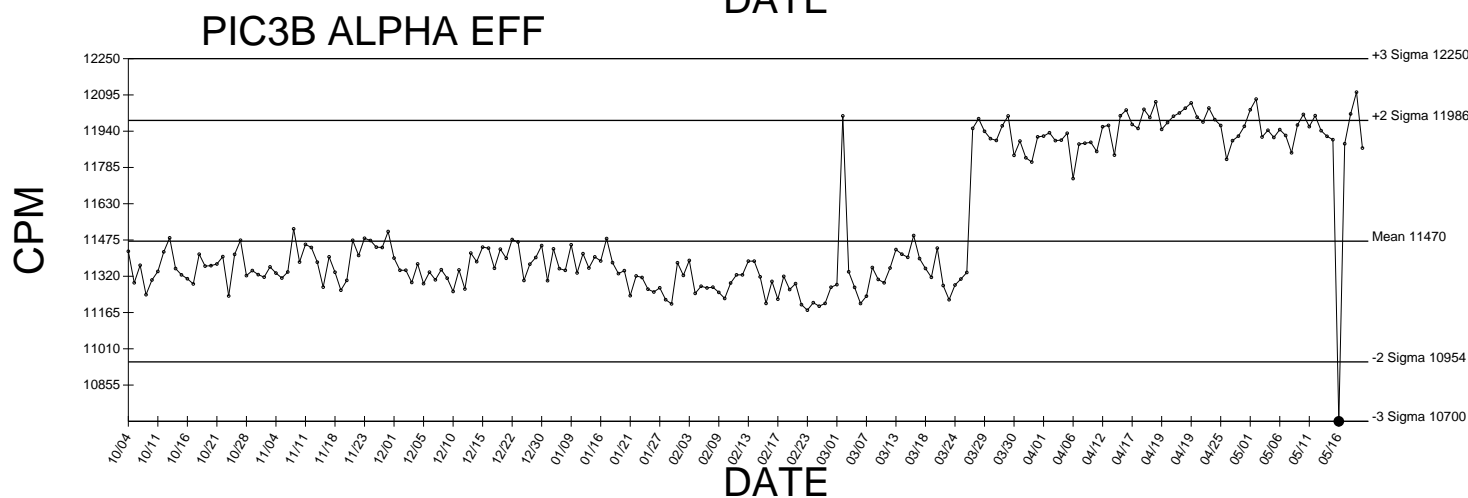
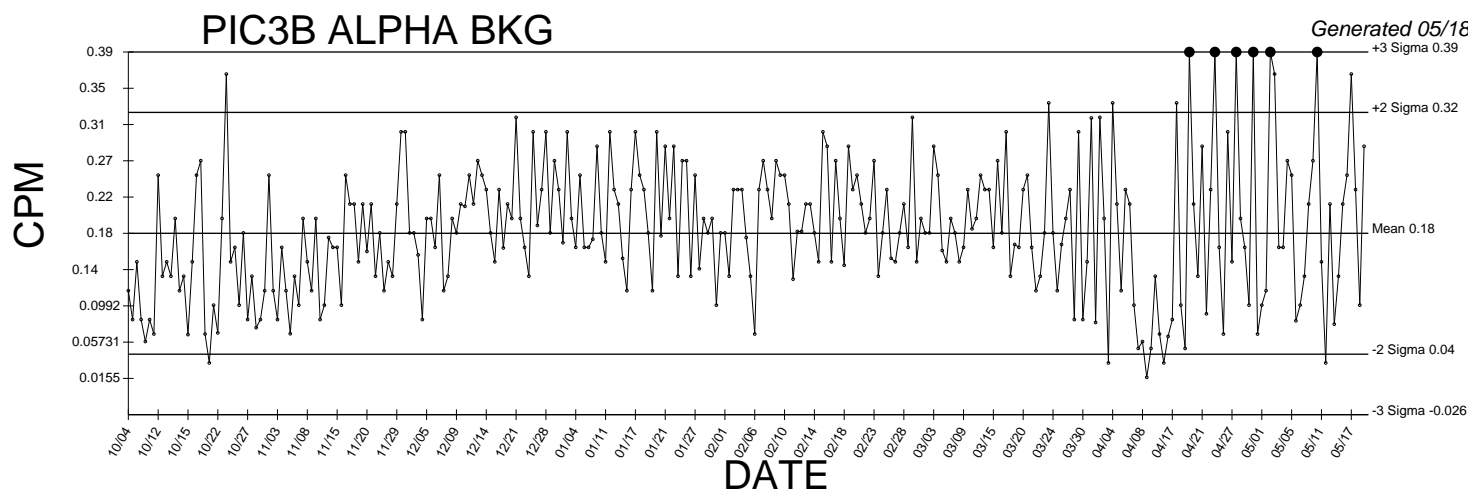
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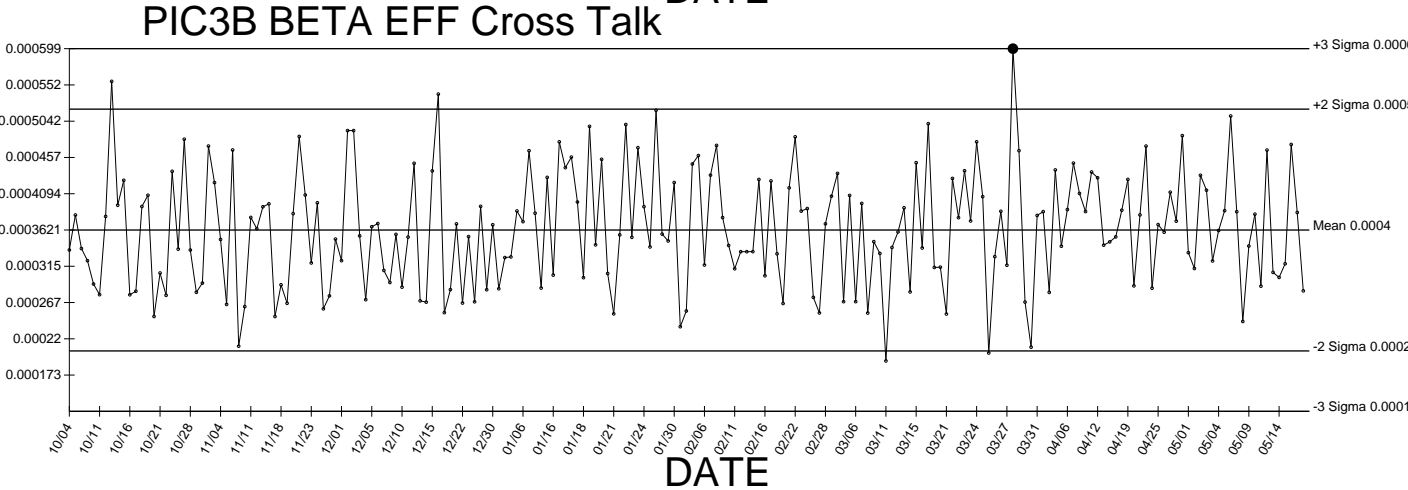
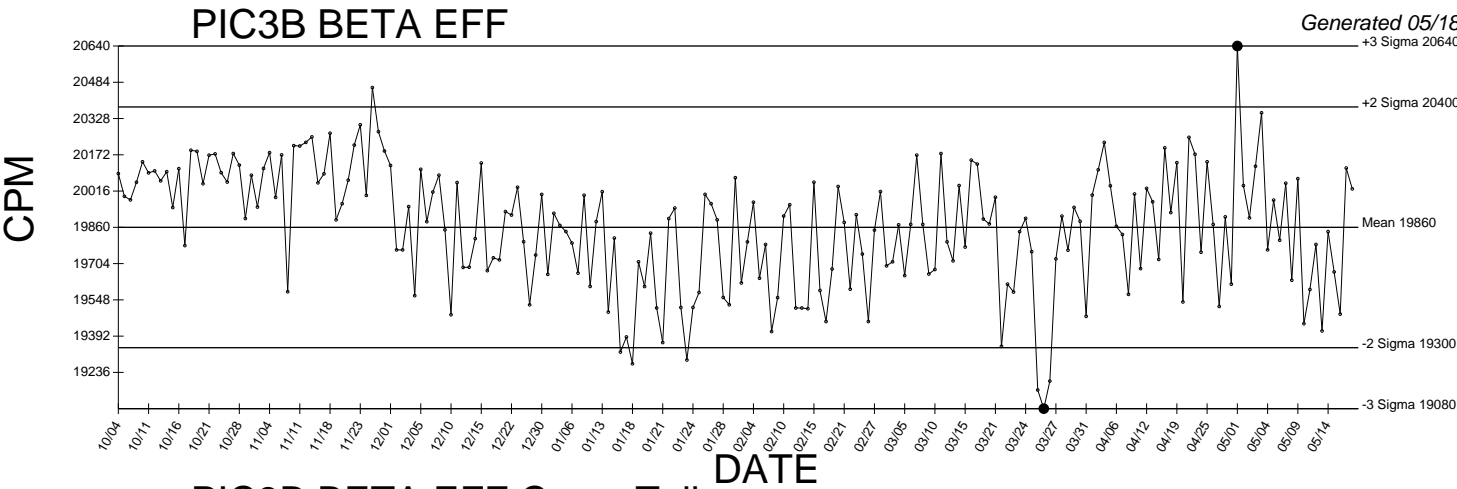


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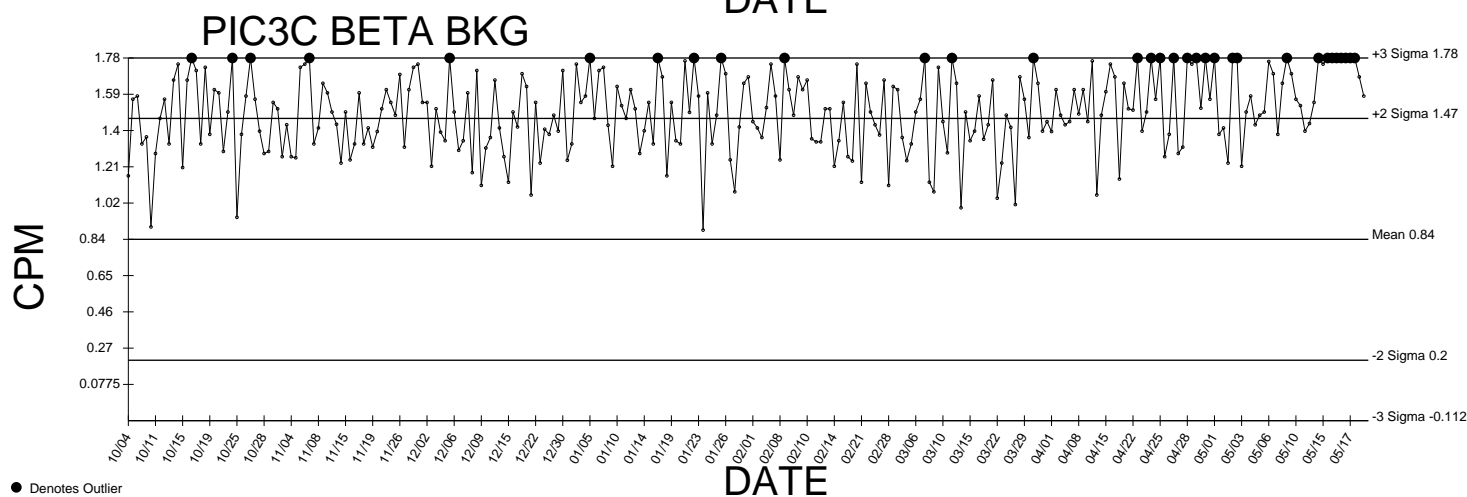
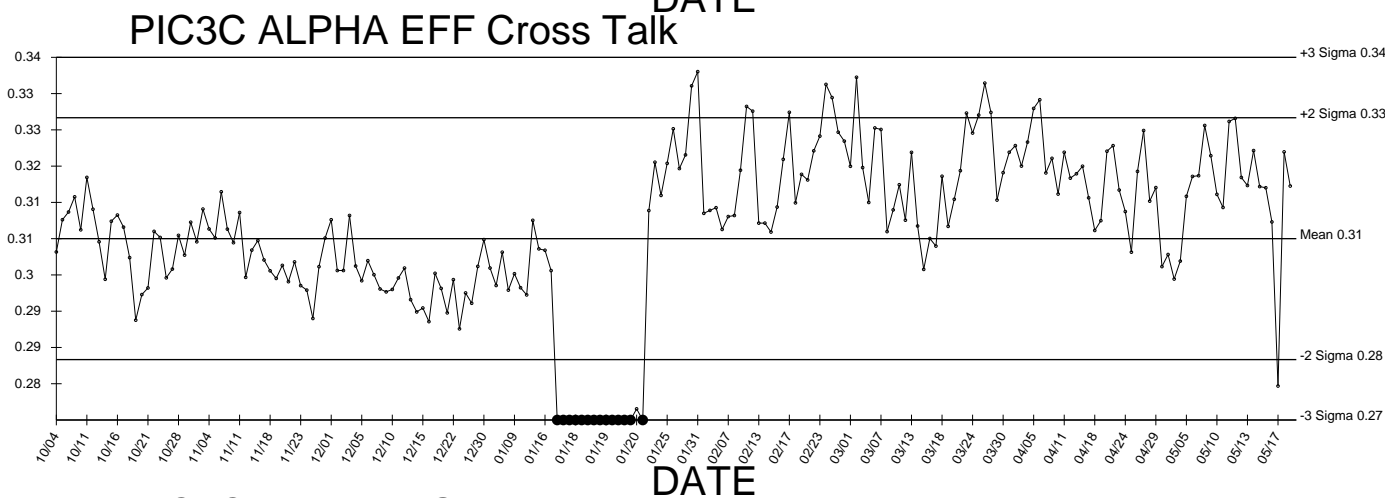
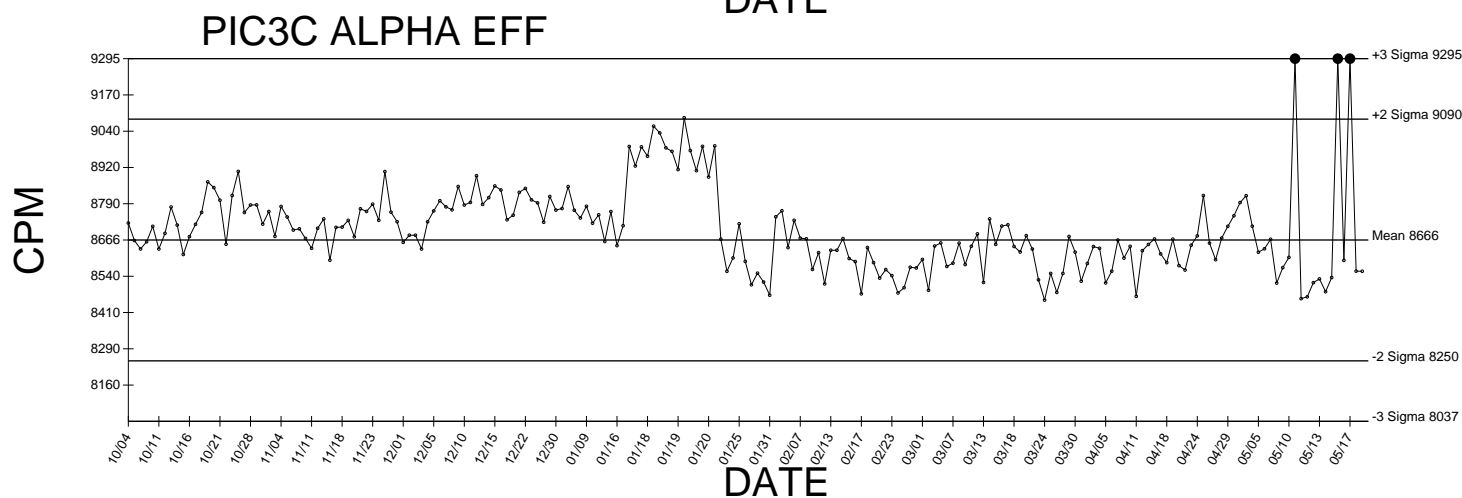
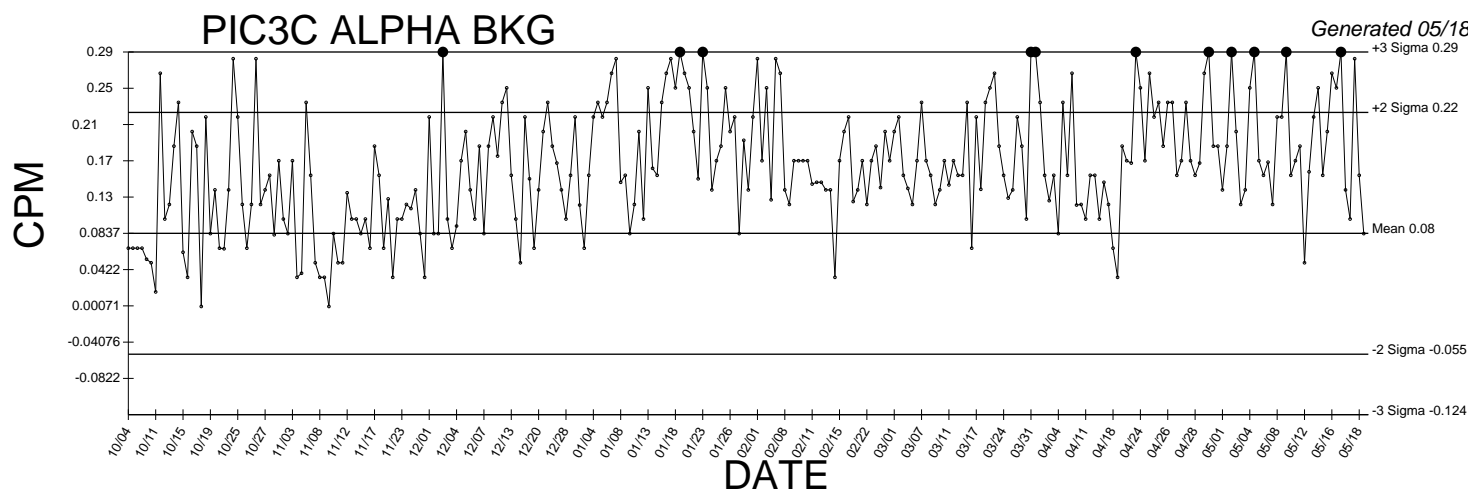


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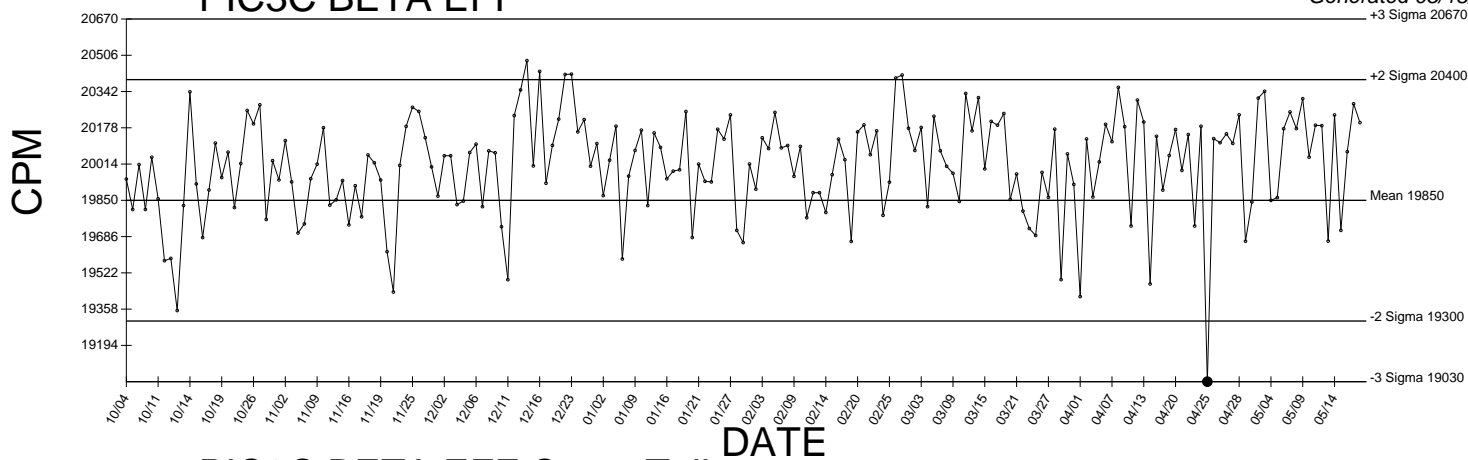
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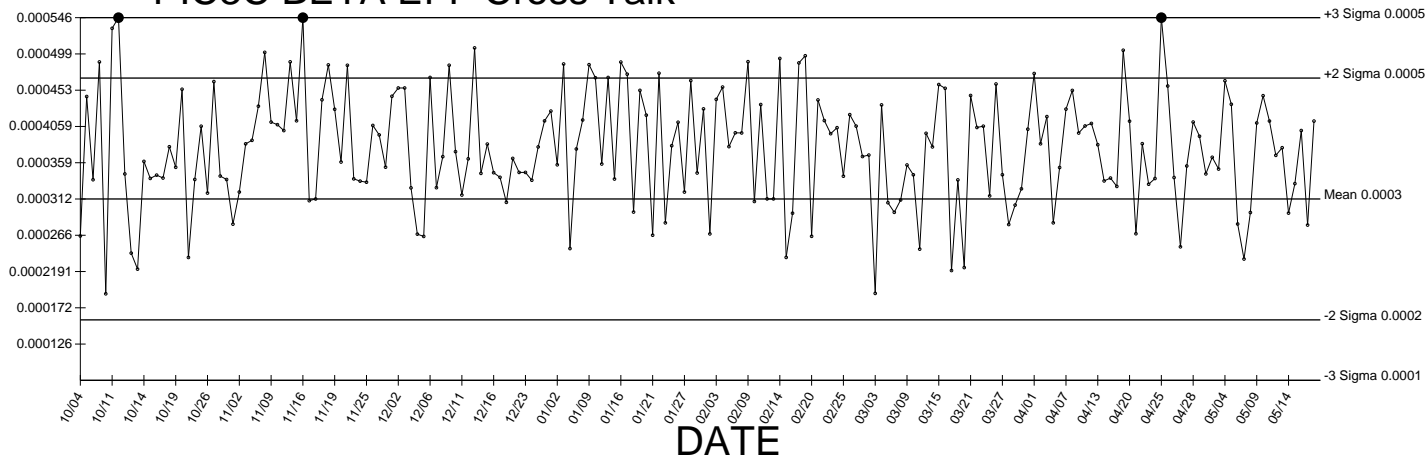
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PIC3C BETA EFF

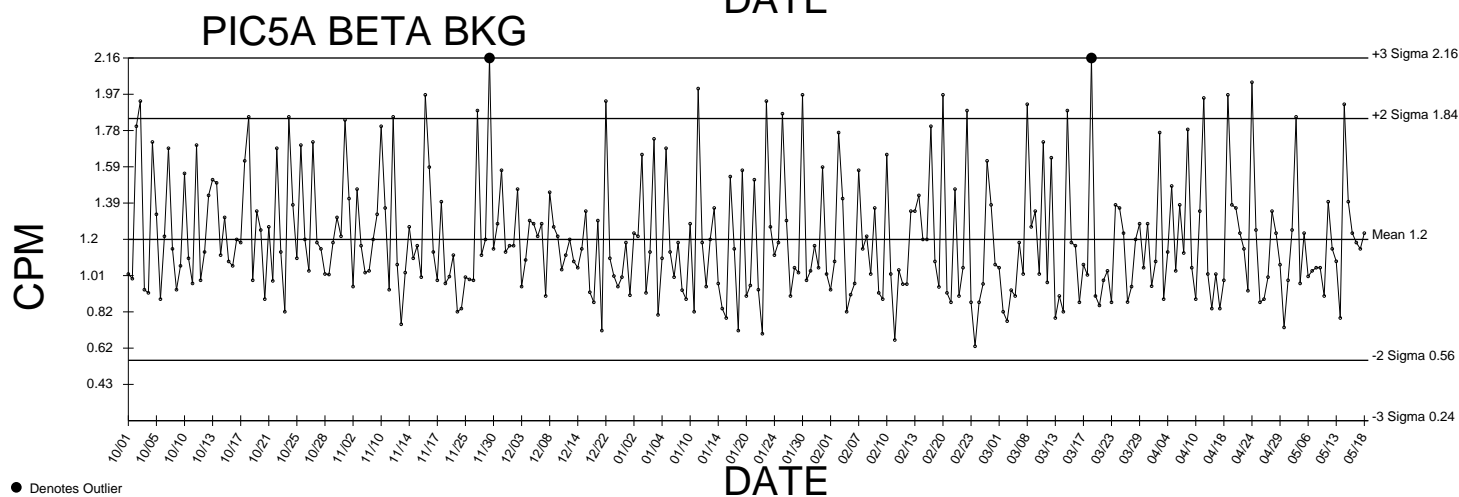
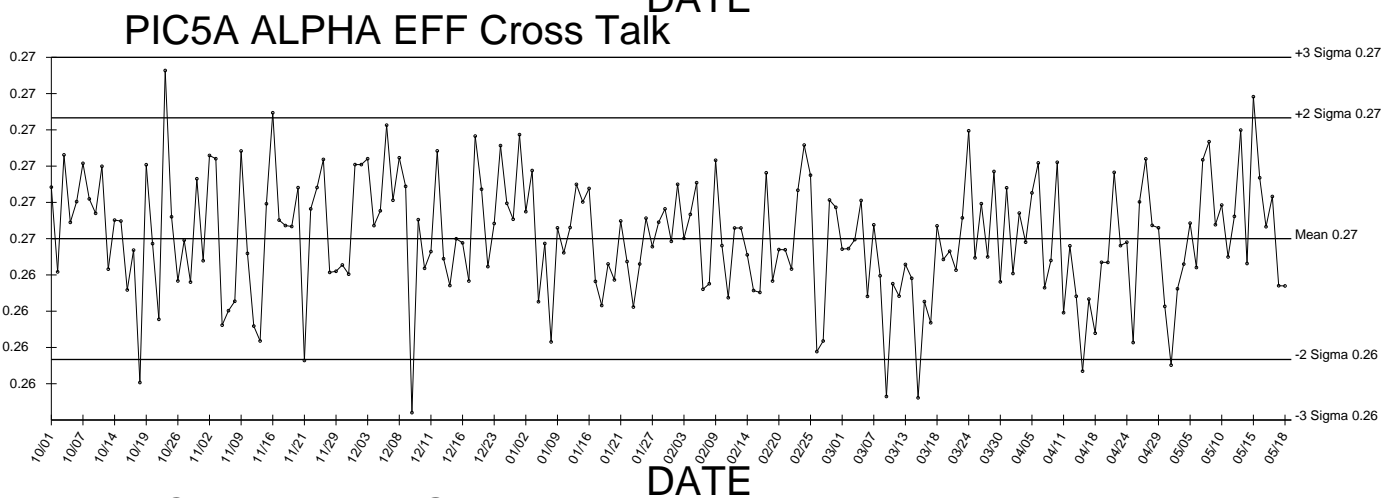
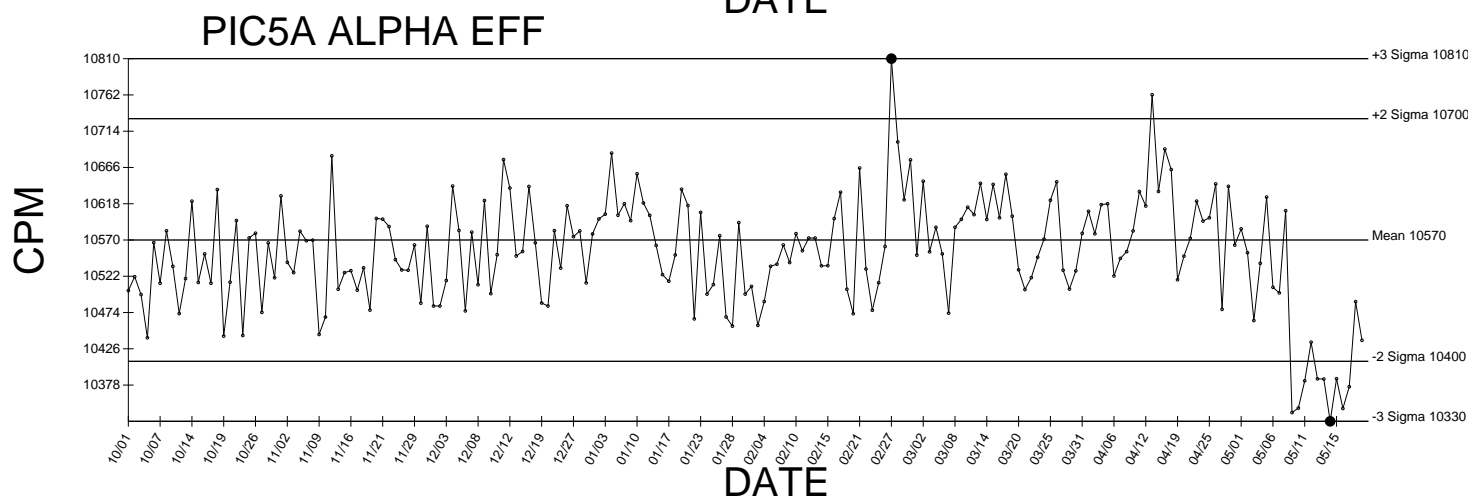
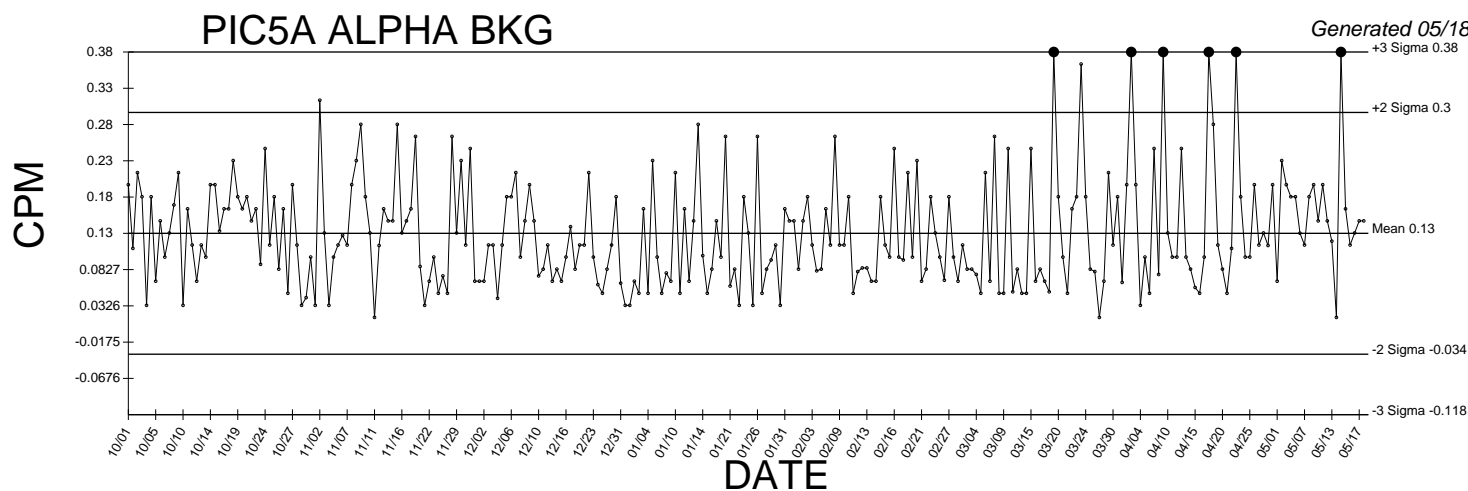
Generated 05/18/2023



PIC3C BETA EFF Cross Talk

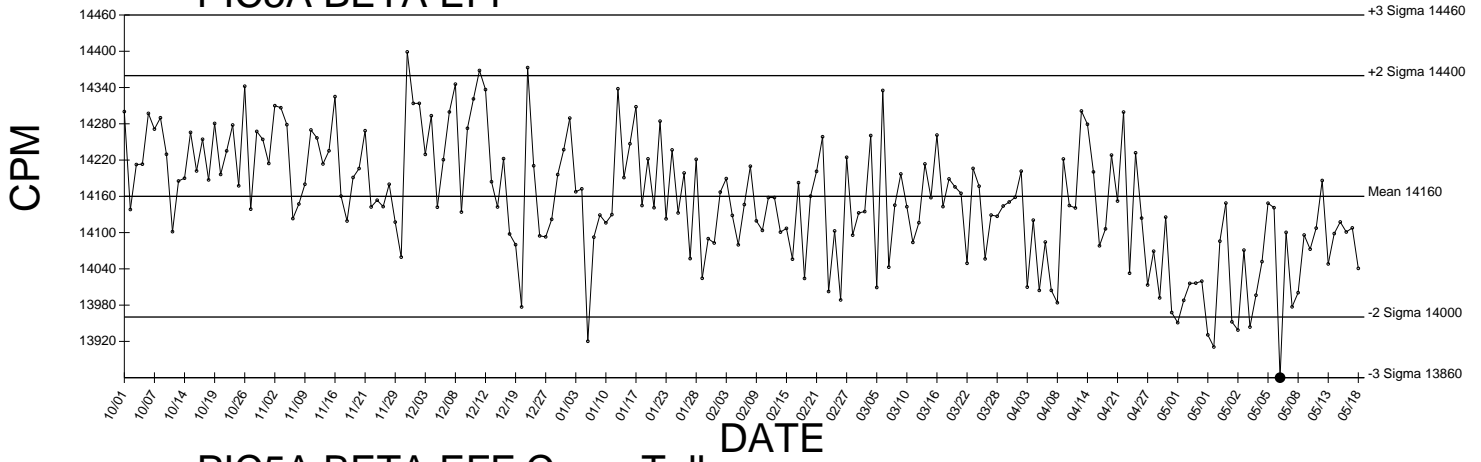


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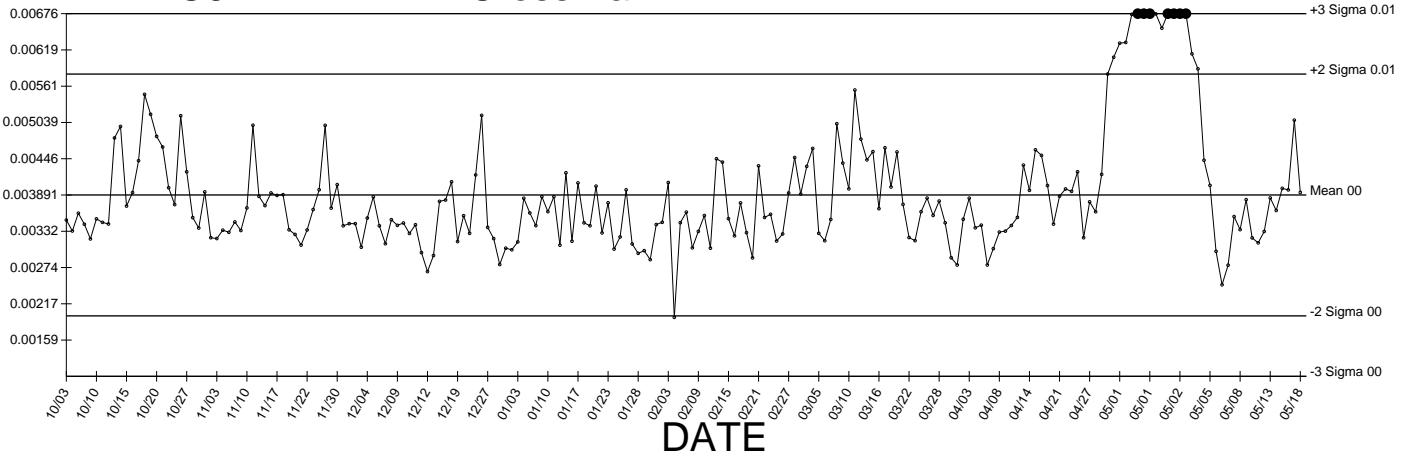


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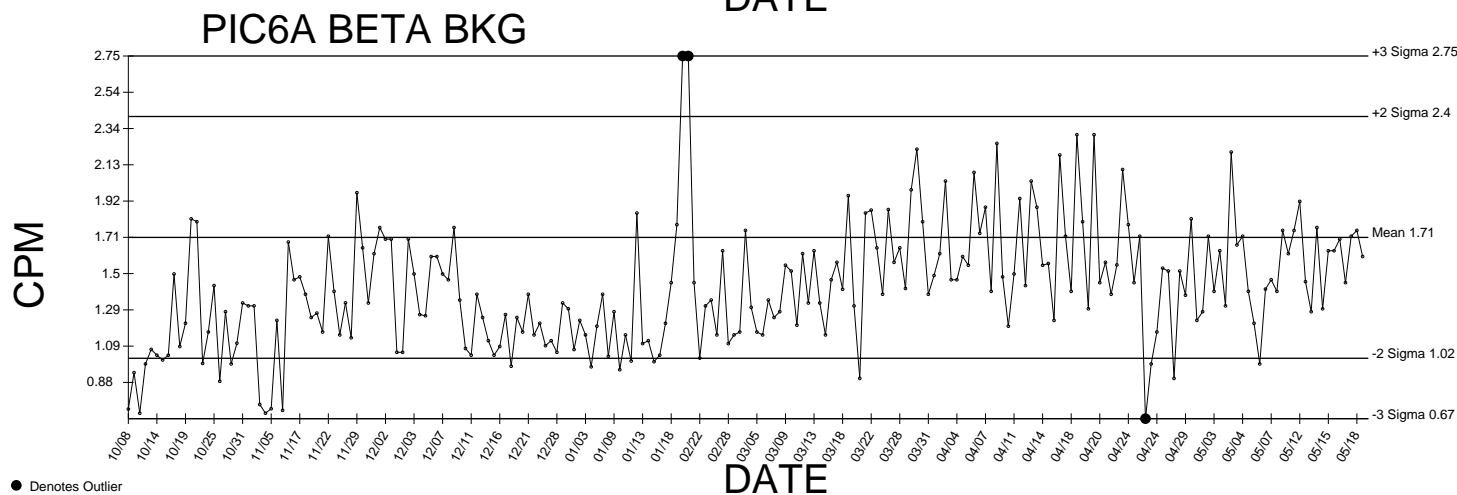
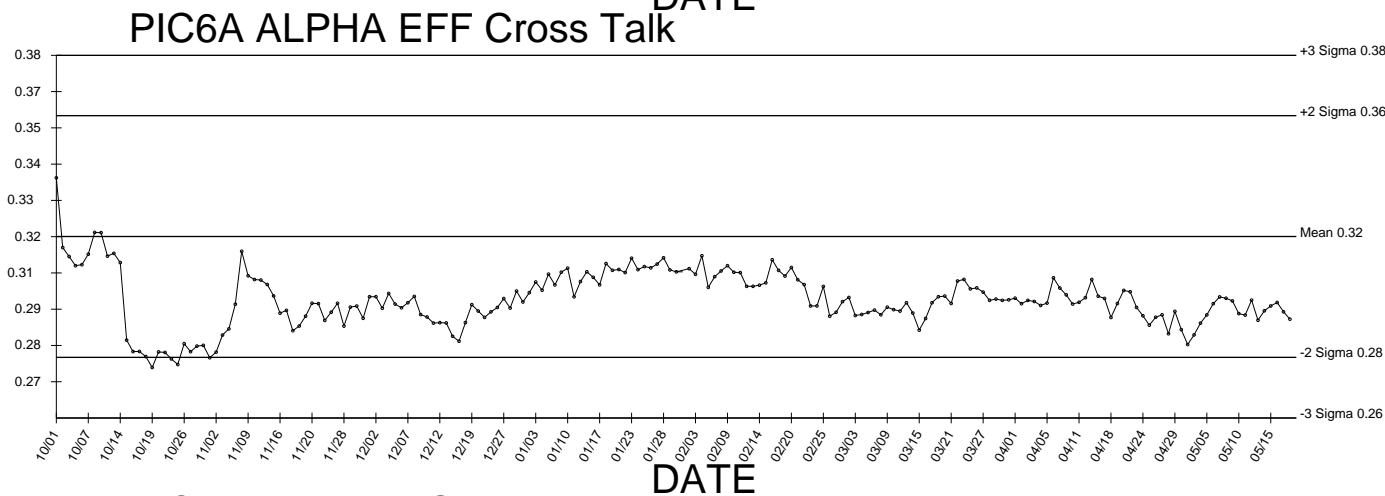
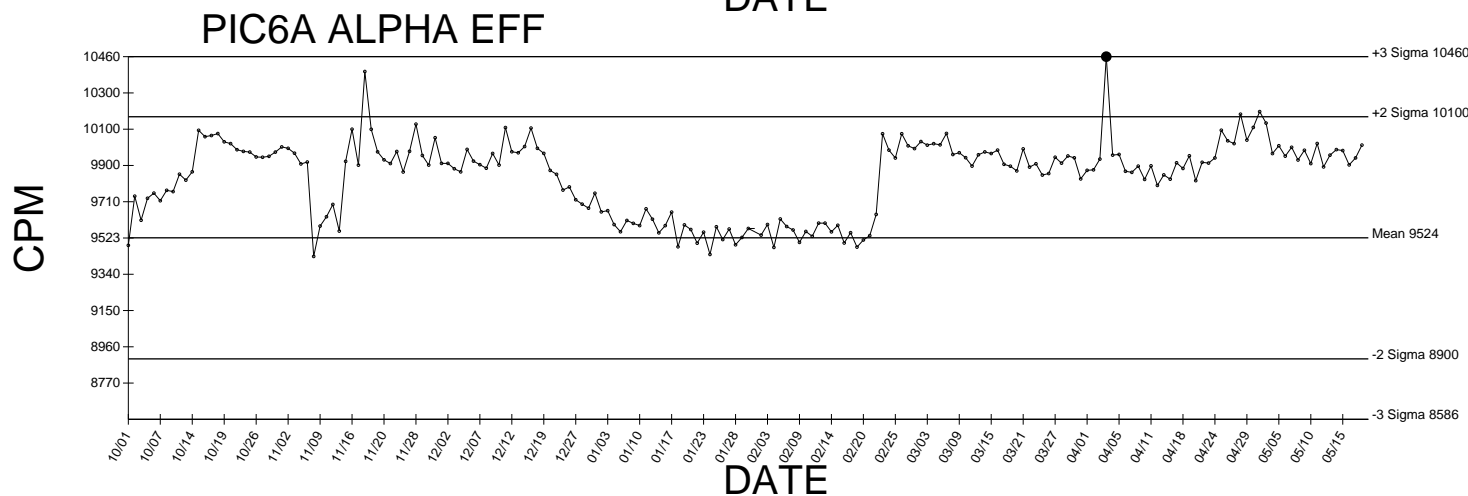
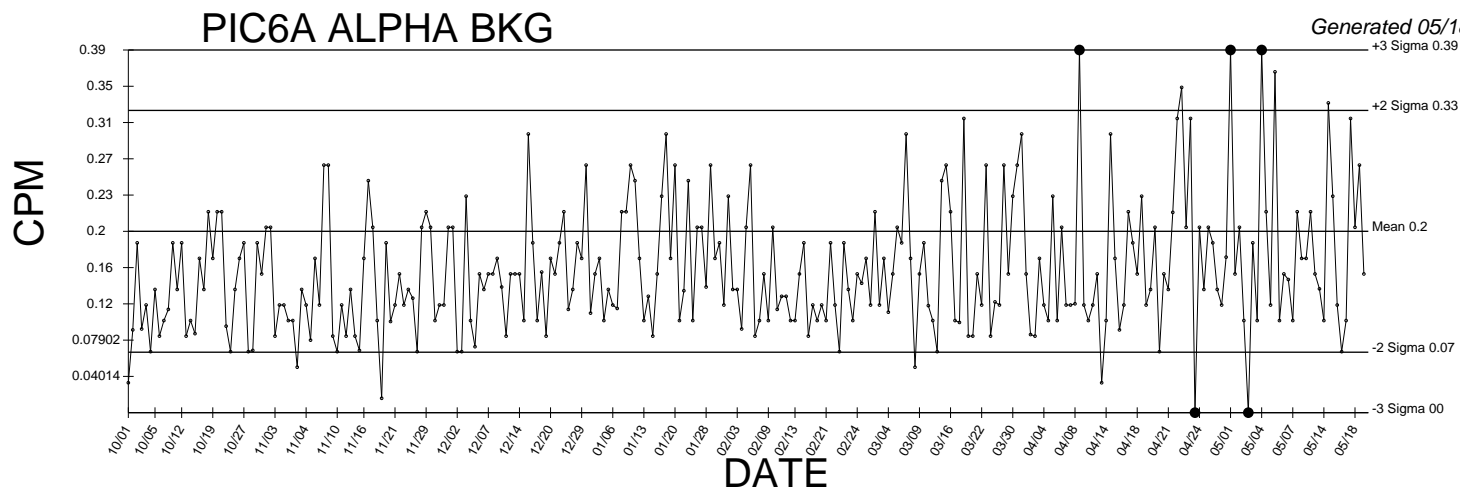
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+3 Sigma 14460



PIC5A BETA EFF Cross Talk



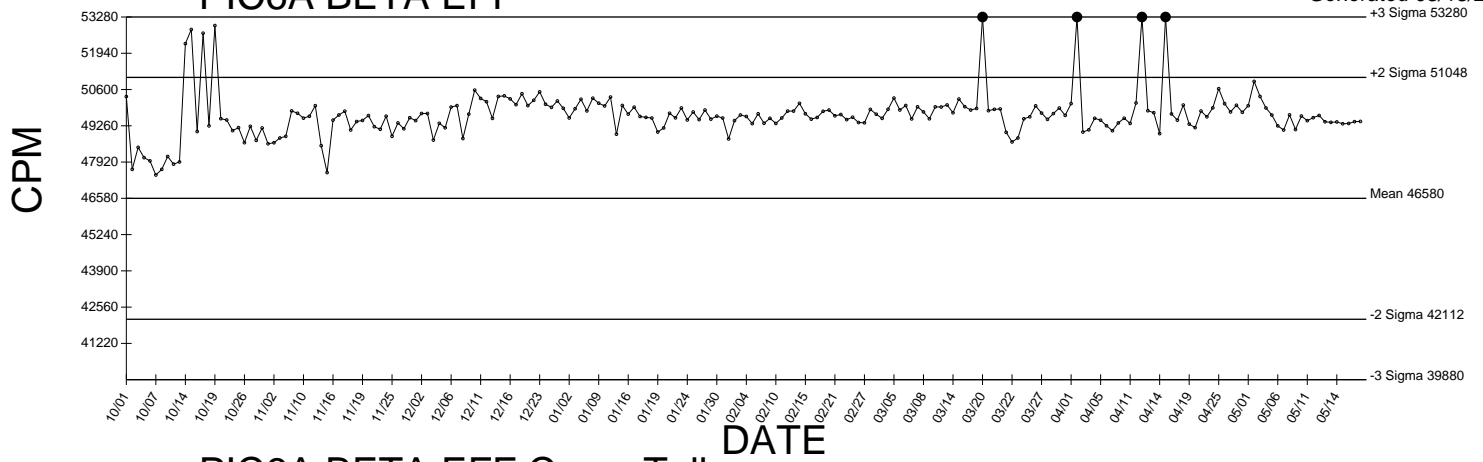
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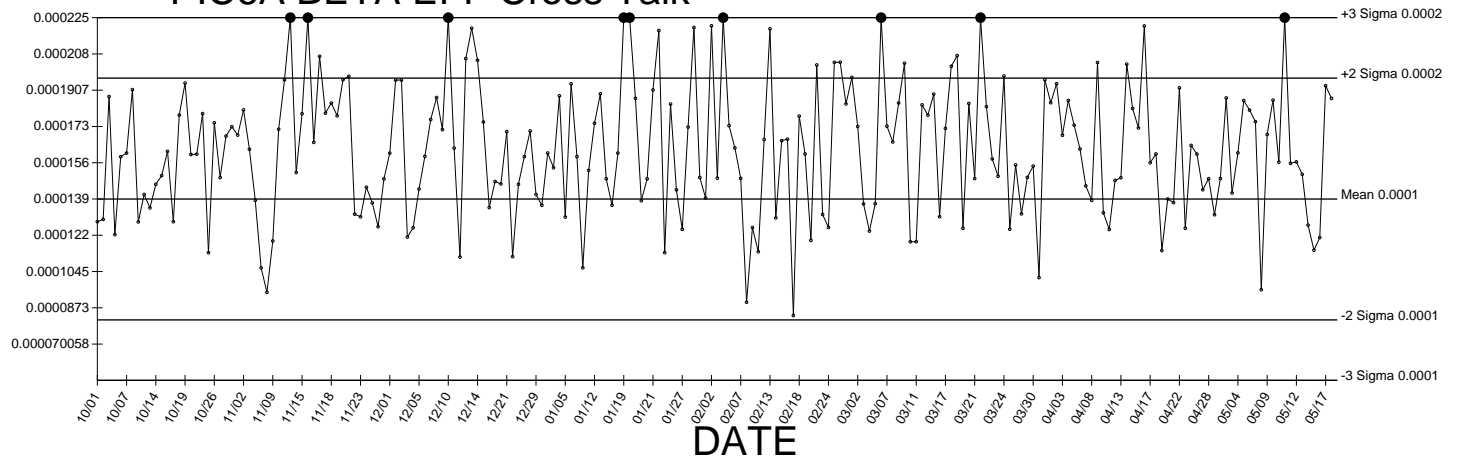
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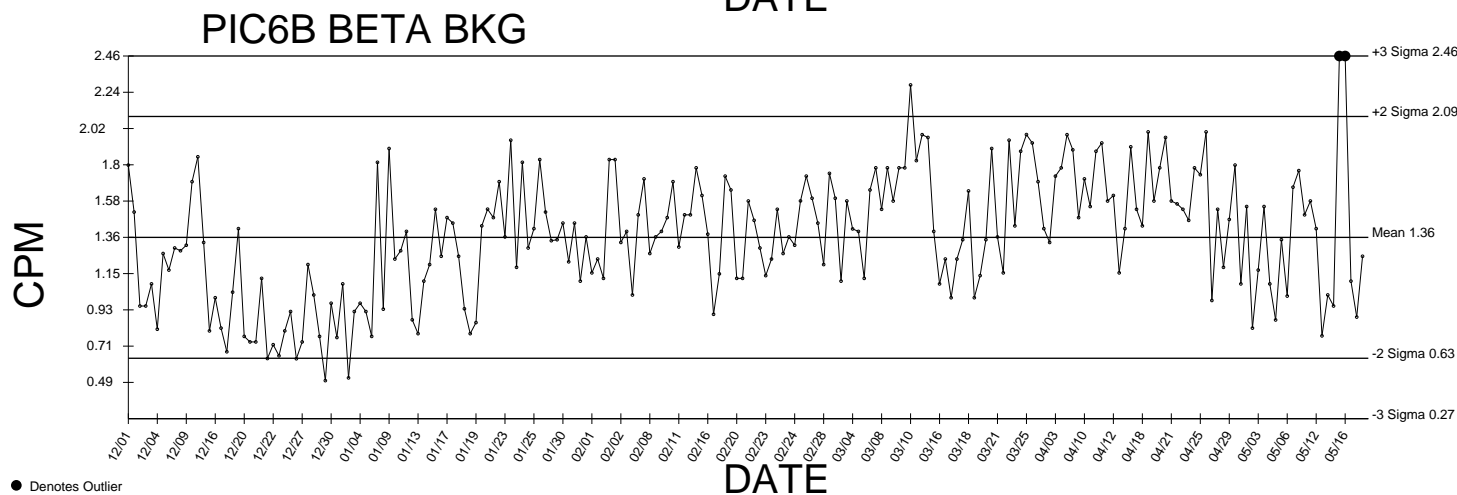
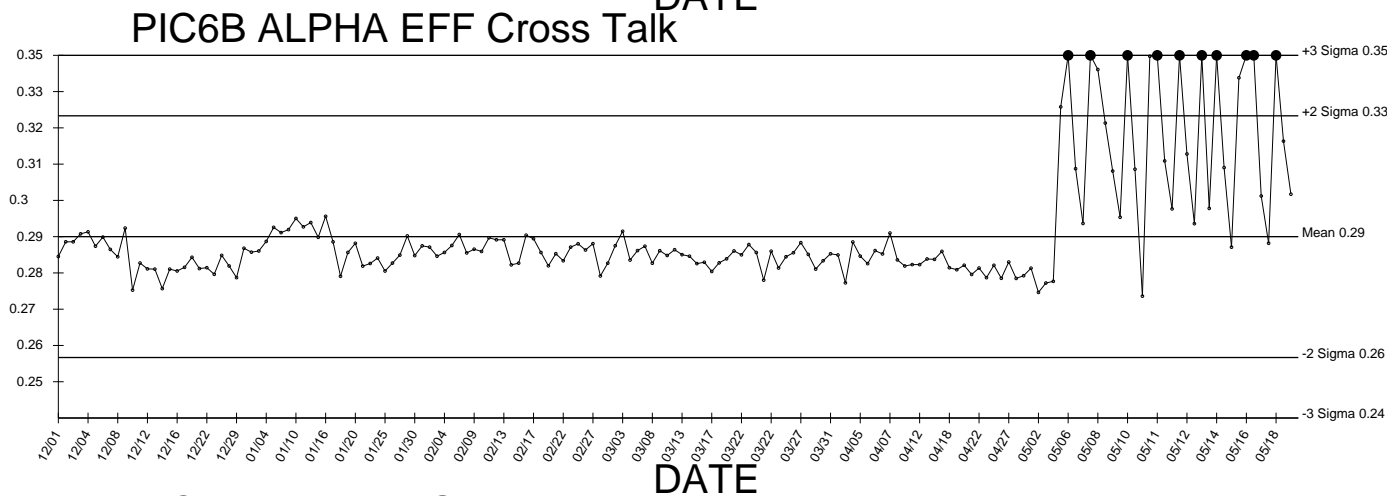
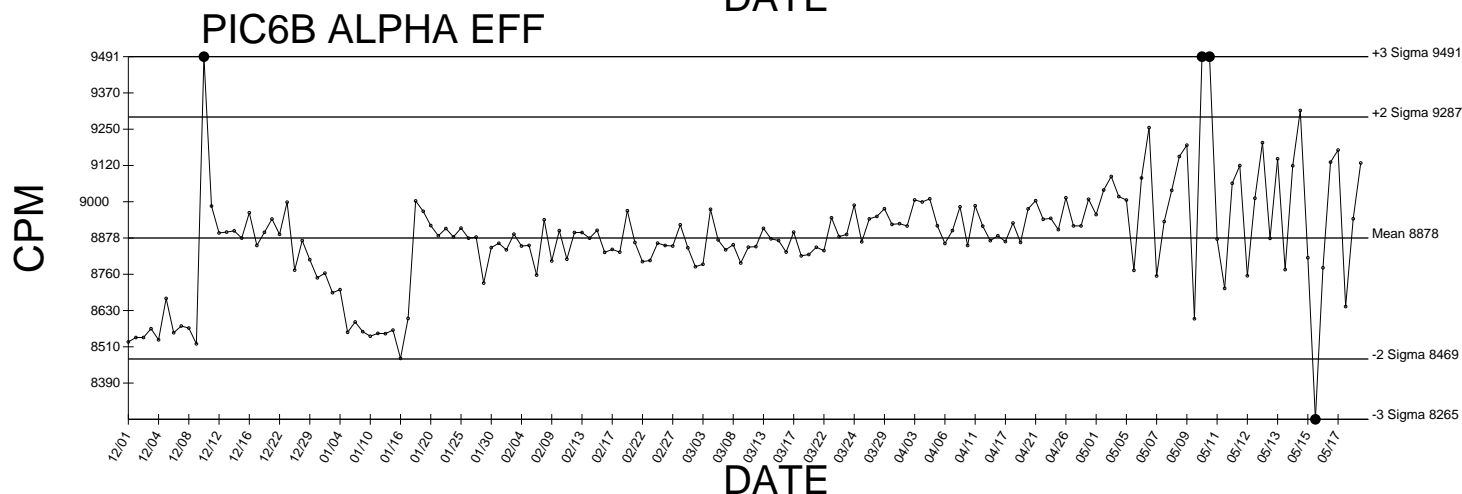
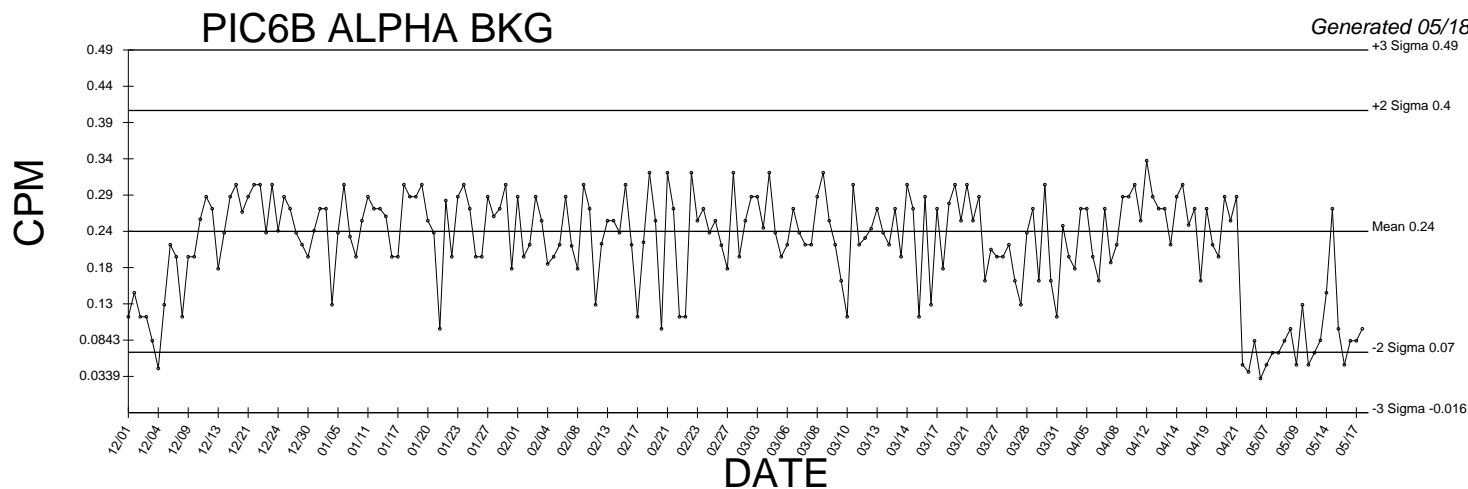
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PIC6A BETA EFF Cross Talk



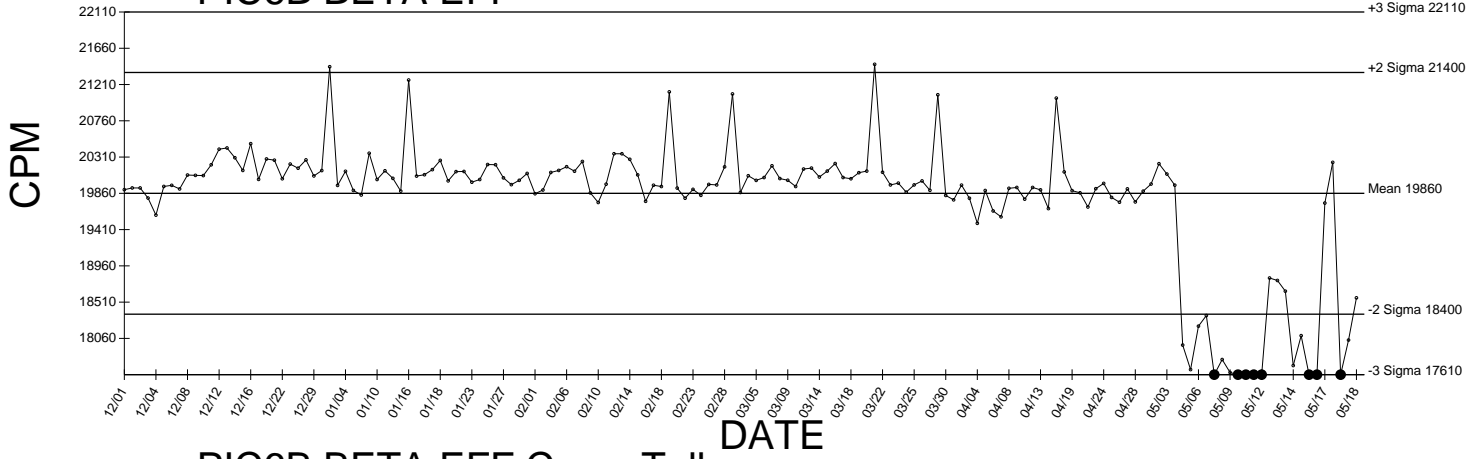
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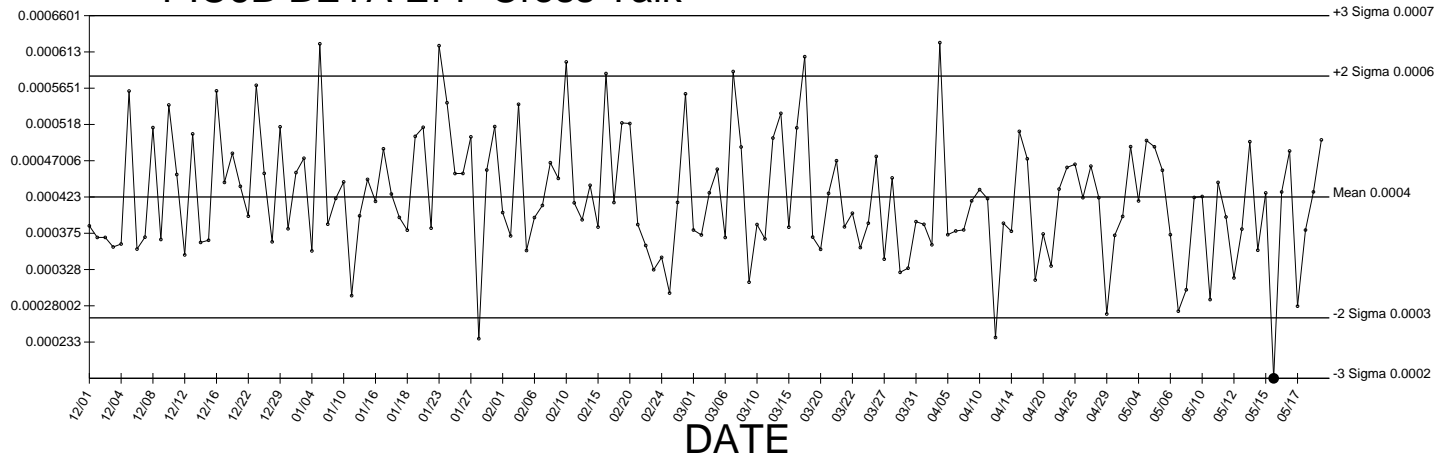
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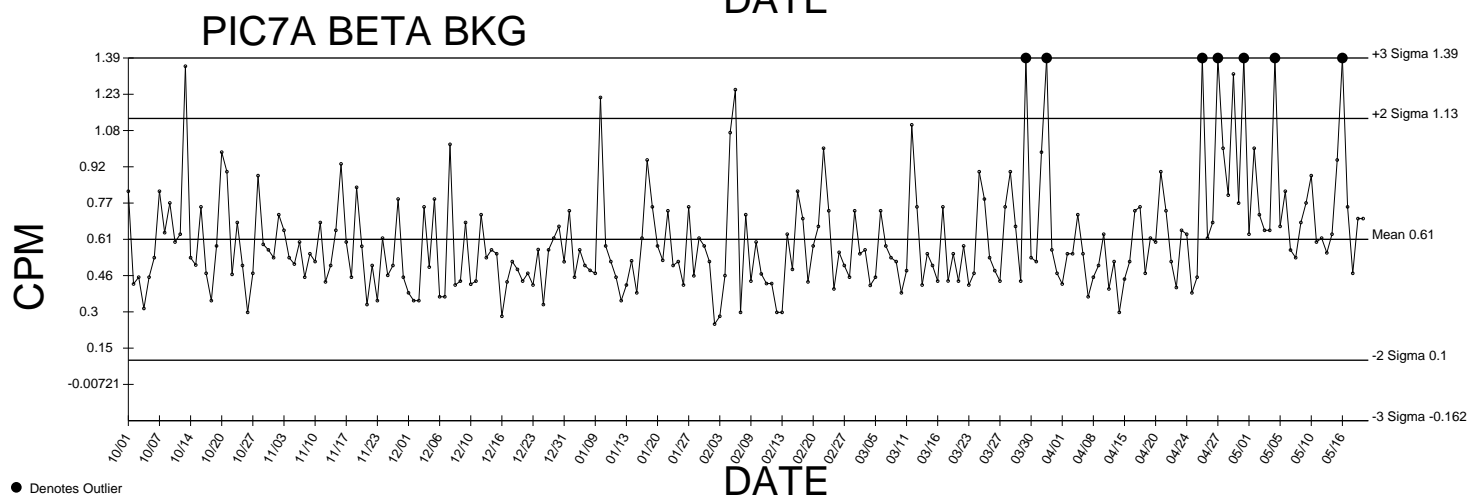
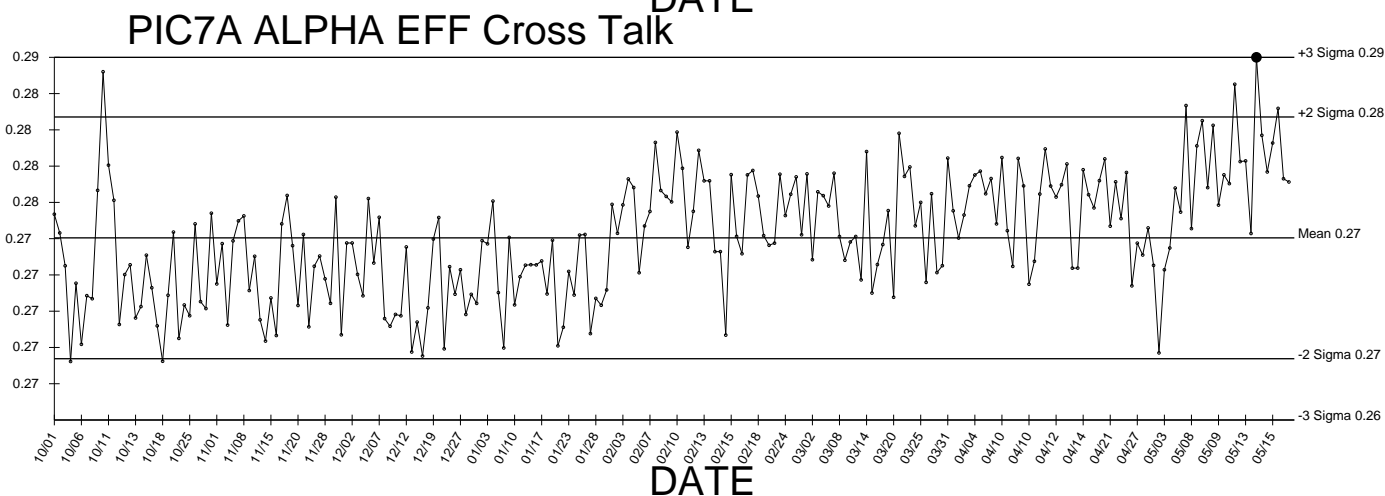
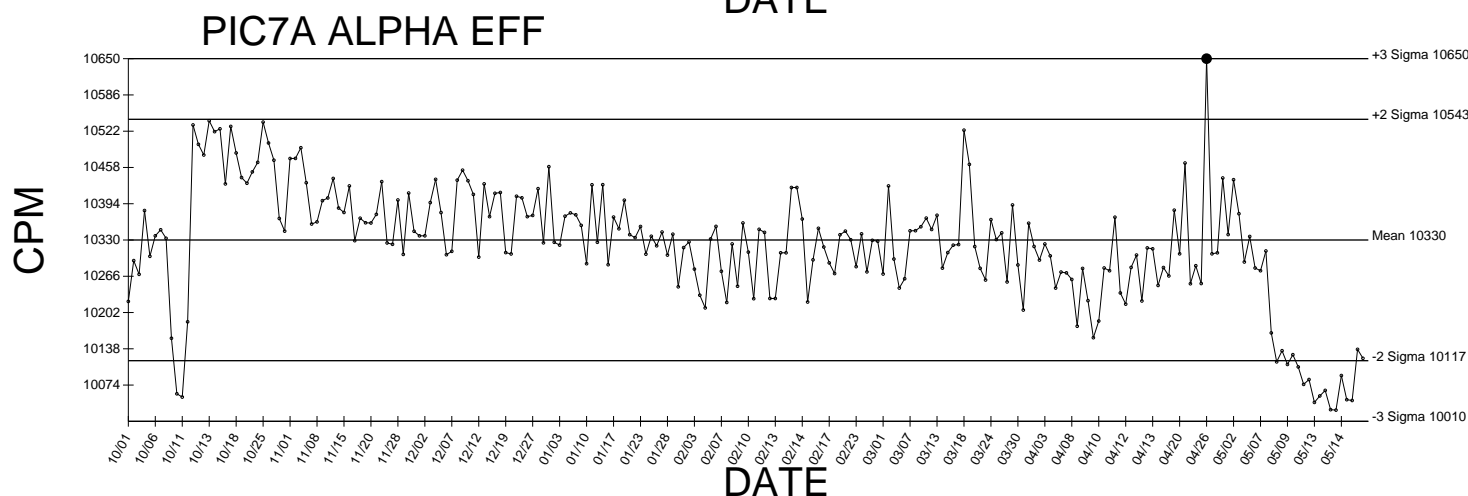
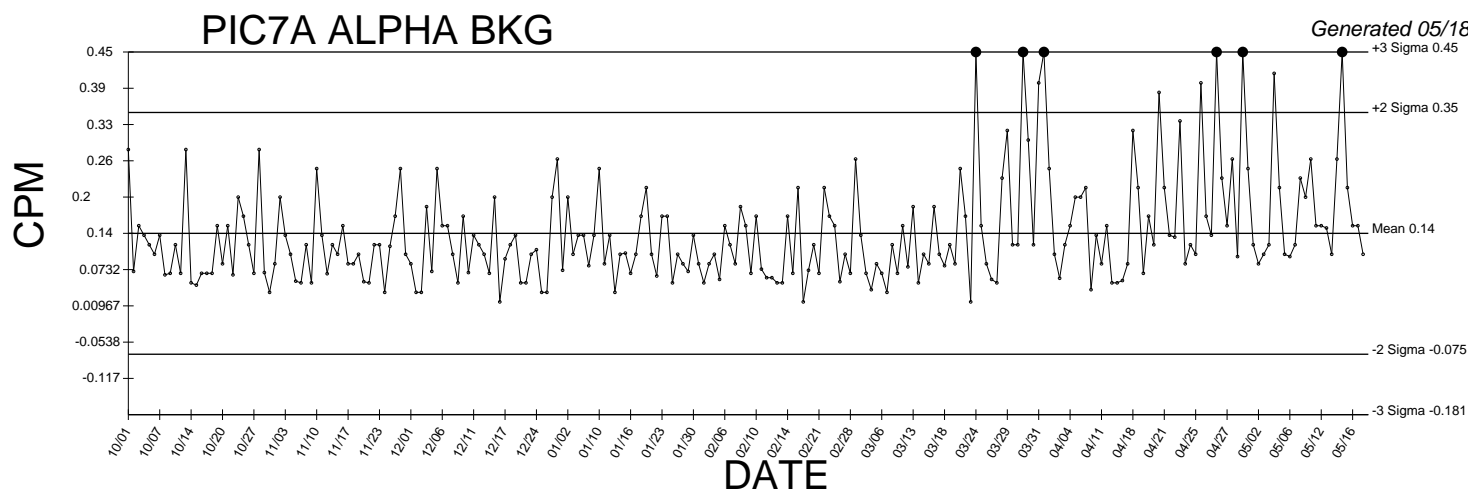
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+3 Sigma 22110



PIC6B BETA EFF Cross Talk

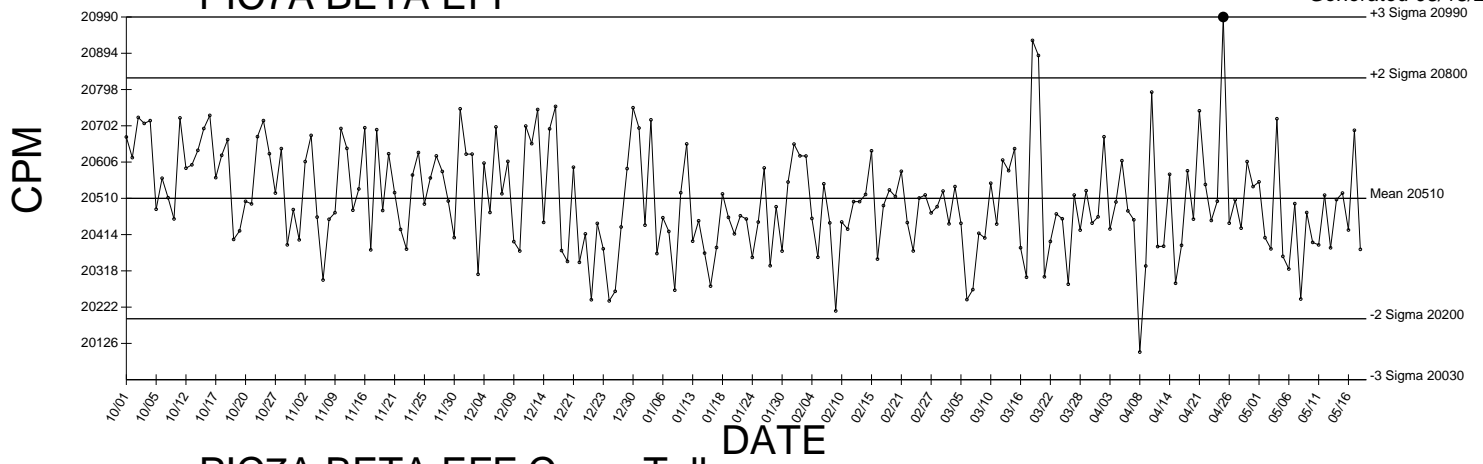


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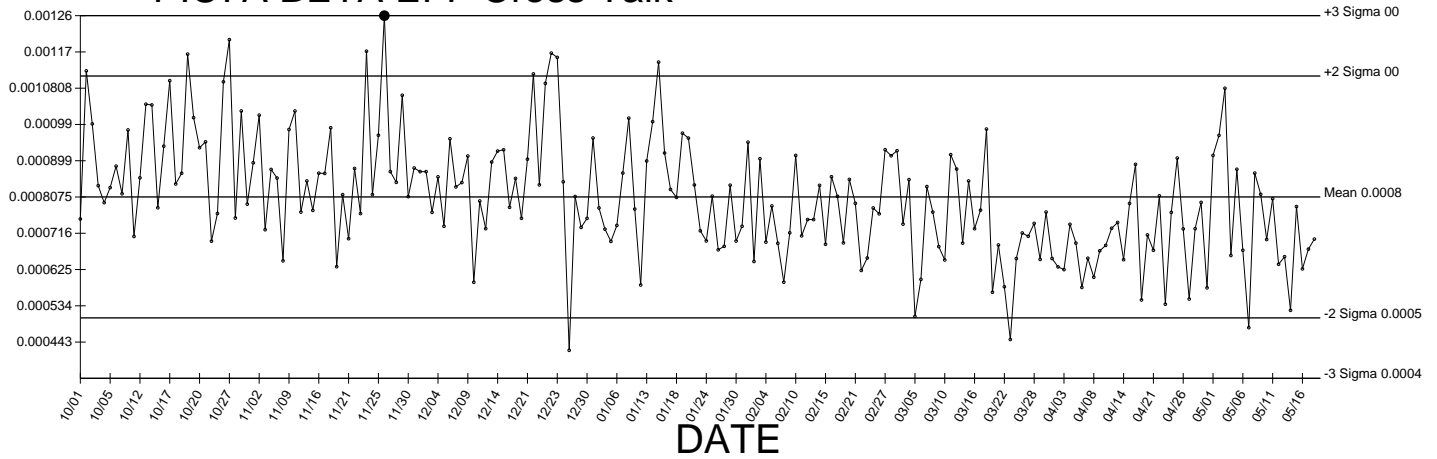


PIC7A BETA EFF

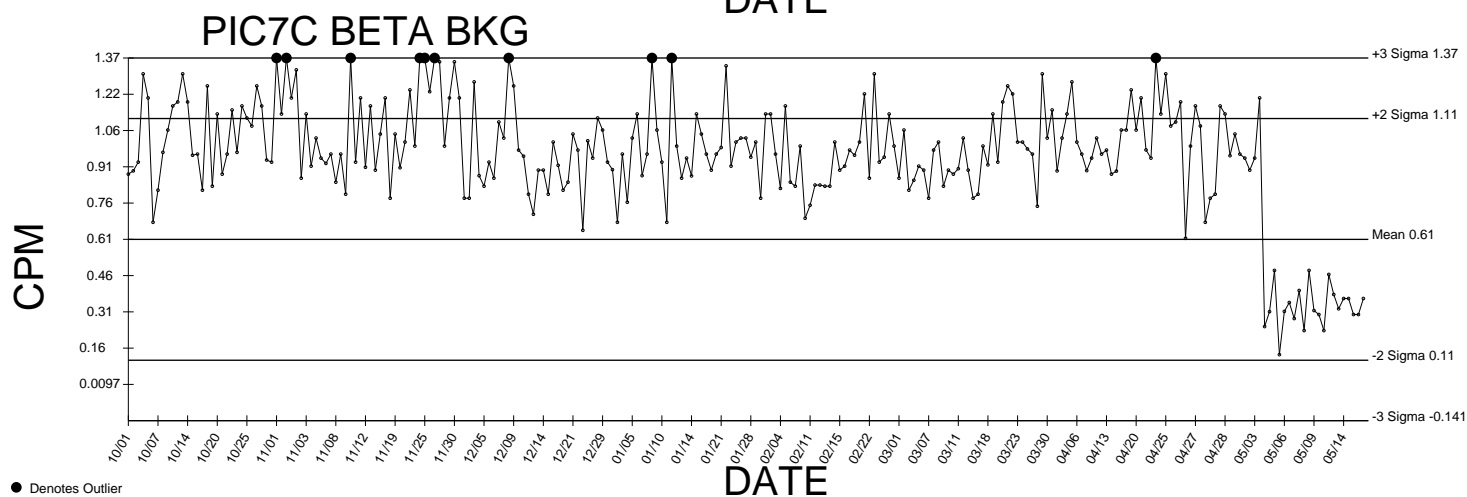
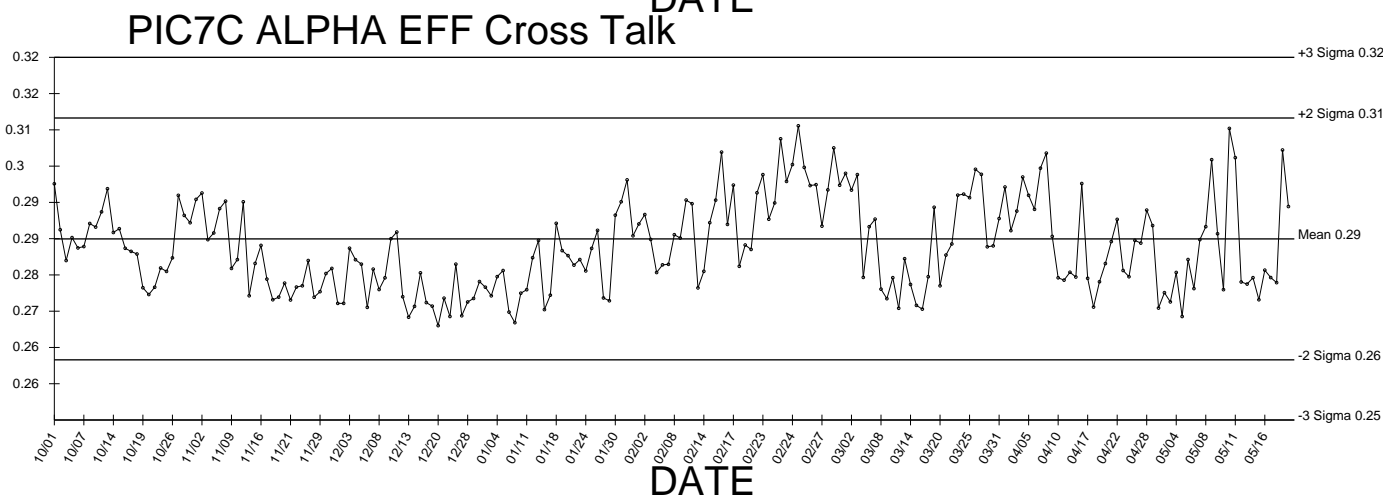
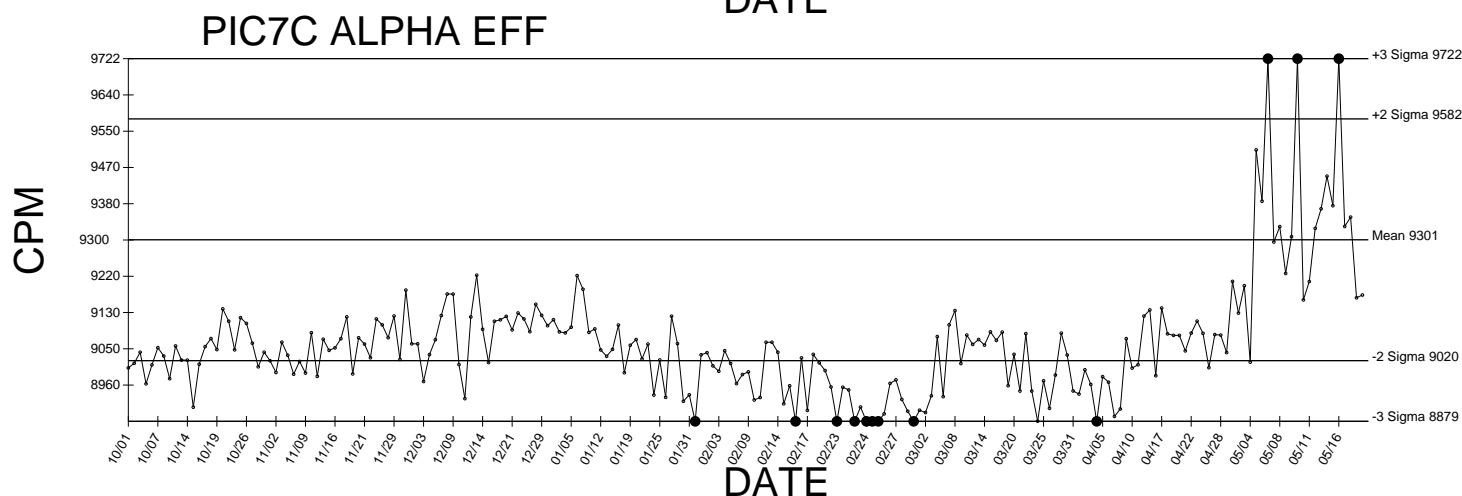
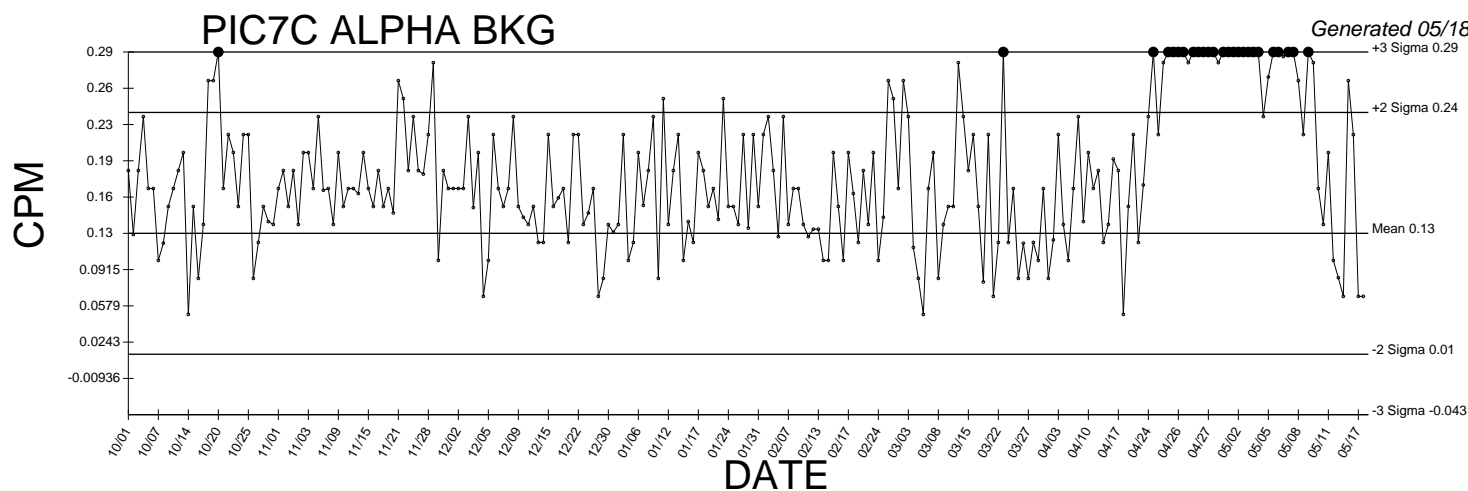
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PIC7A BETA EFF Cross Talk

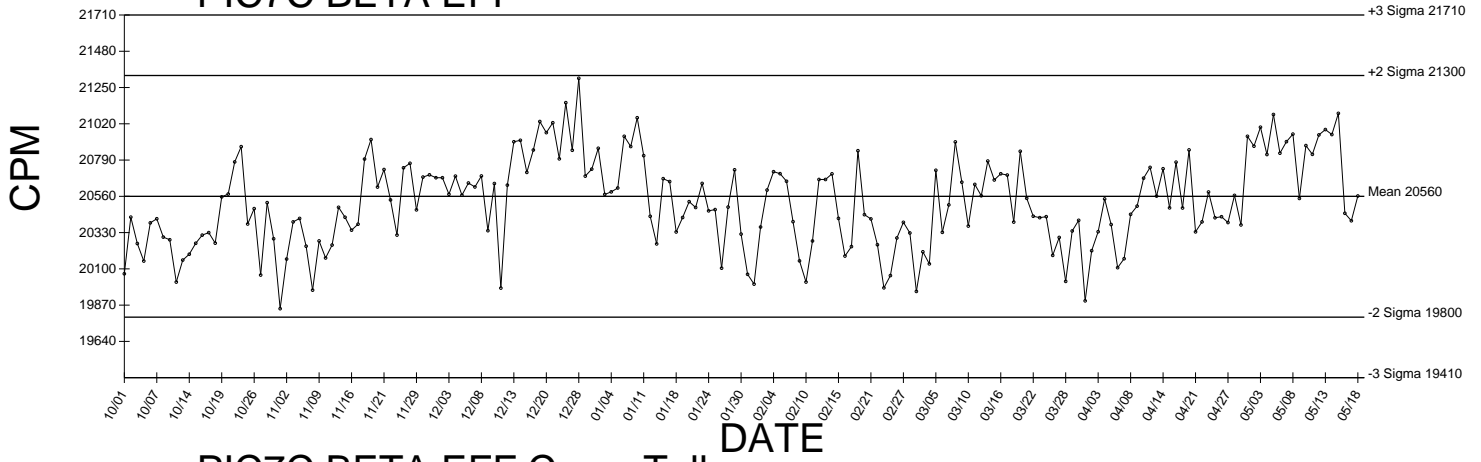


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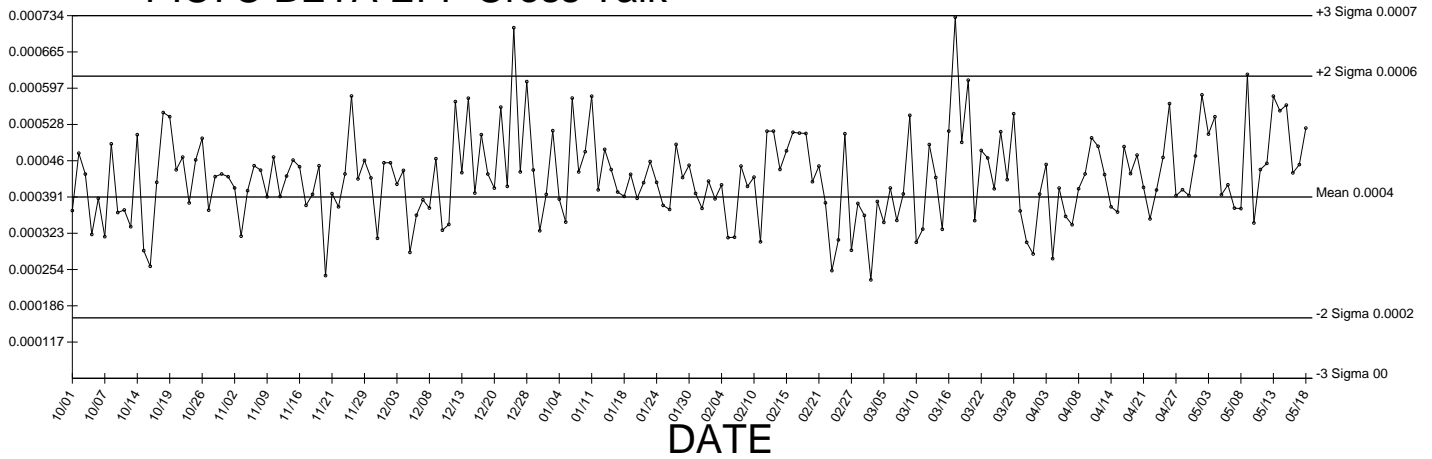


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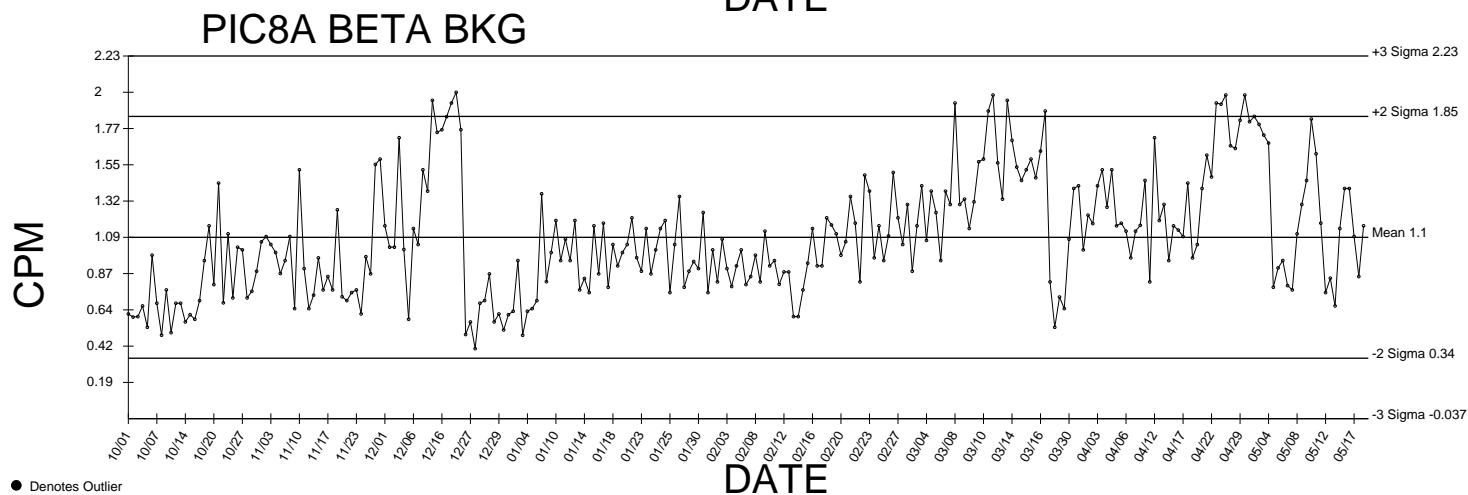
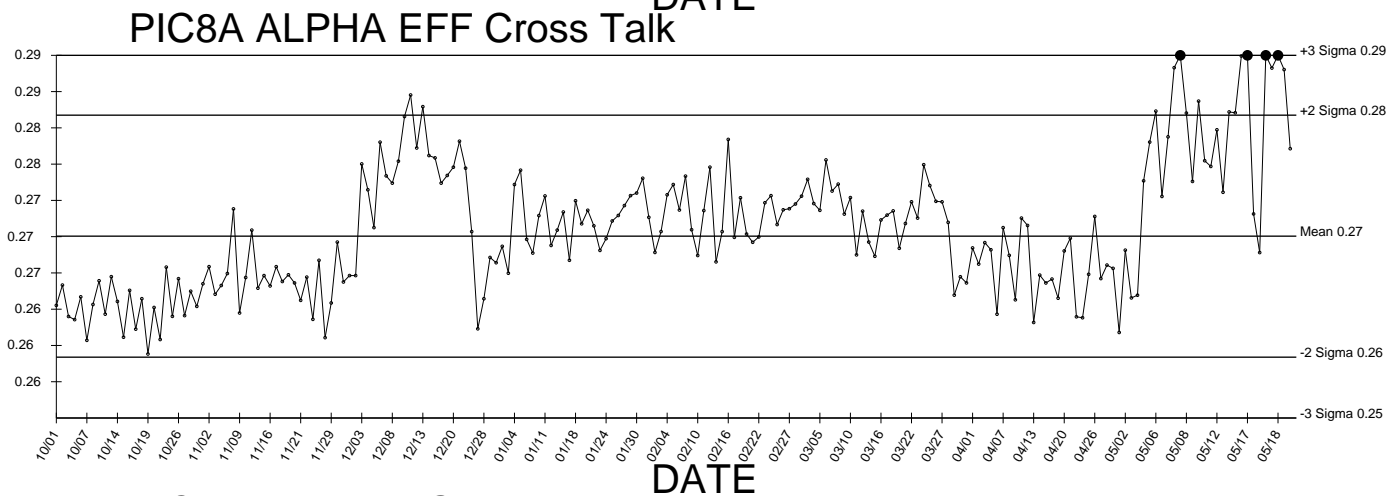
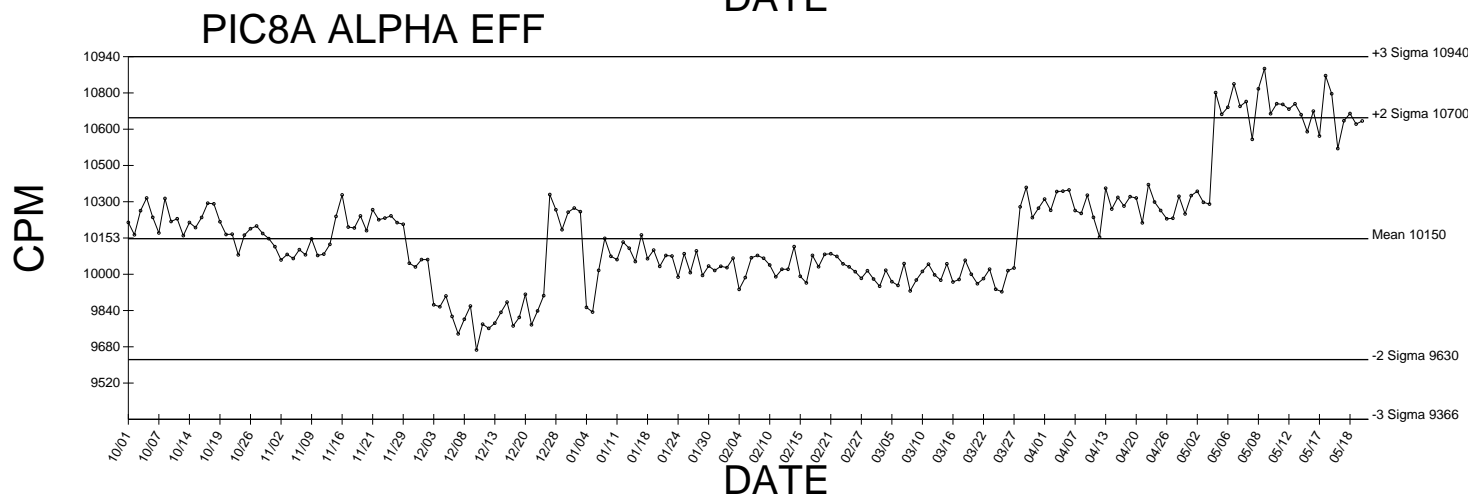
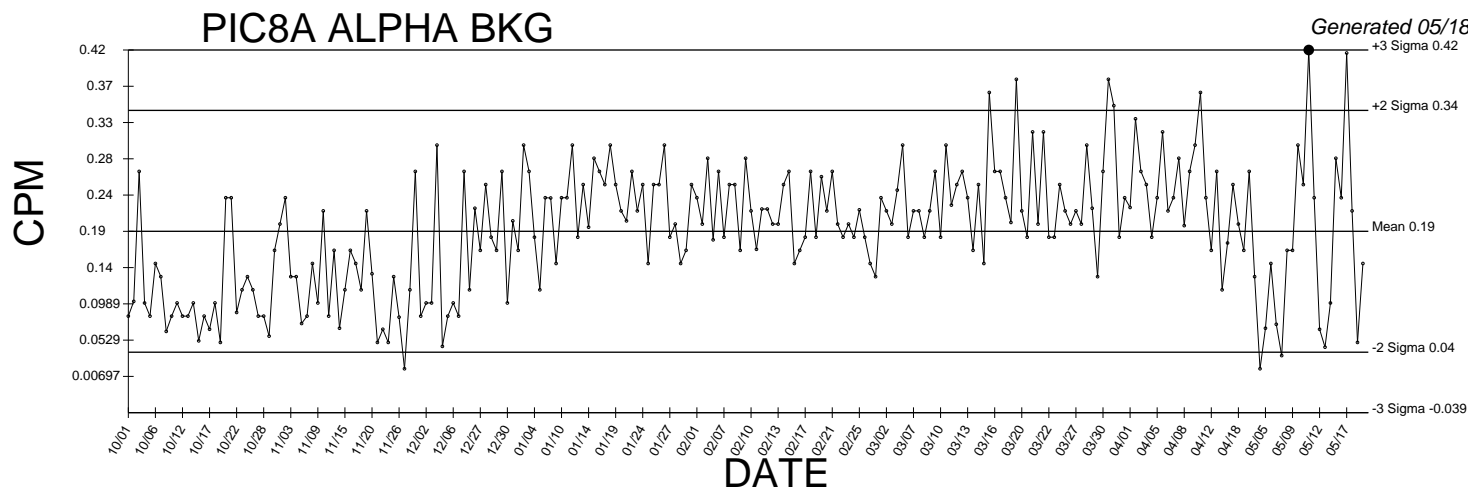
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PIC7C BETA EFF Cross Talk



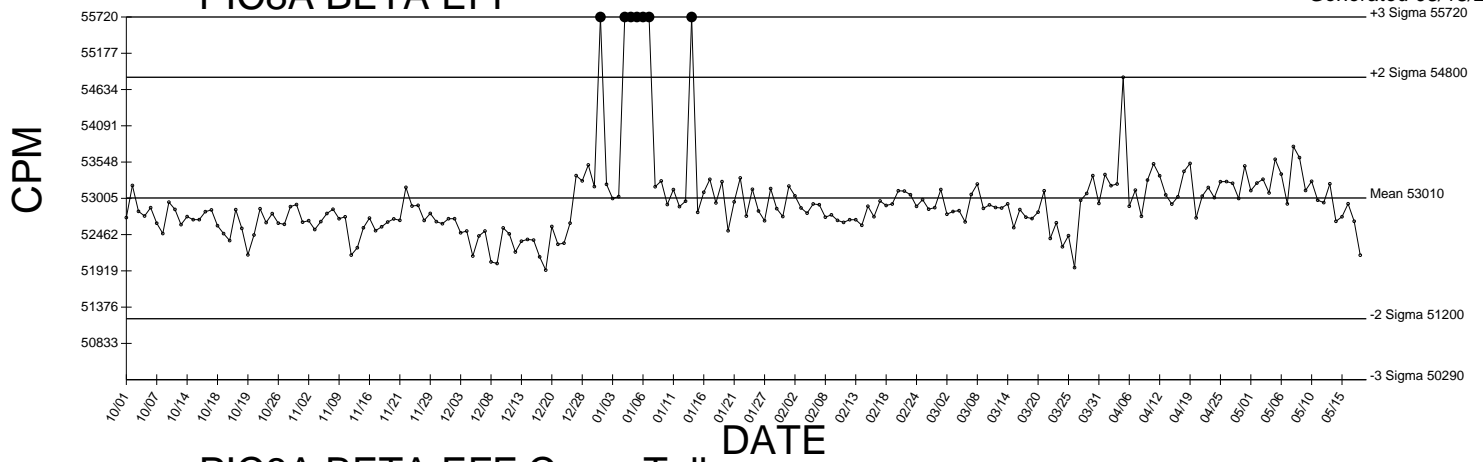
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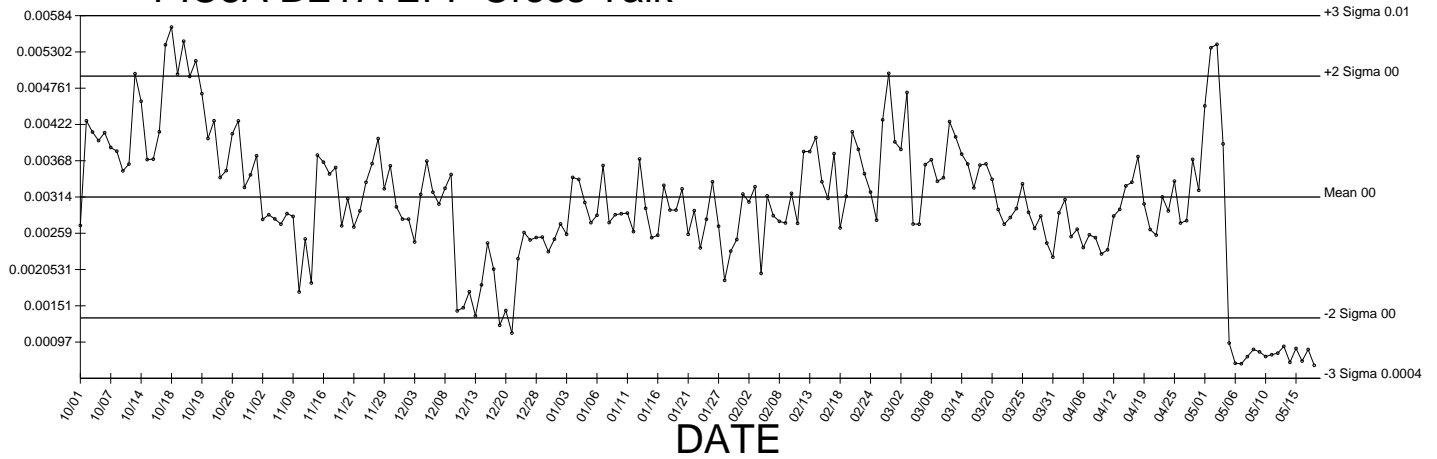
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PIC8A BETA EFF

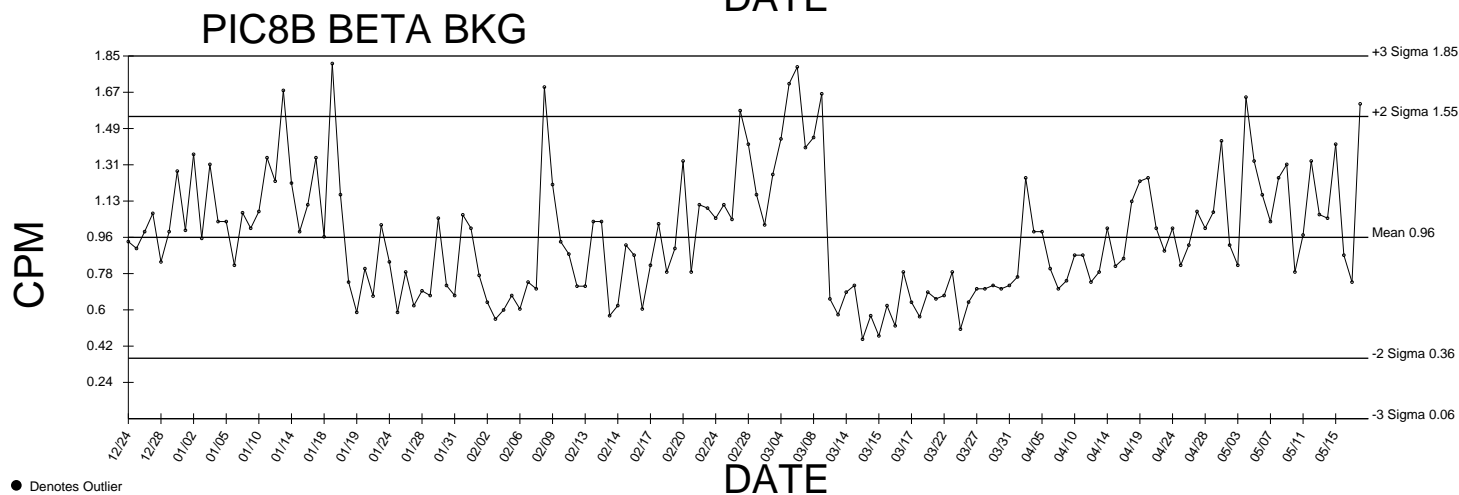
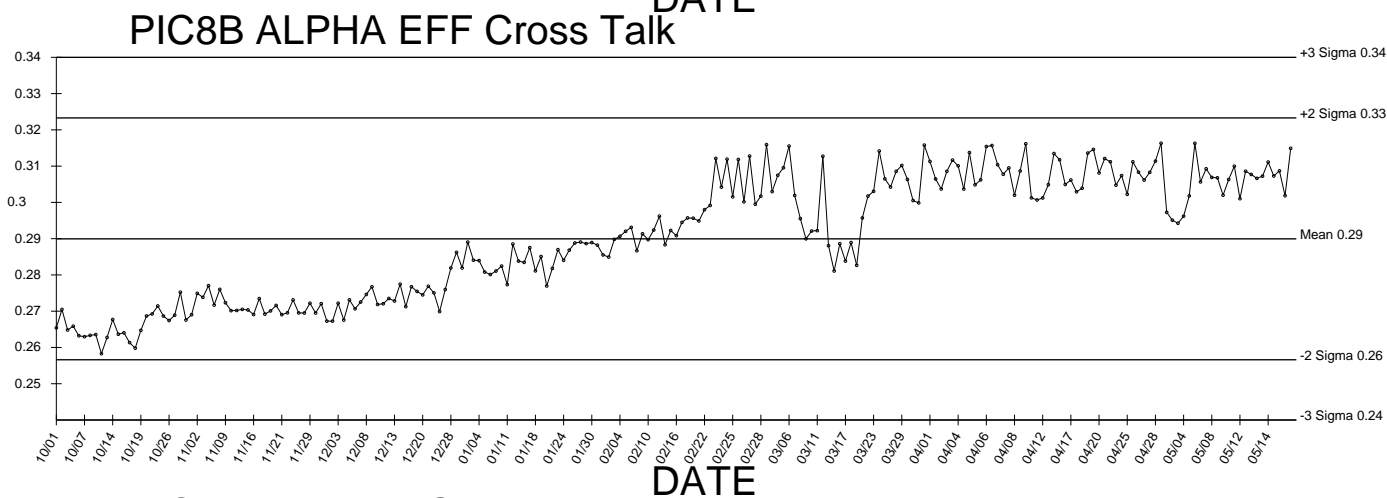
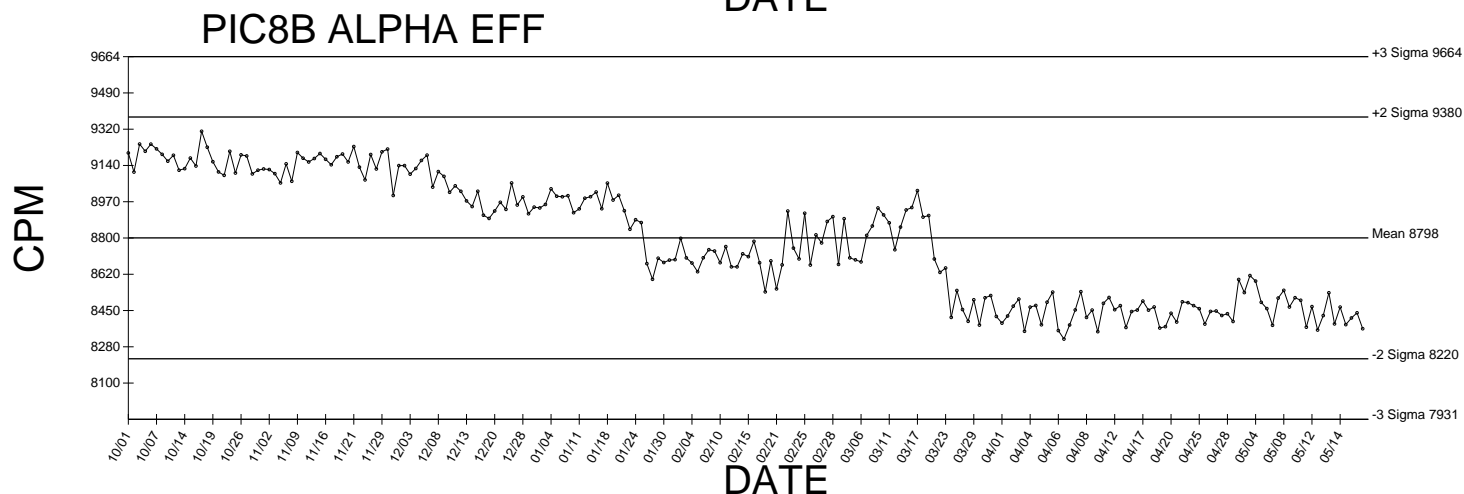
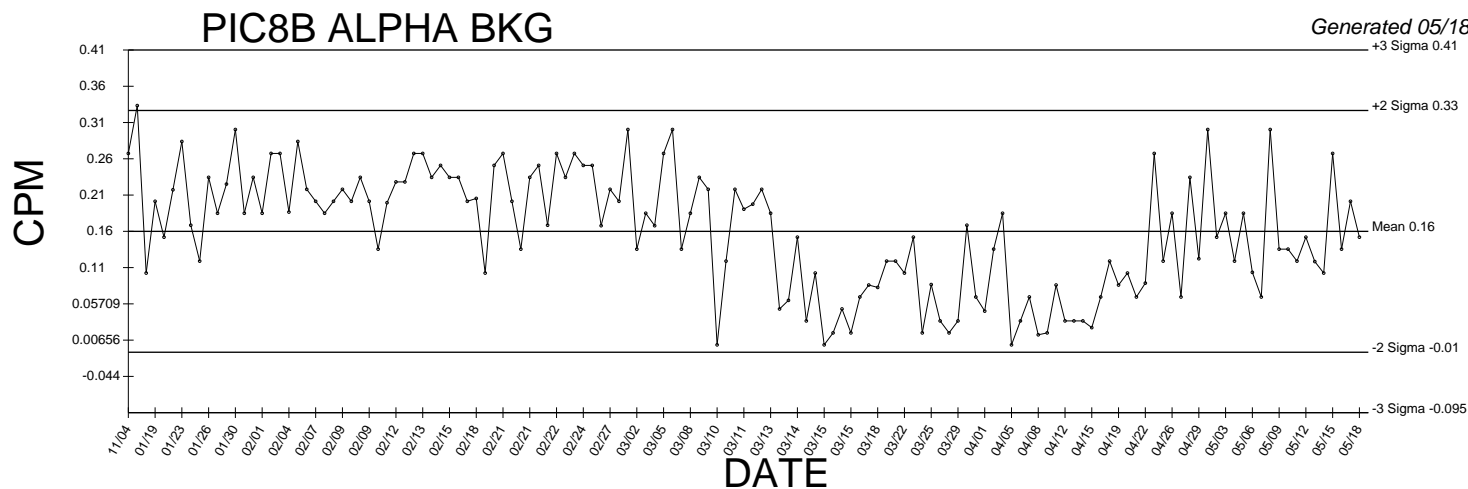
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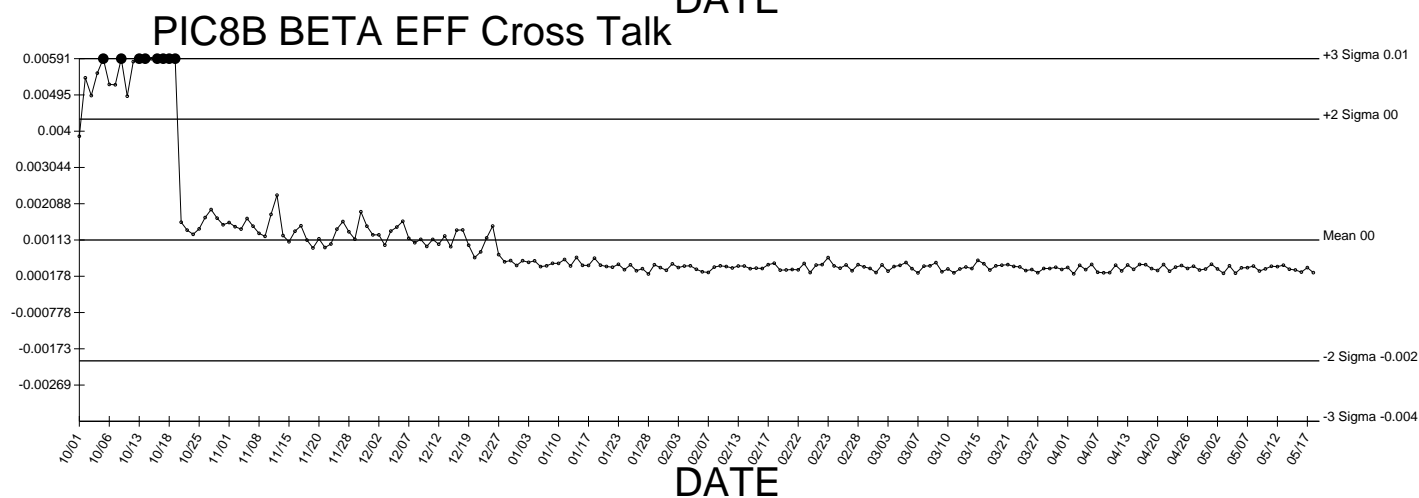
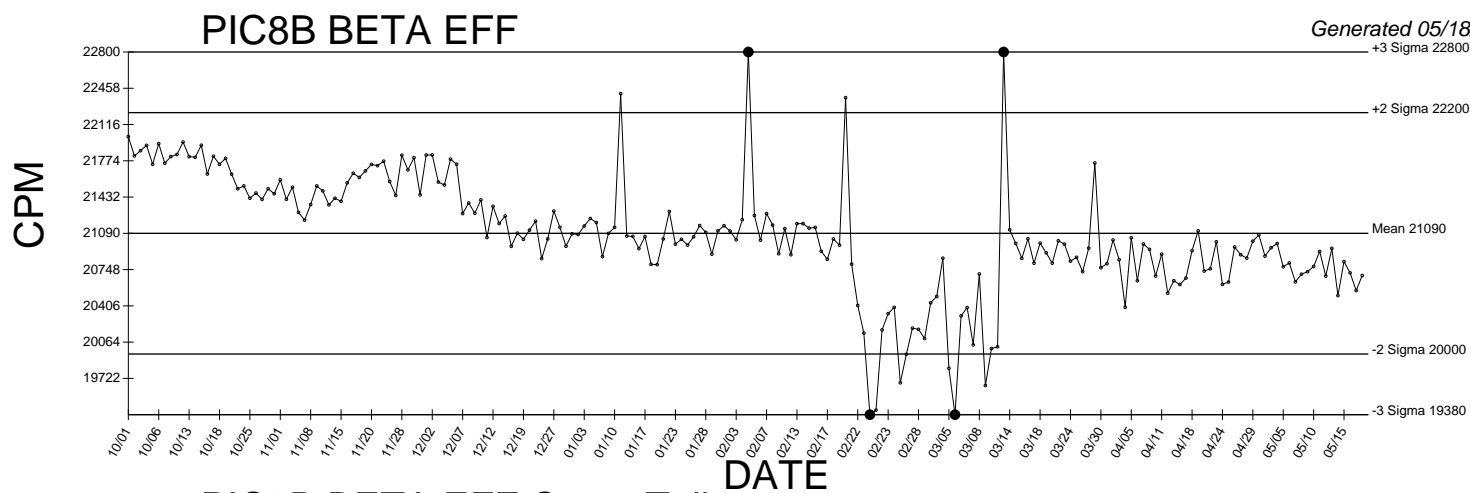


PIC8A BETA EFF Cross Talk

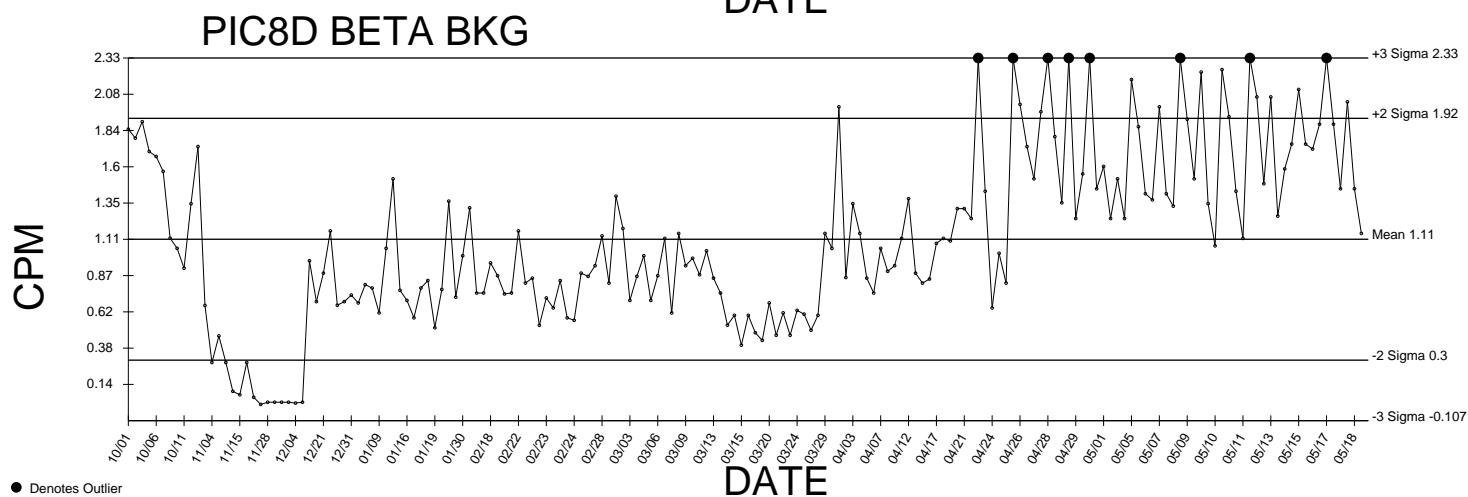
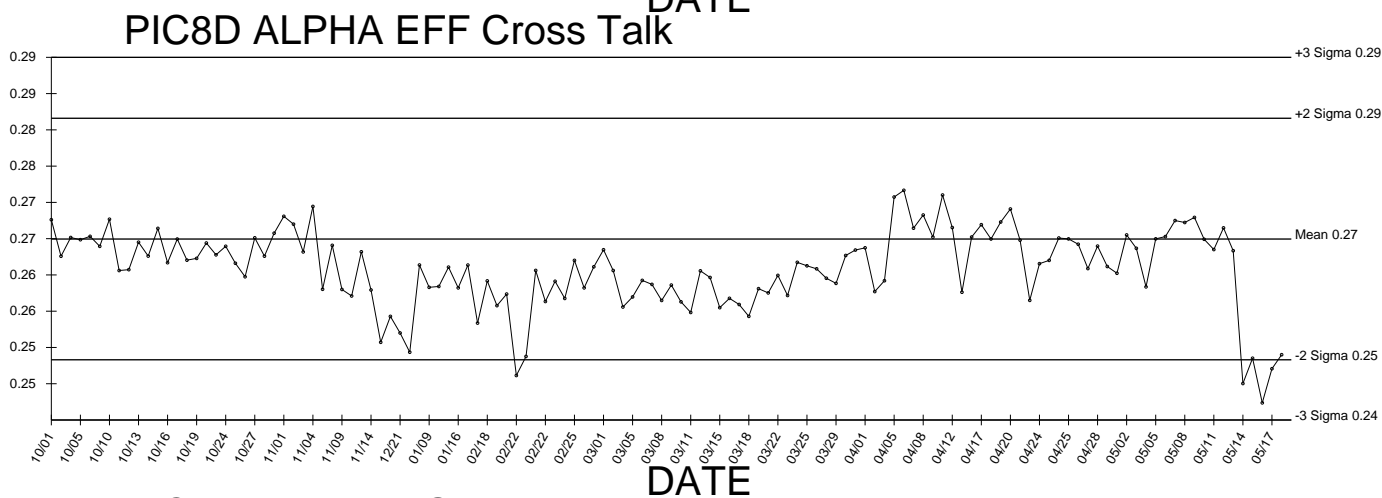
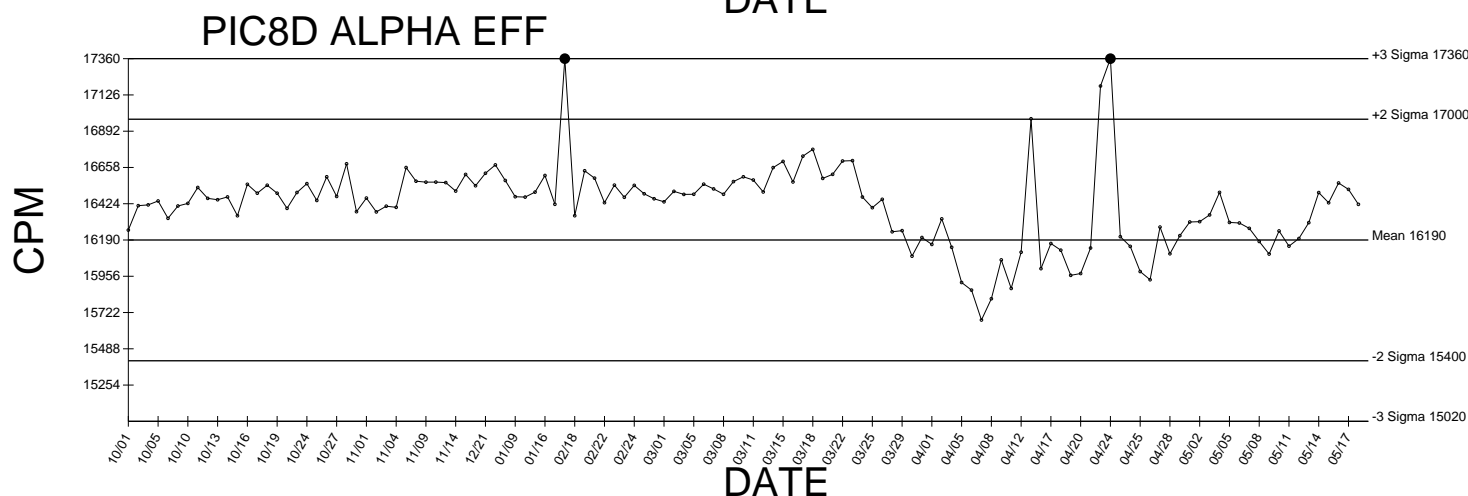
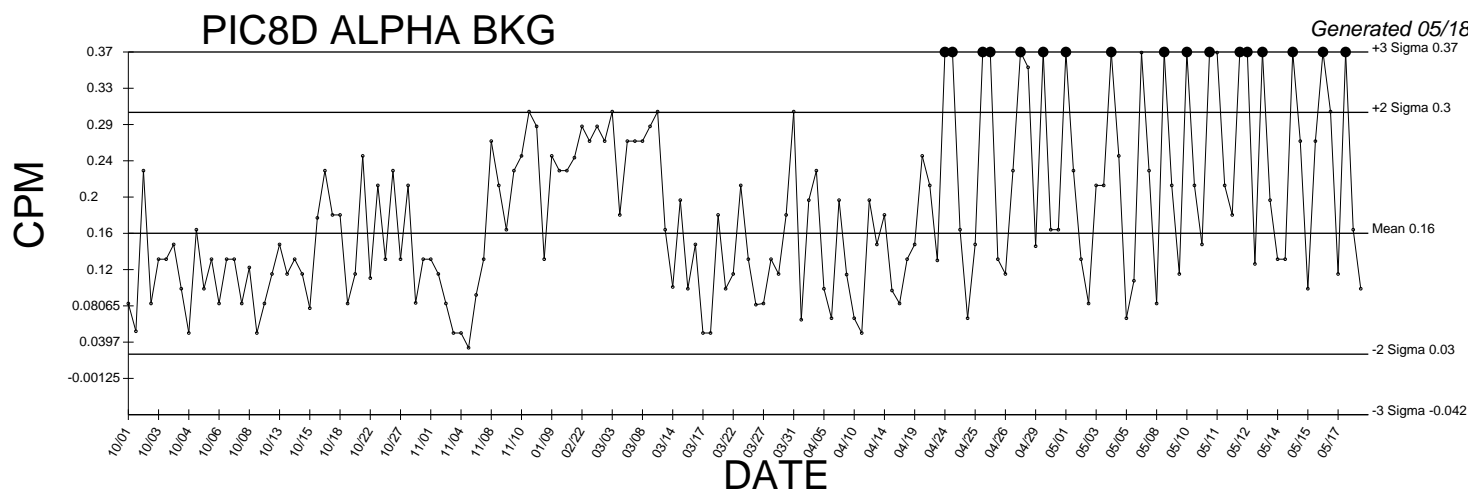


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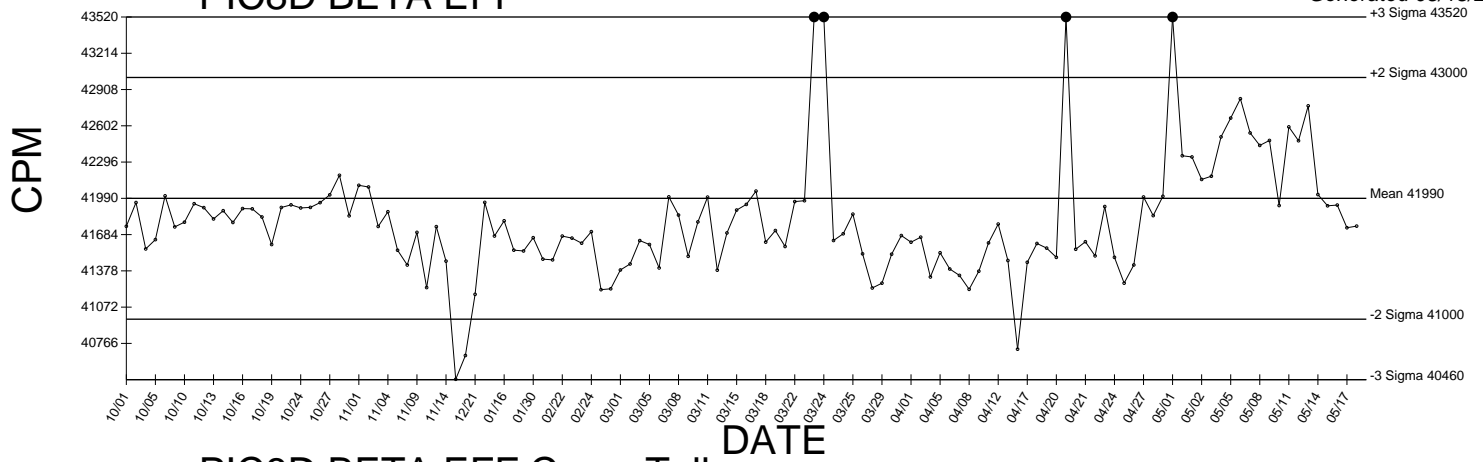


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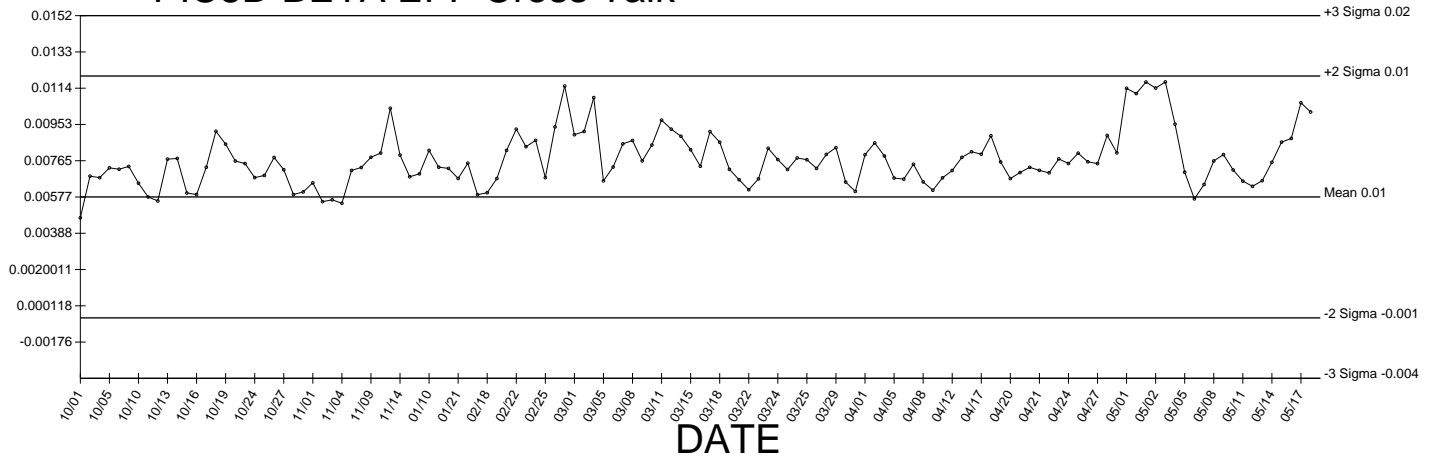


PIC8D BETA EFF

Generated 05/18/2023



PIC8D BETA EFF Cross Talk



● Denotes Outlier

RAD Standards Traceability



National Institute of Standards & Technology

Certificate

1951

Standard Reference Material® 4251d

Received
3-31-20

Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive Barium-133 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4251d consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **Barium-133** massic activity, at a **Reference Time of 1200 EST, 13 July 2018**, is:

$(382.6 \pm 4.6) \text{ kBq} \cdot \text{g}^{-1}$.

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO/JCGM and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analysis.

Expiration of Certification: The certification of **SRM 4251d** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Use and Handling"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet or register online) will facilitate notification.

Radiological and chemical hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared by the NIST Physical Measurement Laboratory, Radiation Physics Division, under the direction of B.E. Zimmerman, Group Leader of the Radioactivity Group. Overall technical direction and physical measurement leading to certification were provided by R. Fitzgerald, R. Collé and L. Laureano-Pérez of the NIST Radiation Physics Division, Radioactivity Group. Photon-emitting-impurity analyses were provided by L. Pibida of the NIST Radiation Physics Division, Radioactivity Group.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

James M. Adams, Chief
Radiation Physics Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 17 October 2019

Steven J. Choquette, Director
Office of Reference Materials

Table 1. Certified Massic Activity of SRM 4251d

Radionuclide	Barium-133
Reference time	1200 EST, 13 July 2018
Massic activity of the solution	382.6 kBq·g ⁻¹
Relative expanded uncertainty ($k = 2$)	1.2 % ^(a)

^(a) The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4, 5]. The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4251d

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	88 µg·g ⁻¹ Ba ⁺² in 0.98 mol·L ⁻¹ HCl
Solution density	(1.015 ± 0.002) g·mL ⁻¹ at 22.6 °C ^(a)
Solution mass	(5.063 ± 0.003) g ^(a)
Photon-emitting impurities	None detected ^(b)
Half-lives used [6]	¹³³ Ba: (10.539 ± 0.006) a ^(c)
Calibration methods (and instruments)	The certified massic activity for ¹³³ Ba was obtained by 4π (e, X) - γ(NaI) live-timed anti-coincidence (LTAC) counting. Confirmatory measurements were performed by five other methods: (i) 4παβ liquid scintillation (LS) spectrometry (with ³ H standard efficiency tracing for β efficiencies) and two counters; (ii) 4παβ liquid scintillation (LS) spectrometry (with ⁵⁵ Fe standard efficiency tracing for β efficiencies) and two counters; (iii) an LS-based 4παβ triple-to-double coincidence ratio (TDCR) method; (iv) 4πγ ionization chamber measurements using NIST chamber "A"; and (v) HPGe γ-ray spectrometry. ^(d)

^(a) The stated uncertainty is two times the standard uncertainty [5].

^(b) The estimated limits of detection for photon-emitting impurities, expressed as massic photon emission rates (numbers of photons per second per gram), are:

336 s⁻¹·g⁻¹ for energies between 15 keV and 95 keV,

150 s⁻¹·g⁻¹ for energies between 100 keV and 280 keV,

276 s⁻¹·g⁻¹ for energies between 285 keV and 370 keV,

142 s⁻¹·g⁻¹ for energies between 380 keV and 400 keV,

16 s⁻¹·g⁻¹ for energies between 410 keV and 1430 keV,

24 s⁻¹·g⁻¹ for energies between 1440 keV and 1480 keV, and

13 s⁻¹·g⁻¹ for energies between 1490 keV and 2000 keV,

provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of ¹³³Ba.

^(c) The stated uncertainty is the standard uncertainty. See reference 6.

^(d) The expanded ($k = 2$) uncertainties for the five confirmatory methods were: (i) 2.4 %; (ii) 2.4 %; (iii) 1.2 %; (iv) 1.6 %; and (v) 1.7 %, respectively. All of the confirmatory measurements agreed with the certified value within their respective measurement uncertainties. The results for methods (iii) and (iv) agreed with the certified anti-coincidence value to better than 0.2 %.

Table 2. Uncertainty evaluation for the massic activity of SRM 4251d

Uncertainty component		Assessment Type ^(a)	Relative standard uncertainty contribution on massic activity of ¹³³ Ba (%)
1	Measurement repeatability; standard deviation of the distribution for 6 samples, each measured once	A	0.35
2	Background; estimated by half the difference of using the middle background measurement rather than the background measurement closest in time to each sample measurement	A	0.06
3	Extrapolation fit; median uncertainty on least-squares intercept value for a single set of γ -ray gates	A	0.05
4	Analysis model, standard deviation between extrapolation intercept for two gate settings	A	0.46
5	Dead time; from previous systematic studies	B	0.1
6	Gravimetric (mass) measurements; includes uncertainty on average sample mass and dilution to SRM solution. From previous systematic studies.	B	0.05
7	¹³³ Ba decay corrections; from DDEP half-life of ¹³³ Ba of (10.539 \pm 0.006) a	B	0.00004
8	Impurity limit, from limit (no impurities seen) from γ -ray spectrometry	A	0.04
Relative combined standard uncertainty			0.60
Relative expanded uncertainty ($k = 2$)			1.2

^(a) Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.

INSTRUCTIONS FOR USE AND HANDLING

Storage: SRM 4251d should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to the SDS for further information.

REFERENCES

- [1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*; available at <https://www.nist.gov/pml/radiation-physics/ampoule-specifications-and-opening-procedure> (accessed Oct 2019). Note: This SRM is contained in the standard NIST ampoule.
- [2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)*; (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology (JCGM); BIPM, Sevres Cedex, France; p. 19 (2012); available at https://www.bipm.org/utis/common/documents/jcgm/JCGM_200_2012.pdf (accessed Oct 2019).
- [3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)*; (2008 version with Minor Corrections), 3rd edition; JCGM: BIPM, Sevres Cedex, France; p. 18 (2012); available at https://www.bipm.org/utis/common/documents/jcgm/JCGM_200_2012.pdf (accessed Oct 2019).
- [4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement*; (GUM 1995 with Minor Corrections), JCGM: BIPM, Sevres Cedex, France (2008); available at https://www.bipm.org/utis/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Oct 2019).
- [5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at <https://www.nist.gov/pml/nist-technical-note-1297> (accessed Oct 2019).
- [6] Chechev, V.P. and N.K. Kuzmenko ; *LNE-LNHB/CEA Table of Radionuclides*, ¹³³Ba; (October 2016); available at www.lnhb.fr/nuclides/Ba-133_tables.pdf (accessed Oct 2019).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at <https://www.nist.gov/srm>.

Standard Logbook

Serial ID: 1951 **Open/Reference Date:** 13-JUL-18 **Aliquot :** 5.063 g
Name: Barium-133 **Received:** 31-MAR-20 **Density :** Hand Calculated g/mL
Type: Source Material **Expires:** 31-MAR-35 **Logbook Num :** GL-CED-297-244
Employee: Tim Chandler **Lot Number :** 4251d
Supplier: NIST **Solvent :** 0.98M HCl
Uncertainty : .6 percent

Description: Barium-133
Comments: None

Analyte	Concentration	Analyte	Concentration
Barium-133	382.6 kBq/g		



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1951
Prepared By:	Tim Chandler
Carrier Conc:	0.98M HCl
Reference Date:	07/13/2018
Ampoule Mass (g):	5.063 g
Uncertainty:	+/- .6 %
LogBook No:	GL-CED-297-244
Supplier:	NIST

A Solution Material Info			
Isotope:	Barium-133		
Prepared By:	Bethany Fiem		
Prep Date:	09/23/2020		
Verification Date:	09/16/2023		
Expiration Date:	09/16/2023		
Primary Code:	1951-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	5.034 g		
Density(g/mL):	1.0167	Balance ID:	B733529066

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(5.034 \text{ g}) * (382.6 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 1155605.0400 \text{ dpm/mL}$
$(5.034 \text{ g}) * (382.6 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0167 \text{ g/mL}) / (100 \text{ mL}) = 1136603.3060 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/23/2020	Bethany Fiem	19.301	1000	1951-B	21937.5804 dpm/mL	09/16/2021	09/16/2022
09/16/2021	Bethany Fiem	19.02	1000	1951-C	21618.1948 dpm/mL	09/16/2021	09/16/2022
06/02/2022	Jennie Kill-Bowden	19.0813	1000	1951-D	21687.8687 dpm/mL	06/03/2022	06/02/2023
01/10/2023	Jennie Kill-Bowden	19.1	1000	1951-E	21709.1231 dpm/mL	01/10/2023	01/10/2024

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ba-133 Standard 1951-E

v1.0.2

Instrument	Blue
Analyst	JXK3
Verification Prep Date	1/10/2023

Standard Information	
Isotope	Ba-133
Serial Number	1951-E
Isotope Halflife	3.8410E+03 D
Reference Date	7/13/2018
Ref. Act. (DPM/mL)	21709.1231
Amount of Std. (mL)	1.0
Standard Prep Date	1/10/2023

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	1/10/2023	62.50	13242.50	36.80
2	1/10/2023	60.10	13151.25	36.80
3	1/10/2023	62.70	13137.50	36.80

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	13205.70	0.798005	16548.39	16548.39
2	13114.45	0.798005	16434.04	16434.04
3	13100.70	0.798005	16416.81	16416.81

Mean Value = dpm/mL
 16466.41
 Stdev = 71.51346004
 Certificate Value* = 16141.9
 Two sigma = 143.027
 10 % of Mean = 1646.641
 Rule A (Pass/Fail) Pass
 % Recovery 102.01%
 Rule B (Pass/Fail) Pass
 Expiration Date 1/10/2024

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ba-133 source 1951-E by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBlue for Ba-133 source standard verification. The Ba-133 efficiency calibration which was used for verification calculations was performed on 1/10/2023 using Ba-133 source 1842-A.

Standard results for each verification source was calculated as follows:

$$\text{Source dpm/mL} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency (cpm/dpm), and
- D = volume used for standard verification.

RAD-M-001

2/10/23
 Jais Bui

CERTIFICATE OF CALIBRATION

Standard Reference Source

2051

SRS Number: 124197

Source Description: 5 mL Liquid in 5 mL Flame Sealed Ampoule

Product Code: 8328

Customer: GEL Laboratories LLC

P.O. Number: GEL2232884, Item 2

RECEIVED
10/13/22

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA). The master solution was calibrated using a germanium gamma-ray spectrometer system. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 20-September-2022 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty			Calibration Method**
			u_A , %	u_B , %	U , %*	
Ra-228	2.100E+03	3.701E+03	0.5	2.4	4.9	HPGe

Uncertainty:** U - Relative expanded uncertainty, $k = 2$. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." *Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

SRS Number: 124197

Comments:

5.00937 g of 0.1 M HCl solution with approximately 30 µg/g Ba carrier.

Separation date: 01-March-2018

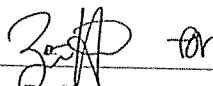
Impurities:

α-impurities: Ra-226 7.3E+01 Bq, other α-impurities (other than decay products) < 0.1%


γ-impurities (other than decay products) < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____


H. Salvo, Radiochemist

QC Approved by: _____


J. Lafr, Spectroscopist

Date: 12-SEP-22

Standard Logbook

Serial ID: 2051 **Open/Reference Date:** 20-SEP-22 **Aliquot :** 5.00937 g
Name: Radium-228 **Received:** 13-OCT-22 **Density :** Hand Calculated g/mL
Type: Source Material **Expires:** 20-SEP-32 **Logbook Num :** GL-CED-297-343
Employee: Gregory Ramsay **Lot Number :** 124197
Supplier: Eckert & Ziegler **Solvent :** 0.1M HCl
Uncertainty : 4.9 PERCENT
Description: ampule
Comments: None

Analyte	Concentration	Analyte	Concentration
Radium-228	3701 Bq		



Standard Traceability Log Rad

Source Material Info	
Parent Code:	2051
Prepared By:	Gregory Ramsay
Carrier Conc:	0.1M HCl
Reference Date:	09/20/2022
Ampoule Mass (g):	5.00937 g
Uncertainty:	+/- 4.9 %
LogBook No:	GL-CED-297-343
Supplier:	Eckert & Ziegler

A Solution Material Info			
Isotope:	Radium-228		
Prepared By:	Jennie Kill-Bowden		
Prep Date:	12/05/2022		
Verification Date:	12/06/2022		
Expiration Date:	12/05/2023		
Primary Code:	2051-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9732 g		
Density(g/mL):	0.9977	Balance ID:	C008029151

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.9732 \text{ g}) * (3701 \text{ Bq}) * (60 \text{ dpm/Bq}) / (5.00937 \text{ g} * 100 \text{ mL}) = 2204.5662 \text{ dpm/mL}$
$(4.9732 \text{ g}) * (3701 \text{ Bq}) * (60 \text{ dpm/Bq}) / (0.9977 \text{ g/mL}) / (5.00937 \text{ g} * 100 \text{ mL}) = 2209.7437 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
03/27/2023	Jennie Kill-Bowden	27.0171	100	2051-B	597.0087 dpm/mL	03/28/2023	03/27/2024
04/27/2023	Jennie Kill-Bowden	10.2515	250	2051-C	90.6128 dpm/mL	04/28/2023	04/27/2024

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-228 Standard 2051-B

v1.0.2

Instrument	BROWN
Analyst	JXK3
Verification Prep Date	3/27/2023

Standard Information	
Isotope	Ra-228
Serial Number	2051-B
Isotope Halflife	5.7500 Y
Reference Date	9/20/2022
Ref. Act. (DPM/mL)	597.0087
Amount of Std. (mL)	1.0
Standard Prep Date	3/27/2023

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	3/28/2023	93.20	5000.00	56.80
2	3/28/2023	90.80	4883.33	56.80
3	3/28/2023	91.40	4895.12	56.80

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	4943.20	8.654939	571.14	571.14
2	4826.53	8.654939	557.66	557.66
3	4838.32	8.654939	559.02	559.02

	dpm/mL
Mean Value =	562.61
Stdev =	7.420858694
Certificate Value* =	560.9
Two sigma =	14.842
10 % of Mean =	56.261
Rule A (Pass/Fail)	Pass
% Recovery	100.30%
Rule B (Pass/Fail)	Pass
Expiration Date	3/27/2024

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

* Certificate Value is decay corrected to Count Date.

The analyst prepared three standard verification sources for Ra-228 source 2051-B by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBROWN for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 3/27/2023 using Ra-228 source 1952-A.

Standard results for each verification source was calculated as follows:

$$\text{Source dpm/mL} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency (cpm/dpm), and
- D = volume used for standard verification.

RAD-M-001

Los Buis 3/31/23
[Signature]

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2421258

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
619347021	SAMPLE	JE1	PIC2C	MAY-18-23 11:53:16	DONE	25mm Filter	01-JUN-22 00:00
619347022	SAMPLE	JE1	PIC4A	MAY-18-23 11:53:20	DONE	25mm Filter	01-JUN-22 00:00
619900001	SAMPLE	JE1	PIC7A	MAY-18-23 11:53:28	DONE	25mm Filter	01-JUN-22 00:00
619900002	SAMPLE	JE1	PIC7C	MAY-18-23 11:53:32	DONE	25mm Filter	01-JUN-22 00:00
619900003	SAMPLE	JE1	PIC8A	MAY-18-23 11:53:39	DONE	25mm Filter	01-JUN-22 00:00
619900004	SAMPLE	JE1	PIC8D	MAY-18-23 11:53:42	DONE	25mm Filter	01-JUN-22 00:00
619900007	SAMPLE	JE1	PIC11A	MAY-18-23 13:19:38	DONE	25mm Filter	01-JUN-22 00:00
619900008	SAMPLE	JE1	PIC11B	MAY-18-23 13:19:42	DONE	25mm Filter	01-JUN-22 00:00
619900009	SAMPLE	JE1	PIC14C	MAY-18-23 13:19:46	DONE	25mm Filter	01-JUN-22 00:00
619900013	SAMPLE	JE1	PIC12A	MAY-18-23 13:19:53	DONE	25mm Filter	01-JUN-22 00:00
619900015	SAMPLE	JE1	PIC13A	MAY-18-23 13:20:00	DONE	25mm Filter	01-JUN-22 00:00
619900016	SAMPLE	JE1	PIC13D	MAY-18-23 13:20:07	DONE	25mm Filter	01-JUN-22 00:00
1205389309	DUP	JE1	PIC2D	MAY-18-23 13:20:43	DONE	25mm Filter	01-JUN-22 00:00
619900005	SAMPLE	JE1	PIC6B	MAY-18-23 13:20:53	DONE	25mm Filter	01-JUN-22 00:00
619900006	SAMPLE	JE1	PIC5A	MAY-18-23 13:20:57	DONE	25mm Filter	01-JUN-22 00:00
619900010	SAMPLE	JE1	PIC3C	MAY-18-23 13:21:09	DONE	25mm Filter	01-JUN-22 00:00
619900011	SAMPLE	JE1	PIC8D	MAY-18-23 13:21:17	DONE	25mm Filter	01-JUN-22 00:00
619900012	SAMPLE	JE1	PIC8B	MAY-18-23 13:21:20	DONE	25mm Filter	01-JUN-22 00:00
619900014	SAMPLE	JE1	PIC6A	MAY-18-23 13:21:29	DONE	25mm Filter	01-JUN-22 00:00
1205389310	MS	JE1	PIC1A	MAY-18-23 13:58:31	DONE	25mm Filter	01-JUN-22 00:00
1205389311	MSD	JE1	PIC1B	MAY-18-23 13:58:35	DONE	25mm Filter	01-JUN-22 00:00
1205389312	LCS	JE1	PIC1C	MAY-18-23 13:58:42	DONE	25mm Filter	01-JUN-22 00:00
1205389308	MB	JE1	PIC3B	MAY-18-23 15:26:11	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2421259 Check-list

This check-list was completed on 22-MAY-23 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 22-MAY-23 and Lyndsey Pace on 22-MAY-23.

Batch ID:
2421259

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2421259
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 19-MAY-2023			Package: 21-MAY-2023	SDG: 22-MAY-2023		
Type	Sample Id	Description		Serial Number	Spike Amount	Spike Units
MS	1205389315	Radium-226 SPIKE		1715-G	.1	mL
MS	1205389316	Radium-226 SPIKE		1715-G	.1	mL
LCS	1205389318	Radium-226 SPIKE		1715-G	.1	mL
MSD	1205389317	Radium-226 SPIKE		1715-G	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	619347021	11-MAY-2023	1	507.09	507.09	05/17/23 10:52	105	05/21/23 04:45	05/21/23 07:46	3	22
2	619347022	11-MAY-2023	1	500.88	500.88	05/17/23 10:52	202	05/21/23 04:45	05/21/23 07:46	8	17
3	619900001	11-MAY-2023	1	500.76	500.76	05/17/23 10:52	303	05/21/23 04:45	05/21/23 07:46	2	10
4	619900002	11-MAY-2023	1	504.59	504.59	05/17/23 10:52	402	05/21/23 04:45	05/21/23 07:46	7	15
5	619900003	11-MAY-2023	1	501.58	501.58	05/17/23 10:52	508	05/21/23 04:45	05/21/23 07:46	5	13
6	619900004	11-MAY-2023	1	503.21	503.21	05/17/23 10:52	608	05/21/23 04:45	05/21/23 07:46	1	162
7	619900005	11-MAY-2023	1	501.7	501.7	05/17/23 10:52	708	05/21/23 04:45	05/21/23 07:46	2	33
8	619900006	11-MAY-2023	1	506.82	506.82	05/17/23 10:52	802	05/21/23 04:45	05/21/23 07:47	3	13
9	619900007	11-MAY-2023	1	505.45	505.45	05/17/23 10:52	101	05/21/23 05:15	05/21/23 08:19	3	8
10	619900008	11-MAY-2023	1	503.24	503.24	05/17/23 10:52	201	05/21/23 05:15	05/21/23 08:19	3	17
11	619900009	11-MAY-2023	1	502.47	502.47	05/17/23 10:52	308	05/21/23 05:15	05/21/23 08:19	4	18
12	619900010	11-MAY-2023	1	505.63	505.63	05/17/23 10:52	403	05/21/23 05:15	05/21/23 08:19	2	84
13	619900011	11-MAY-2023	1	508.37	508.37	05/17/23 10:52	502	05/21/23 05:15	05/21/23 08:19	1	19
14	619900012	11-MAY-2023	1	503.51	503.51	05/17/23 10:52	604	05/21/23 05:15	05/21/23 08:19	1	15
15	619900013	11-MAY-2023	1	503.16	503.16	05/17/23 10:52	701	05/21/23 05:15	05/21/23 08:19	3	18
16	619900014	11-MAY-2023	1	507.93	507.93	05/17/23 10:52	801	05/21/23 05:15	05/21/23 08:19	3	28
17	619900015	11-MAY-2023	1	502.02	502.02	05/17/23 10:52	103	05/21/23 05:45	05/21/23 08:50	5	4
18	619900016	11-MAY-2023	1	506.13	506.13	05/17/23 10:52	206	05/21/23 05:45	05/21/23 08:50	2	13
19	1205389313 MB	11-MAY-2023	1		508.37	05/17/23 10:52	304	05/21/23 05:45	05/21/23 08:50	7	16
20	1205389314 DUP (619900001)	11-MAY-2023	1	503.73	503.73	05/17/23 10:52	408	05/21/23 05:45	05/21/23 08:50	2	16
21	1205389315 MS (619347021)	11-MAY-2023	1	105.75	105.75	05/17/23 10:52	506	05/21/23 05:45	05/21/23 08:50	3	790
22	1205389316 MS (619900001)	11-MAY-2023	1	102.07	102.07	05/17/23 10:52	607	05/21/23 05:45	05/21/23 08:50	3	736
23	1205389317 MSD (619347021)	11-MAY-2023	1	101.17	101.17	05/17/23 10:52	703	05/21/23 05:45	05/21/23 08:50	3	793
24	1205389318 LCS	11-MAY-2023	1		508.37	05/17/23 10:52	803	05/21/23 05:45	05/21/23 08:50	3	518

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 11-MAY-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
File type : Excel
Version # : 1.3.2

Batch : 2421259
Analyst : LIN01615
Prep Date : 5/11/2023
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Half-life of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Half-life of Rn-222 : 3.8235 days
Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
	Sample	Sample	Sample		Cell	Counting	Gross	Gross	Background	Background	Count	Cell
Pos.	ID	Aliquot	StDev.	Sample	Number	Time	Counts	CPM	Counts	CPM	Time	Efficiency
		L	L	Date/Time		(min.)					(min.)	(cpm/dpm)
1	619347021.1	0.5071	2.0284E-05	4/19/2023 14:35	105	30	22	0.733	3	0.100	30	1.5340
2	619347022.1	0.5009	2.0259E-05	4/19/2023 15:30	202	30	17	0.567	8	0.267	30	1.8360
3	619900001.1	0.5008	2.0259E-05	4/17/2023 13:00	303	30	10	0.333	2	0.067	30	1.7210
4	619900002.1	0.5046	2.0275E-05	4/17/2023 14:25	402	30	15	0.500	7	0.233	30	1.4980
5	619900003.1	0.5016	2.0262E-05	4/17/2023 15:25	508	30	13	0.433	5	0.167	30	1.8020
6	619900004.1	0.5032	2.0269E-05	4/18/2023 9:45	608	30	162	5.400	1	0.033	30	1.7970
7	619900005.1	0.5017	2.0263E-05	4/18/2023 9:50	708	30	33	1.100	2	0.067	30	1.6020
8	619900006.1	0.5068	2.0283E-05	4/18/2023 10:45	802	30	13	0.433	3	0.100	30	1.5330
9	619900007.1	0.5055	2.0278E-05	4/18/2023 11:50	101	30	8	0.267	3	0.100	30	1.8120
10	619900008.1	0.5032	2.0269E-05	4/17/2023 15:20	201	30	17	0.567	3	0.100	30	1.7110
11	619900009.1	0.5025	2.0266E-05	4/18/2023 12:45	308	30	18	0.600	4	0.133	30	1.5970
12	619900010.1	0.5056	2.0279E-05	4/17/2023 10:40	403	30	84	2.800	2	0.067	30	1.5070
13	619900011.1	0.5084	2.0289E-05	4/18/2023 10:50	502	30	19	0.633	1	0.033	30	1.8630
14	619900012.1	0.5035	2.0270E-05	4/17/2023 12:25	604	30	15	0.500	1	0.033	30	1.6810
15	619900013.1	0.5032	2.0269E-05	4/18/2023 11:35	701	30	18	0.600	3	0.100	30	1.7440
16	619900014.1	0.5079	2.0288E-05	4/17/2023 14:15	801	30	28	0.933	3	0.100	30	1.4200
17	619900015.1	0.5020	2.0264E-05	4/18/2023 12:30	103	30	4	0.133	5	0.167	30	1.6400
18	619900016.1	0.5061	2.0281E-05	4/18/2023 13:25	206	30	13	0.433	2	0.067	30	1.8770
19	1205389313.1	0.5084	2.0289E-05	5/11/2023 0:00	304	30	16	0.533	7	0.233	30	1.8850
20	1205389314.1	0.5037	2.0271E-05	4/17/2023 13:00	408	30	16	0.533	2	0.067	30	1.5020
21	1205389315.1	0.1058	1.1717E-05	4/19/2023 14:35	506	30	790	26.333	3	0.100	30	1.7710
22	1205389316.1	0.1021	1.1496E-05	4/17/2023 13:00	607	30	736	24.533	3	0.100	30	1.8040
23	1205389317.1	0.1012	1.1442E-05	4/19/2023 14:35	703	30	793	26.433	3	0.100	30	1.6440
24	1205389318.1	0.5084	2.0289E-05	5/11/2023 0:00	803	30	518	17.267	3	0.100	30	1.4760

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008

Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
7.900%	5/1/2023	4/30/2024	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:46	0.493	0.977	1.002	1.000
5.100%	8/1/2022	7/31/2023	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:46	0.493	0.977	1.002	1.000
7.400%	10/25/2022	10/31/2023	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:46	0.493	0.977	1.002	1.000
5.300%	2/1/2023	1/31/2024	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:46	0.493	0.977	1.002	1.000
4.500%	6/1/2022	5/31/2023	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:46	0.493	0.977	1.002	1.000
6.300%	7/1/2022	6/30/2023	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:46	0.493	0.977	1.002	1.000
7.700%	11/1/2022	10/31/2023	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:46	0.493	0.977	1.002	1.000
6.100%	4/8/2023	3/31/2024	5/17/2023 10:52	5/21/2023 4:45	5/21/2023 7:47	0.493	0.977	1.002	1.000
4.500%	5/1/2023	4/30/2024	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
8.900%	8/1/2022	7/31/2023	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
9.600%	10/25/2022	10/31/2023	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
6.100%	2/1/2023	1/31/2024	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
6.700%	6/1/2022	5/31/2023	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
6.700%	7/1/2022	6/30/2023	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
6.200%	11/1/2022	10/31/2023	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
3.200%	4/8/2023	3/31/2024	5/17/2023 10:52	5/21/2023 5:15	5/21/2023 8:19	0.495	0.977	1.002	1.000
9.600%	5/1/2023	4/30/2024	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000
2.800%	8/1/2022	7/31/2023	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000
8.900%	10/25/2022	10/31/2023	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000
7.000%	2/1/2023	1/31/2024	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000
5.300%	6/1/2022	5/31/2023	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000
3.400%	7/1/2022	6/30/2023	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000
9.000%	11/1/2022	10/31/2023	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000
4.700%	4/8/2023	3/31/2024	5/17/2023 10:52	5/21/2023 5:45	5/21/2023 8:50	0.497	0.977	1.002	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.41
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.41
LCS Volume Added: 0.10

Results															
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L Recovery
1	0.2291	0.1618	1	0.4440	0.7628	27.48%	0.6333	0.1667	0.3934	0.4253		SAMPLE			
2	0.3165	0.2234	1	0.5488	0.3056	55.79%	0.3000	0.1667	0.3328	0.3371		SAMPLE			
3	0.1689	0.1192	1	0.3471	0.2899	43.93%	0.2667	0.1155	0.2460	0.2531		SAMPLE			
4	0.3602	0.2543	1	0.6325	0.3305	58.87%	0.2667	0.1563	0.3798	0.3843		SAMPLE			
5	0.2546	0.1797	1	0.4631	0.2764	53.22%	0.2667	0.1414	0.2873	0.2911		SAMPLE			
6	0.1138	0.0803	1	0.2643	5.5600	10.13%	5.3667	0.4256	0.8642	1.3647		SAMPLE			
7	0.1811	0.1278	1	0.3722	1.2045	20.58%	1.0333	0.1972	0.4505	0.5160		SAMPLE			
8	0.2294	0.1620	1	0.4445	0.4020	40.46%	0.3333	0.1333	0.3152	0.3240		SAMPLE			
9	0.1939	0.1369	1	0.3758	0.1699	66.48%	0.1667	0.1106	0.2209	0.2227		SAMPLE			
10	0.2063	0.1456	1	0.3997	0.5060	33.16%	0.4667	0.1491	0.3168	0.3369		SAMPLE			
11	0.2556	0.1804	1	0.4772	0.5429	34.85%	0.4667	0.1563	0.3565	0.3791		SAMPLE			
12	0.1903	0.1344	1	0.3912	3.3489	12.85%	2.7333	0.3091	0.7423	0.9721		SAMPLE			
13	0.1083	0.0764	1	0.2515	0.5914	25.73%	0.6000	0.1491	0.2880	0.3103		SAMPLE			
14	0.1211	0.0855	1	0.2814	0.5147	29.35%	0.4667	0.1333	0.2882	0.3052		SAMPLE			
15	0.2024	0.1429	1	0.3922	0.5319	31.17%	0.5000	0.1528	0.3185	0.3340		SAMPLE			
16	0.2462	0.1739	1	0.4771	1.0786	22.50%	0.8333	0.1856	0.4708	0.5005		SAMPLE			
17	0.2775	0.1959	1	0.5048	-0.0377	300.15%	-0.0333	0.1000	0.2214	0.2216		SAMPLE			
18	0.1521	0.1074	1	0.3126	0.3590	35.32%	0.3667	0.1291	0.2477	0.2539		SAMPLE			
19	0.2821	0.1991	1	0.4953	0.2912	54.03%	0.3000	0.1599	0.3041	0.3112		MB			
20	0.1910	0.1348	1	0.3926	0.5737	31.10%	0.4667	0.1414	0.3408	0.3594	619900001.1	DUP	65.7%		
21	0.9448	0.6670	1	1.8307	130.2834	6.39%	26.2333	0.9387	9.1371	24.9065	619347021.1	MS			126.6865 102.2%
22	0.9610	0.6785	1	1.8620	123.4194	5.03%	24.4333	0.9062	8.9714	21.5761	619900001.1	MS			131.2544 94.0%
23	1.0639	0.7511	1	2.0614	147.2606	9.68%	26.3333	0.9404	10.3079	35.1128	619347021.1	MSD	12.2%		132.4217 110.6%
24	0.2358	0.1665	1	0.4569	21.2786	6.46%	17.1667	0.7608	1.8485	4.0858		LCS			26.3524 80.7%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 21-MAY-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:14	1	1.18E+05	117878	-1.98		
LUCAS2	EFF	06:12	1	1.35E+05	134613	0.71		
LUCAS3	EFF	06:10	1	94762	94762	-2.46		
LUCAS4	EFF	06:09	1	1.28E+05	127663	-0.36		
LUCAS5	EFF	06:06	1	1.35E+05	134581	1.97		
LUCAS6	EFF	06:05	1	1.31E+05	131004	1.41		
LUCAS7	EFF	06:03	1	1.34E+05	133967	1.24		
LUCAS8	EFF	06:02	1	1.32E+05	132340	0.44		

Reviewed by:



Lyndsey Pace

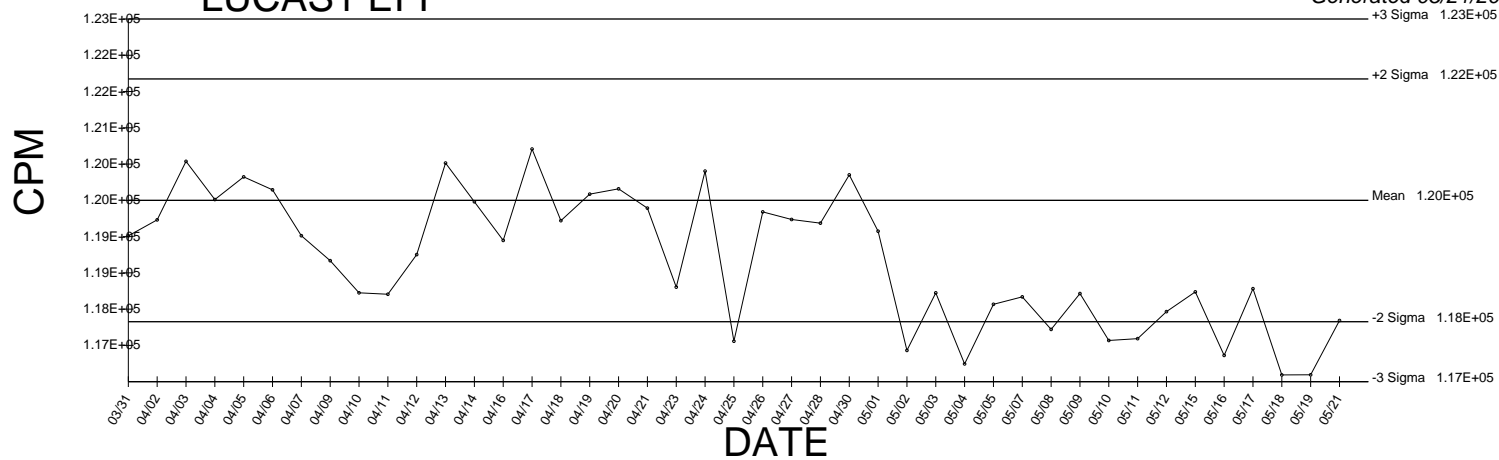
Date: 21-MAY-23

GEL Laboratories LLC

Efficiency Data

LUCAS1 EFF

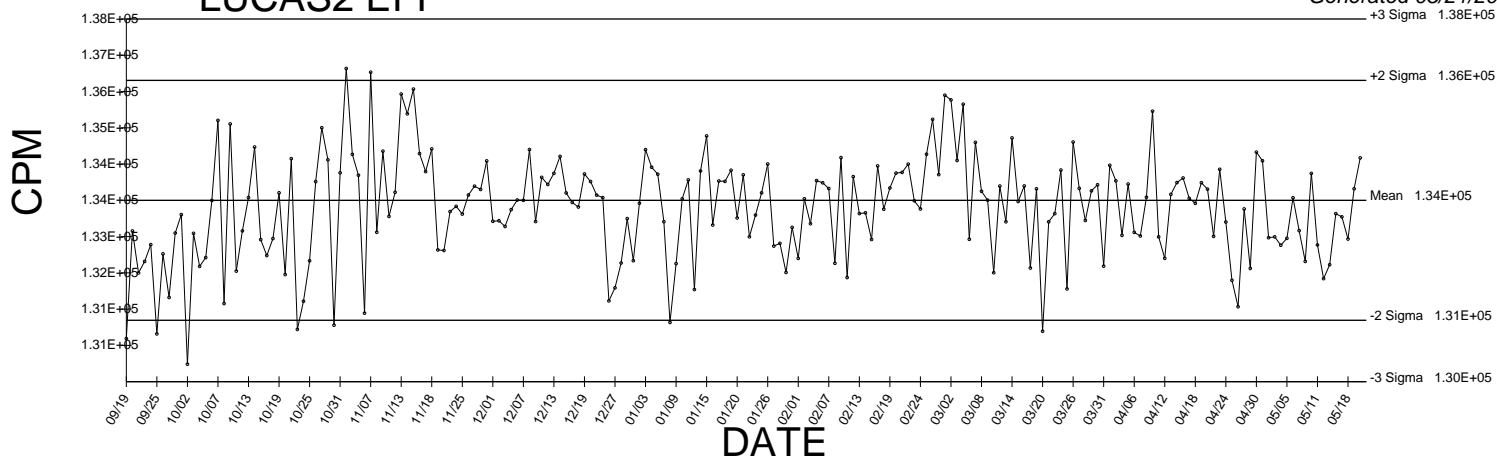
Generated 05/21/2023



● Denotes Outlier

LUCAS2 EFF

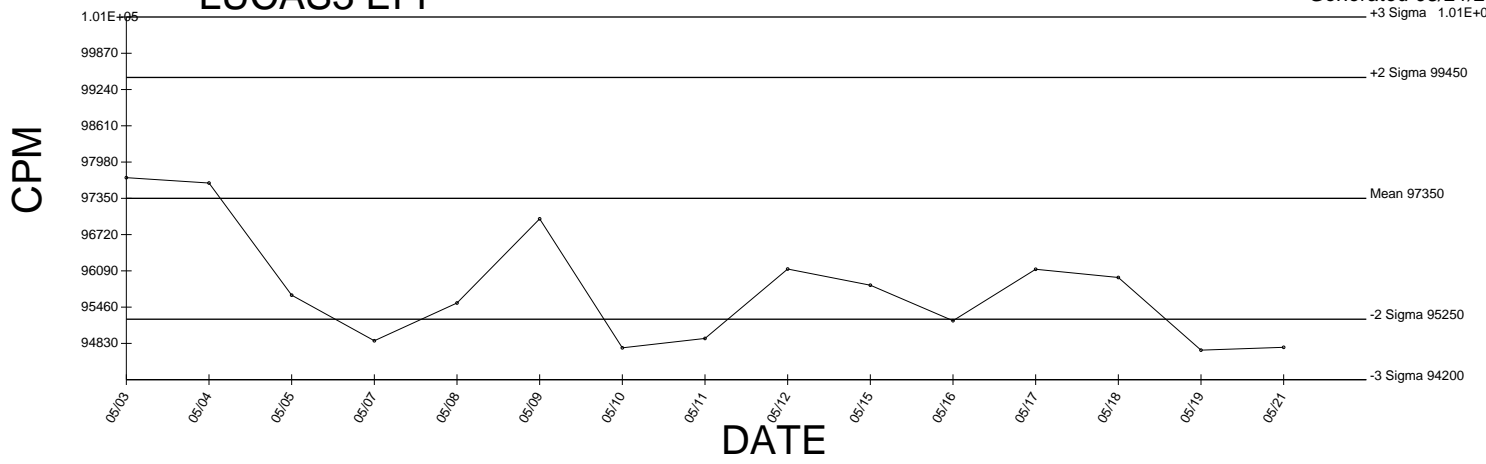
Generated 05/21/2023



● Denotes Outlier

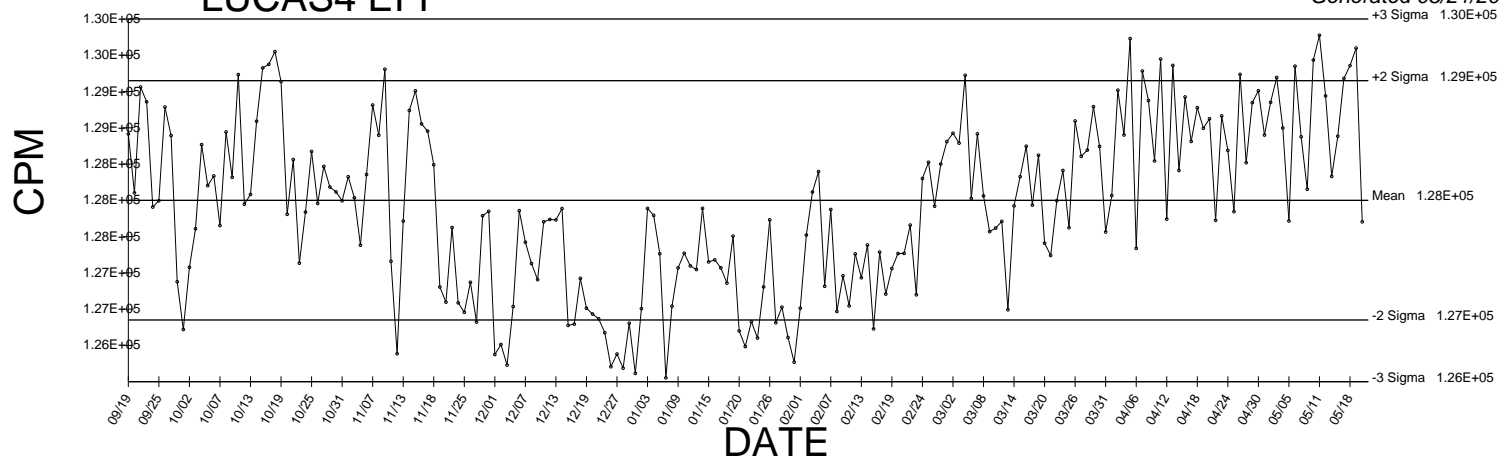
LUCAS3 EFF

Generated 05/21/2023



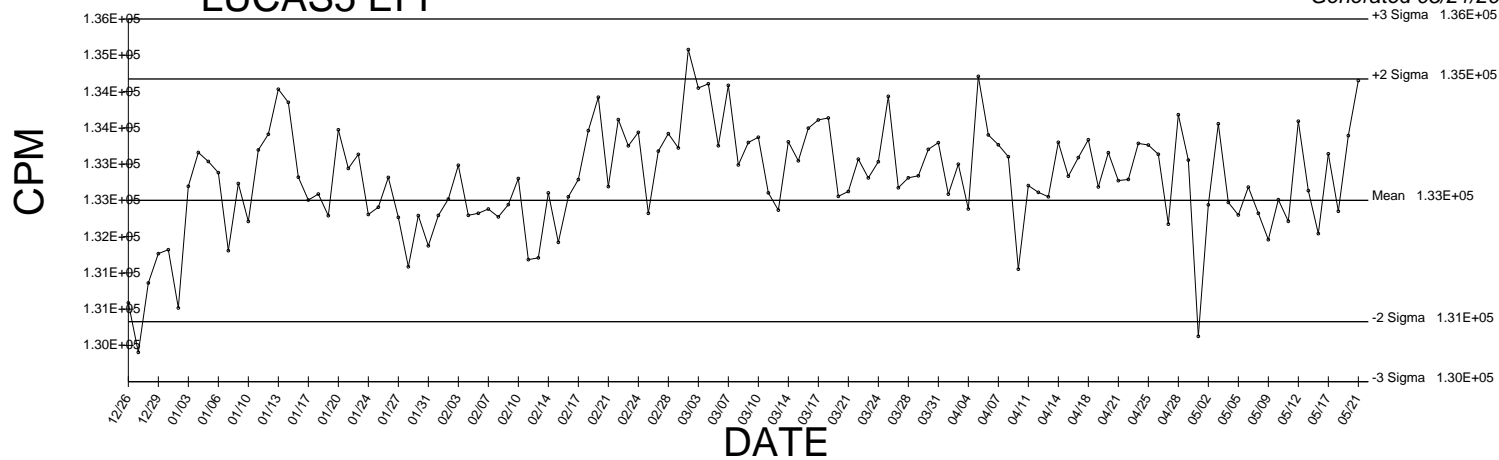
LUCAS4 EFF

Generated 05/21/2023



LUCAS5 EFF

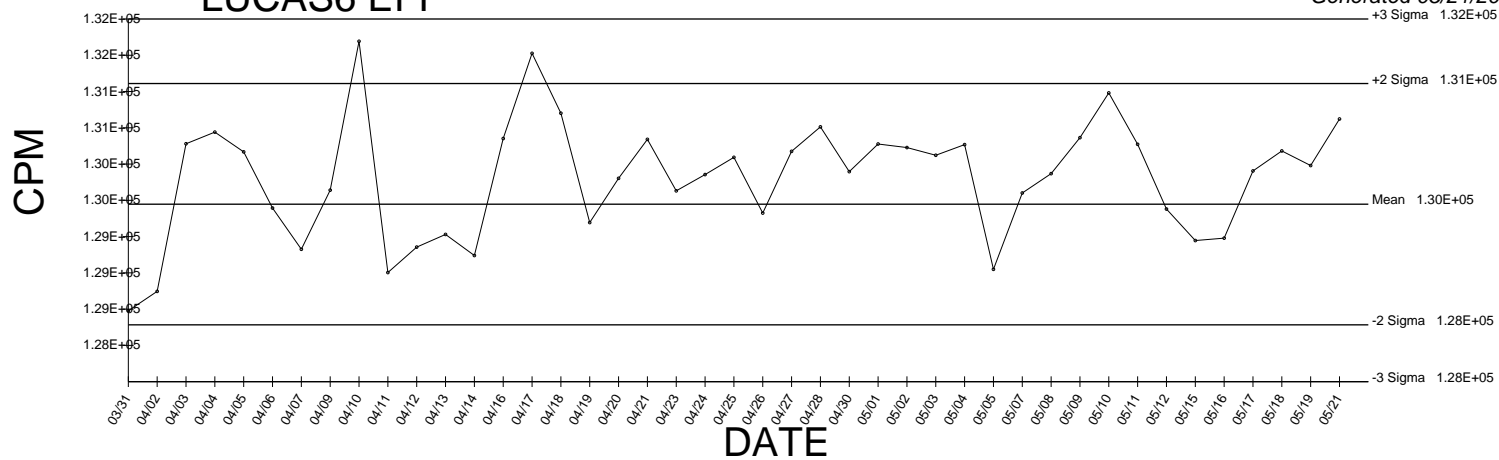
Generated 05/21/2023



● Denotes Outlier

LUCAS6 EFF

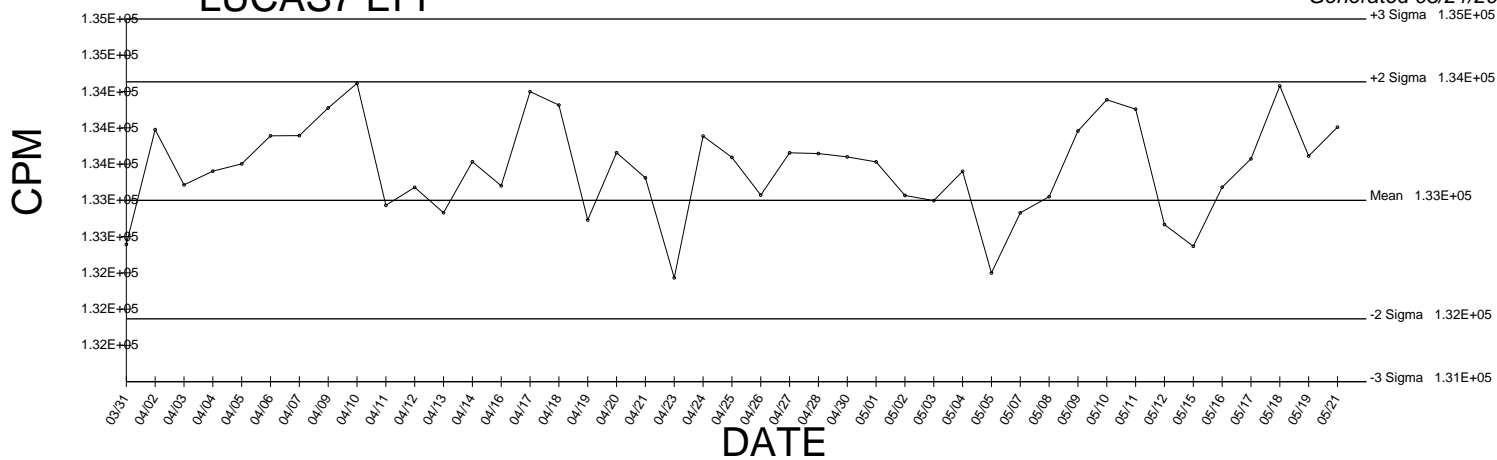
Generated 05/21/2023



● Denotes Outlier

LUCAS7 EFF

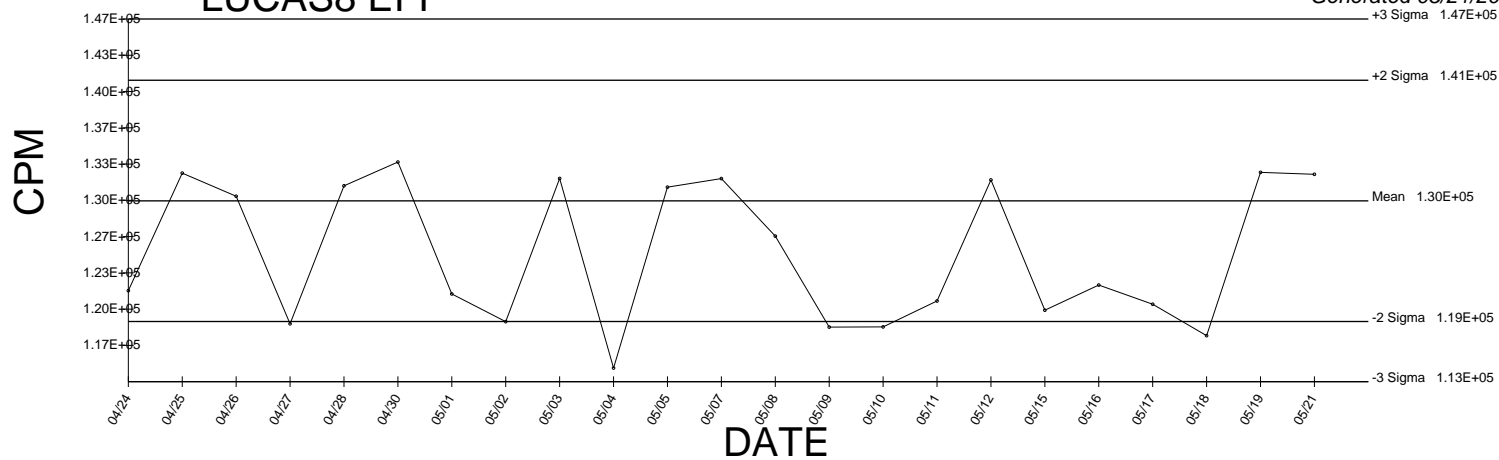
Generated 05/21/2023



● Denotes Outlier

LUCAS8 EFF

Generated 05/21/2023



● Denotes Outlier

RAD Standards Traceability



Eckert & Ziegler

Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

1715

98367

Ra-226 5 mL Liquid in Flame Sealed Vial

Customer: GEL Laboratories, LLC

P.O. No.: GEL 1408580, Item 7 **Product Code:** 8226

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics, using a germanium gamma spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, %			Reference Date (12:00 PM EST)
			u_A	u_B	U	
Ra-226	5.844E+05	3.676E+04	1.0	2.1	4.7	09/09/2014

*Uncertainty: U - Relative expanded uncertainty, $k = 2$. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:

Impurities: γ -impurities (other than decay products) < 0.1%.
5.02193 g 0.1M HCl solution with approximately 30 $\mu\text{g/g}$ Ba carrier.

Source Prepared by:

R. Ormsby
R. Ormsby, Radiochemist

QC Approved:

L. Tkavadze
L. Tkavadze, Nuclear Metrologist

Date:

9 Sep 14

RECEIVED
9/10/14



Standard Logbook

Serial ID: 1715 **Open/Reference Date:** 09-SEP-14 **Aliquot :** 5.02193 g
Name: Radium-226 **Received:** 10-SEP-14 **Density :** Hand Calculated
Type: Source Material **Expires:** 11-SEP-15 **Logbook Num :** GL-CED-297-008
Employee: Gregory Ramsay **Lot Number :** 98367
Supplier: Eckert & Ziegler **Solvent :** 0.1M HCl
Uncertainty : 2.35 PERCENT

Description: ampule
Comments: None

Analyte	Concentration	Analyte	Concentration
Radium-226	36760 Bq		



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1715
Prepared By:	Gregory Ramsay
Carrier Conc:	0.1M HCl
Reference Date:	09/09/2014
Ampoule Mass (g):	5.02193 g
Uncertainty:	+/- 2.35 %
LogBook No:	GL-CED-297-008
Supplier:	Eckert & Ziegler

A Solution Material Info			
Isotope:	Radium-226		
Prepared By:	Gregory Ramsay		
Prep Date:	07/06/2016		
Verification Date:	09/08/2022		
Expiration Date:	09/08/2023		
Primary Code:	1715-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9865 g		
Density(g/mL):	0.9967	Balance ID:	C31514

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.9865 \text{ g}) * (36760 \text{ Bq}) * (60 \text{ dpm/Bq}) / (5.02193 \text{ g} * 100 \text{ mL}) = 21900.3937 \text{ dpm/mL}$
$(4.9865 \text{ g}) * (36760 \text{ Bq}) * (60 \text{ dpm/Bq}) / (0.9967 \text{ g/mL}) / (5.02193 \text{ g} * 100 \text{ mL}) = 21972.4854 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
07/06/2016	Gregory Ramsay	2.6261	200	1715-B	288.51 dpm/ml	01/25/2017	11/10/2018
02/08/2017	Gregory Ramsay	21.96	250	1715-C	1930.063 dpm/ml	02/08/2017	02/08/2018
12/19/2017	Gregory Ramsay	2.63	200	1715-D	288.938 dpm/ml	01/22/2021	01/22/2022
06/17/2019	Gregory Ramsay	2.7402	200	1715-E	301.045 dpm/ml	10/12/2023	10/12/2023
01/03/2020	Bethany Fiem	.9865	100	1715-F	216.758568 dpm/mL	01/03/2020	01/03/2021
09/14/2021	Gregory Ramsay	3.3966	250	1715-G	298.527 dpm/mL	09/08/2022	09/08/2023
04/22/2022	Matelon DeFreese	.5052	200	1715-H	55.502498 dpm/mL	05/01/2023	05/01/2024

Verification for Ra-226 Standard 1715-G

v1.0.2

Instrument	BLUE
Analyst	GXR1
Verification Prep Date	9/8/2022

Standard Information	
Isotope	Ra-226
Serial Number	1715-G
Isotope Half-life	1.6000E+03 Y
Reference Date	9/9/2014
Ref. Act. (DPM/mL)	298.527
Amount of Std. (mL)	2.0
Standard Prep Date	9/14/2021

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	9/9/2022	64.70	807.20	14.60
2	9/9/2022	64.80	780.40	14.60
3	9/9/2022	65.00	837.90	14.60

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	792.60	1.287109	307.90	615.80
2	765.80	1.287109	297.49	594.98
3	823.30	1.287109	319.83	639.65

dpm/mL
308.40
11.17699926

Mean Value =
Stdev =

Certificate Value* = 297.5
Two sigma = 22.354
10 % of Mean = 30.840
Rule A (Pass/Fail) Pass
% Recovery 103.67%
Rule B (Pass/Fail) Pass
Expiration Date 9/8/2023

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

* Certificate Value is decay corrected to Count Date.

The analyst prepared three standard verification sources for Ra-226 source 1715-G by transferring 2 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBLUE for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 9/8/2022 using Ra-226 source 1926-A.

Standard results for each verification source was calculated as follows:

$$\text{Source dpm/mL} = (A - B)/(C)(D)$$

where:

A = Ver. source cpm,
B = BKG cpm,
C = System efficiency (cpm/dpm), and
D = volume used for standard verification.

RAD-M-001

9/13/2022
9/13/2022
9/13/2022

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2421259

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
619347021	SAMPLE	LXP1	LUCAS1	MAY-21-23 07:46:00	DONE	Lucas Cell	01-MAY-23 00:00
619347022	SAMPLE	LXP1	LUCAS2	MAY-21-23 07:46:00	DONE	Lucas Cell	01-AUG-22 00:00
619900001	SAMPLE	LXP1	LUCAS3	MAY-21-23 07:46:00	DONE	Lucas Cell	25-OCT-22 00:00
619900002	SAMPLE	LXP1	LUCAS4	MAY-21-23 07:46:00	DONE	Lucas Cell	01-FEB-23 00:00
619900003	SAMPLE	LXP1	LUCAS5	MAY-21-23 07:46:00	DONE	Lucas Cell	01-JUN-22 00:00
619900004	SAMPLE	LXP1	LUCAS6	MAY-21-23 07:46:00	DONE	Lucas Cell	01-JUL-22 00:00
619900005	SAMPLE	LXP1	LUCAS7	MAY-21-23 07:46:00	DONE	Lucas Cell	01-NOV-22 00:00
619900006	SAMPLE	LXP1	LUCAS8	MAY-21-23 07:47:00	DONE	Lucas Cell	08-APR-23 00:00
619900007	SAMPLE	LXP1	LUCAS1	MAY-21-23 08:19:00	DONE	Lucas Cell	01-MAY-23 00:00
619900008	SAMPLE	LXP1	LUCAS2	MAY-21-23 08:19:00	DONE	Lucas Cell	01-AUG-22 00:00
619900009	SAMPLE	LXP1	LUCAS3	MAY-21-23 08:19:00	DONE	Lucas Cell	25-OCT-22 00:00
619900010	SAMPLE	LXP1	LUCAS4	MAY-21-23 08:19:00	DONE	Lucas Cell	01-FEB-23 00:00
619900011	SAMPLE	LXP1	LUCAS5	MAY-21-23 08:19:00	DONE	Lucas Cell	01-JUN-22 00:00
619900012	SAMPLE	LXP1	LUCAS6	MAY-21-23 08:19:00	DONE	Lucas Cell	01-JUL-22 00:00
619900013	SAMPLE	LXP1	LUCAS7	MAY-21-23 08:19:00	DONE	Lucas Cell	01-NOV-22 00:00
619900014	SAMPLE	LXP1	LUCAS8	MAY-21-23 08:19:00	DONE	Lucas Cell	08-APR-23 00:00
619900015	SAMPLE	LXP1	LUCAS1	MAY-21-23 08:50:00	DONE	Lucas Cell	01-MAY-23 00:00
619900016	SAMPLE	LXP1	LUCAS2	MAY-21-23 08:50:00	DONE	Lucas Cell	01-AUG-22 00:00
1205389313	MB	LXP1	LUCAS3	MAY-21-23 08:50:00	DONE	Lucas Cell	25-OCT-22 00:00
1205389314	DUP	LXP1	LUCAS4	MAY-21-23 08:50:00	DONE	Lucas Cell	01-FEB-23 00:00
1205389315	MS	LXP1	LUCAS5	MAY-21-23 08:50:00	DONE	Lucas Cell	01-JUN-22 00:00
1205389316	MS	LXP1	LUCAS6	MAY-21-23 08:50:00	DONE	Lucas Cell	01-JUL-22 00:00
1205389317	MSD	LXP1	LUCAS7	MAY-21-23 08:50:00	DONE	Lucas Cell	01-NOV-22 00:00
1205389318	LCS	LXP1	LUCAS8	MAY-21-23 08:50:00	DONE	Lucas Cell	08-APR-23 00:00

23041559

ERM-CRANBERRY: ERM, Inc.
Project: Sammis CCR

Chain of Custody Form

Page 1 of 2
☒ ALS Environmental
 3352 128th Avenue
 Holland, Michigan 49424
 (Tel) 616.399.6070
 (Fax) 616.399.6185

Customer Information		Project Information		ALS Project Manager:		ALS Work Order #:		Parameter/Method Request for Analysis											
Purchase Order		Project Name	Sammis CCR	A	Chloride, Sulfate, Fluoride														
Work Order		Project Number		B	Total Dissolved Solids														
Company Name	ERM	Bill To Company	ERM	C	Total B, Ca, K, Na														
Send Report To	Cory Portwood	Invoice Attn.	Cory Portwood	D	Total Trace Sn, As, Be, Ba, Co, Cd, Cr, Pb, Mg, Mb, Se, Ti, Li, Sb														
Address	800 Cranberry Woods Dr	Address		E	Total Mercury														
City/State/Zip	Cranberry, PA 16006	City/State/Zip		F	Radium 226 and 228 (Report Separately)														
Phone	502-974-5041	Phone		G	Field Parameters (pH)														
Fax		Fax		H	Total Alkalinity														
e-Mail Address	Cory.Portwood@erm.com			I															
				J															
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold		
1	MW-1	4-17	1300	GW			X	X	X	X	X	X	X	X					
2	MW-2	4-17	1425	GW			X	X	X	X	X	X	X	X					
3	MW-3	4-17	1525	GW			X	X	X	X	X	X	X	X					
4	MW-4	4-18	0945	GW			X	X	X	X	X	X	X	X					
5	MW-5	4-18	0950	GW			X	X	X	X	X	X	X	X					
6	MW-6	4-18	1045	GW			X	X	X	X	X	X	X	X					
7	MW-9	4-18	1150	GW			X	X	X	X	X	X	X	X					
8																			
9	P-1	4-17	1520	GW			X	X	X	X	X	X	X	X					
10	P-2	4-18	1245	GW			X	X	X	X	X	X	X	X					
Sampler(s): Please Print & Sign		Shipment Method:		Turnaround Time: (Business Days)				<input type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD				Results Due Date:							
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Notes:													
<i>[Signature]</i>	4/18	7:15	<i>[Signature]</i>	4/18/23	1600														
Relinquished by:	Date:	Time:	Received by (Laboratory):	Date:	Time:	ALS Cooler ID	Cooler Temp	QC Package: (Check Box Below)											
<i>[Signature]</i> ACS	4/18/23	1700	<i>[Signature]</i>	4/19/23	0930	1R3	2.1°C	<input type="checkbox"/> Level II: Standard QC <input type="checkbox"/> Level III: Raw Data <input type="checkbox"/> TRRP LRC <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> Level IV: SW846 Methods/CLP like <input type="checkbox"/> Other:											
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):																
<i>[Signature]</i> DFS	4/19/23	1300																	
Preservative Key: 1-HCl 2-HNO ₃ 3-H ₂ SO ₄ 4-NaOH 5-Na ₂ S ₂ O ₃ 6-NaHSO ₄ 7-Other 8-4°C						Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS.													

23041559

ERM-CRANBERRY: ERM, Inc.
Project: Sammis CCR

Chain of Custody Form

Page 2 of 2☒ ALS Environmental
3352 128th Avenue
Holland, Michigan 49424
(Tel) 616.399.6070
(Fax) 616.399.6185

ALS Project Manager:							ALS Work Order #:										
Information							Parameter/Method Request for Analysis										
Project Name: Sammis CCR							A Chloride, Sulfate, Fluoride										
Work Order							B Total Dissolved Solids										
Company Name: ERM							C Total B, Ca, K, Na										
Bill To Company: ERM							D Total Trace Sn, As, Be, Ba, Co, Cd, Cr, Pb, Mg, Mb, Se, Ti, Li, Sb										
Send Report To: Cory Portwood							E Total Mercury										
Invoice Attn: Cory Portwood							F Radium 226 and 228										
Address: 800 Cranberry Woods Dr							G Field Parameters (pH)										
City/State/Zip: Cranberry, PA 16006							H Total Alkalinity										
Phone: 502-974-5041							I										
Fax:							J										
e-Mail Address: Cory.Portwood@erm.com																	
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-10D	4-17	1640	GW			X	X	X	X	X	X	X	X			
2	MW-11S	4-18	1650	GW			X	X	X	X	X	X	X	X			
3	MW-11D	4-17	1225	GW			X	X	X	X	X	X	X	X			
4	MW-12S	4-18	1135	GW			X	X	X	X	X	X	X	X			
5	MW-13BR	4-17	1415	GW			X	X	X	X	X	X	X	X			
6	MW-13S	4-18	1230	GW			X	X	X	X	X	X	X	X			
7	MW-14S	4-18	1325	GW			X	X	X	X	X	X	X	X			
8																	
9																	
10																	

Sampler(s): Please Print & Sign				Shipment Method:		Turnaround Time: (Business Days)				Other: <input type="checkbox"/>		Results Due Date:	
						<input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD							

Relinquished by:		Date:	Time:	Received by:		Date:	Time:	Notes:	
<i>[Signature]</i>		4/18	7:15	<i>[Signature]</i>		4/18/23	1600		
Relinquished by:		Date:	Time:	Received by (Laboratory):		Date:	Time:	Notes:	
<i>[Signature]</i> ACS		4/18/23	1700	<i>[Signature]</i>		4/19/23	0930		
Logged by (Laboratory):		Date:	Time:	Checked by (Laboratory):					
<i>[Signature]</i> DES		4/19/23	1300						

ALS Cooler ID		Cooler Temp	QC Package: (Check Box Below)	
1R3		21°C	<input type="checkbox"/> Level II: Standard QC <input type="checkbox"/> Level III: Raw Data	
pH33		26°C	<input type="checkbox"/> TRRP LRC <input type="checkbox"/> TRRP Level IV	
2.5°C			<input type="checkbox"/> Level IV: SW846 Methods/CLP like	
			<input type="checkbox"/> Other:	

Preservative Key: 1-HCl 2-HNO₃ 3-H₂SO₄ 4-NaOH 5-Na₂S₂O₃ 6-NaHSO₄ 7-Other 8-4°C

Revision 2 - Effective 11/9/2016

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Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS.

Sample Receipt Checklist

Client Name: **ERM-CRANBERRY**

Date/Time Received: **19-Apr-23 09:30**

Work Order: **23041559**

Received by: **DS**

Checklist completed by Diane Shaw 19-Apr-23
eSignature Date

Reviewed by: Jodi Blauw 19-Apr-23
eSignature Date

Matrices: **Groundwater**

Carrier name: **FedEx**

Shipping container/cooler in good condition? Yes ☒ No ☐ Not Present ☐

Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☒

Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒

Chain of custody present? Yes ☒ No ☐

Chain of custody signed when relinquished and received? Yes ☒ No ☐

Chain of custody agrees with sample labels? Yes ☒ No ☐

Samples in proper container/bottle? Yes ☒ No ☐

Sample containers intact? Yes ☒ No ☐

Sufficient sample volume for indicated test? Yes ☒ No ☐

All samples received within holding time? Yes ☒ No ☐

Container/Temp Blank temperature in compliance? Yes ☒ No ☐

Sample(s) received on ice? Yes ☒ No ☐

Temperature(s)/Thermometer(s): 2.1/3.1, 2.6/3.6, 2.6/3.6 c IR3

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 4/19/2023 1:21:26 PM

Water - VOA vials have zero headspace? Yes ☐ No ☐ No VOA vials submitted ☒

Water - pH acceptable upon receipt? Yes ☒ No ☐ N/A ☐

pH adjusted? Yes ☐ No ☒ N/A ☐

pH adjusted by:

Login Notes: pH check <2.

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



07-Nov-2023

Angela Gatchie
ETEM
200 Third Ave.
Carnegie, PA 15106

Re: **Sammis 2023 Sampling**

Work Order: **23100824**

Dear Angela,

ALS Environmental received 3 samples on 10-Oct-2023 09:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 35.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

Certificate No: OH: 87783

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Client: ETEM
Project: Sammis 2023 Sampling
Work Order: 23100824

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
23100824-01	SMMS-MW-9-100923	Groundwater		10/9/2023 12:35	10/10/2023 09:00	<input type="checkbox"/>
23100824-02	SMMS-MW-4-100923	Groundwater		10/9/2023 14:05	10/10/2023 09:00	<input type="checkbox"/>
23100824-03	SMMS-MW-4FB-100923	Groundwater		10/9/2023 14:05	10/10/2023 09:00	<input type="checkbox"/>

Client: ETEM
Project: Sammis 2023 Sampling
WorkOrder: 23100824

QUALIFIERS,
ACRONYMS, UNITS

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
as noted	
mg/L	Milligrams per Liter

Client: ETEM
Project: Sammis 2023 Sampling
Work Order: 23100824

Case Narrative

Samples for the above noted Work Order were received on 10/10/2023. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:

Batch 227910, Method SW6020B, Sample LCS-227910: The LCS recovery was above the upper control limit. All the sample results in the batch were non-detect. No qualification is necessary for this analyte: Sn

Batch 227911, Method SW6020B, Sample MBLK-227911: The concentration in the Method Blank was greater than the quantitation limit. All samples in the batch were non-detect; therefore, no qualification is needed for this analyte: Sn
No other deviations or anomalies were noted.

Wet Chemistry:

No deviations or anomalies were noted.

Client:	ETEM		
Project:	Sammis 2023 Sampling	Work Order:	23100824
Sample ID:	SMMS-MW-9-100923	Lab ID:	23100824-01
Collection Date:	10/9/2023 12:35 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			Method: SW7470A		Prep: SW7470 / 10/11/23		Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/11/2023 16:22
METALS BY ICP-MS			Method: SW6020B		Prep: SW3015A / 10/24/23		Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/24/2023 19:48
Arsenic	0.00025	J	0.00019	0.0050	mg/L	1	10/24/2023 19:48
Barium	0.027		0.00057	0.0050	mg/L	1	10/24/2023 19:48
Beryllium	U		0.00013	0.0020	mg/L	1	10/24/2023 19:48
Boron	0.20		0.015	0.020	mg/L	1	10/24/2023 19:48
Cadmium	U		0.00014	0.0020	mg/L	1	10/24/2023 19:48
Calcium	47		0.22	0.50	mg/L	1	10/24/2023 19:48
Chromium	U		0.00061	0.0050	mg/L	1	10/24/2023 19:48
Cobalt	U		0.00027	0.0050	mg/L	1	10/24/2023 19:48
Lead	U		0.00022	0.0050	mg/L	1	10/24/2023 19:48
Lithium	0.0028	J	0.0017	0.010	mg/L	1	10/24/2023 19:48
Magnesium	9.8		0.037	0.20	mg/L	1	10/24/2023 19:48
Molybdenum	U		0.00033	0.0050	mg/L	1	10/24/2023 19:48
Potassium	2.5		0.034	0.20	mg/L	1	10/24/2023 19:48
Selenium	U		0.00048	0.0050	mg/L	1	10/24/2023 19:48
Sodium	26		0.13	0.20	mg/L	1	10/24/2023 19:48
Thallium	U		0.00015	0.0050	mg/L	1	10/24/2023 19:48
Tin	U		0.0013	0.0020	mg/L	1	10/24/2023 19:48
ALKALINITY			Method: A2320 B-11				Analyst: JB
Alkalinity, Total (as CaCO3)	118		8.4	10	mg/L	1	10/23/2023 12:56
ANIONS BY ION CHROMATOGRAPHY			Method: SW9056A				Analyst: QTN
Chloride	35.8		3.1	10	mg/L	10	10/24/2023 15:13
Fluoride	0.160		0.067	0.10	mg/L	1	10/23/2023 20:23
Sulfate	59.5		1.9	10	mg/L	10	10/24/2023 15:13
TOTAL DISSOLVED SOLIDS			Method: A2540 C-15		Prep: FILTER / 10/16/23		Analyst: LAD
Total Dissolved Solids	260		37	50	mg/L	1	10/18/2023 13:37

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: 07-Nov-23

Client: ETEM
Project: Sammis 2023 Sampling
Sample ID: SMMS-MW-4-100923
Collection Date: 10/9/2023 02:05 PM

Work Order: 23100824
Lab ID: 23100824-02
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/11/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/11/2023 16:27
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/24/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/24/2023 20:43
Arsenic	0.0020	J	0.00019	0.0050	mg/L	1	10/24/2023 20:43
Barium	0.048		0.00057	0.0050	mg/L	1	10/24/2023 20:43
Beryllium	0.00013	J	0.00013	0.0020	mg/L	1	10/24/2023 20:43
Boron	0.15		0.015	0.020	mg/L	1	10/24/2023 20:43
Cadmium	U		0.00014	0.0020	mg/L	1	10/24/2023 20:43
Calcium	42		0.22	0.50	mg/L	1	10/24/2023 20:43
Chromium	0.0039	J	0.00061	0.0050	mg/L	1	10/24/2023 20:43
Cobalt	0.00044	J	0.00027	0.0050	mg/L	1	10/24/2023 20:43
Lead	0.0014	J	0.00022	0.0050	mg/L	1	10/24/2023 20:43
Lithium	0.0026	J	0.0017	0.010	mg/L	1	10/24/2023 20:43
Magnesium	8.9		0.037	0.20	mg/L	1	10/24/2023 20:43
Molybdenum	0.00052	J	0.00033	0.0050	mg/L	1	10/24/2023 20:43
Potassium	2.4		0.034	0.20	mg/L	1	10/24/2023 20:43
Selenium	U		0.00048	0.0050	mg/L	1	10/24/2023 20:43
Sodium	26		0.13	0.20	mg/L	1	10/24/2023 20:43
Thallium	0.0014	J	0.00015	0.0050	mg/L	1	10/24/2023 20:43
Tin	U		0.0013	0.0020	mg/L	1	10/24/2023 20:43
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	106		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	33.7		3.1	10	mg/L	10	10/24/2023 15:44
Fluoride	0.231		0.067	0.10	mg/L	1	10/23/2023 20:33
Sulfate	58.3		1.9	10	mg/L	10	10/24/2023 15:44
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/12/23	Analyst: LAD
Total Dissolved Solids	210		37	50	mg/L	1	10/17/2023 08:52

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: ETEM
Project: Sammis 2023 Sampling
Sample ID: SMMS-MW-4FB-100923
Collection Date: 10/9/2023 02:05 PM

Work Order: 23100824
Lab ID: 23100824-03
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			Method: SW7470A		Prep: SW7470 / 10/11/23		Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/11/2023 16:29
METALS BY ICP-MS			Method: SW6020B		Prep: SW3015A / 10/24/23		Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/24/2023 20:45
Arsenic	U		0.00019	0.0050	mg/L	1	10/24/2023 20:45
Barium	U		0.00057	0.0050	mg/L	1	10/24/2023 20:45
Beryllium	U		0.00013	0.0020	mg/L	1	10/24/2023 20:45
Boron	U		0.015	0.020	mg/L	1	10/24/2023 20:45
Cadmium	U		0.00014	0.0020	mg/L	1	10/24/2023 20:45
Calcium	U		0.22	0.50	mg/L	1	10/24/2023 20:45
Chromium	U		0.00061	0.0050	mg/L	1	10/24/2023 20:45
Cobalt	U		0.00027	0.0050	mg/L	1	10/24/2023 20:45
Lead	U		0.00022	0.0050	mg/L	1	10/24/2023 20:45
Lithium	U		0.0017	0.010	mg/L	1	10/24/2023 20:45
Magnesium	U		0.037	0.20	mg/L	1	10/24/2023 20:45
Molybdenum	U		0.00033	0.0050	mg/L	1	10/24/2023 20:45
Potassium	U		0.034	0.20	mg/L	1	10/24/2023 20:45
Selenium	U		0.00048	0.0050	mg/L	1	10/24/2023 20:45
Sodium	U		0.13	0.20	mg/L	1	10/24/2023 20:45
Thallium	U		0.00015	0.0050	mg/L	1	10/24/2023 20:45
Tin	U		0.0013	0.0020	mg/L	1	10/24/2023 20:45
ALKALINITY			Method: A2320 B-11				Analyst: JB
Alkalinity, Total (as CaCO3)	U		8.4	10	mg/L	1	10/23/2023 12:56
ANIONS BY ION CHROMATOGRAPHY			Method: SW9056A				Analyst: QTN
Chloride	U		0.31	1.0	mg/L	1	10/24/2023 15:54
Fluoride	U		0.067	0.10	mg/L	1	10/24/2023 15:54
Sulfate	U		0.19	1.0	mg/L	1	10/24/2023 15:54
TOTAL DISSOLVED SOLIDS			Method: A2540 C-15		Prep: FILTER / 10/16/23		Analyst: LAD
Total Dissolved Solids	U		37	50	mg/L	1	10/18/2023 13:37
SUBCONTRACTED ANALYSES			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: 227117

Instrument ID HG5

Method: SW7470A

MBLK		Sample ID: MBLK-227117-227117					Units: mg/L		Analysis Date: 10/11/2023 03:50 PM		
Client ID:		Run ID: HG5_231011B				SeqNo: 10075789		Prep Date: 10/11/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.00016	0.00020								

LCS		Sample ID: LCS-227117-227117					Units: mg/L		Analysis Date: 10/11/2023 03:58 PM		
Client ID:		Run ID: HG5_231011B				SeqNo: 10075799		Prep Date: 10/11/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002025	0.00016	0.00020	0.002	0	101	80-120	0			

MS		Sample ID: 23100824-01BMS					Units: mg/L		Analysis Date: 10/11/2023 04:24 PM		
Client ID: SMMS-MW-9-100923		Run ID: HG5_231011B				SeqNo: 10075813		Prep Date: 10/11/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00207	0.00016	0.00020	0.002	-0.000072	107	75-125	0			

MSD		Sample ID: 23100824-01BMSD					Units: mg/L		Analysis Date: 10/11/2023 04:25 PM		
Client ID: SMMS-MW-9-100923		Run ID: HG5_231011B				SeqNo: 10075814		Prep Date: 10/11/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002025	0.00016	0.00020	0.002	-0.000072	105	75-125	0.00207	2.2	20	

The following samples were analyzed in this batch:

23100824-01B23100824-02B23100824-03B

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227910 Instrument ID ICPMS3 Method: SW6020B

MBLK		Sample ID: MBLK-227910-227910					Units: mg/L		Analysis Date: 10/24/2023 07:38 PM		
Client ID:		Run ID: ICPMS3_231024A			SeqNo: 10124285		Prep Date: 10/24/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	U	0.00022	0.0050								
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	U	0.034	0.20								
Selenium	U	0.00048	0.0050								
Sodium	U	0.13	0.20								
Thallium	U	0.00015	0.0050								
Tin	U	0.0013	0.0020								

LCS		Sample ID: LCS-227910-227910					Units: mg/L		Analysis Date: 10/24/2023 07:40 PM		
Client ID:		Run ID: ICPMS3_231024A			SeqNo: 10124286		Prep Date: 10/24/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1076	0.00042	0.0050	0.1	0	108	80-120	0			
Arsenic	0.1036	0.00019	0.0050	0.1	0	104	80-120	0			
Barium	0.1016	0.00057	0.0050	0.1	0	102	80-120	0			
Beryllium	0.1054	0.00013	0.0020	0.1	0	105	80-120	0			
Boron	0.5428	0.015	0.020	0.5	0	109	80-120	0			
Cadmium	0.1079	0.00014	0.0020	0.1	0	108	80-120	0			
Calcium	10.27	0.22	0.50	10	0	103	80-120	0			
Chromium	0.1056	0.00061	0.0050	0.1	0	106	80-120	0			
Cobalt	0.1073	0.00027	0.0050	0.1	0	107	80-120	0			
Lead	0.1029	0.00022	0.0050	0.1	0	103	80-120	0			
Lithium	0.1021	0.0017	0.010	0.1	0	102	80-120	0			
Magnesium	10.47	0.037	0.20	10	0	105	80-120	0			
Molybdenum	0.1027	0.00033	0.0050	0.1	0	103	80-120	0			
Potassium	10.18	0.034	0.20	10	0	102	80-120	0			
Selenium	0.09592	0.00048	0.0050	0.1	0	95.9	80-120	0			
Sodium	10.58	0.13	0.20	10	0	106	80-120	0			
Thallium	0.09668	0.00015	0.0050	0.1	0	96.7	80-120	0			
Tin	0.1223	0.0013	0.0020	0.1	0	122	80-120	0			S

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: 227910

Instrument ID ICPMS3

Method: SW6020B

MS	Sample ID: 23100824-01BMS					Units: mg/L		Analysis Date: 10/24/2023 07:50 PM			
Client ID: SMMS-MW-9-100923			Run ID: ICPMS3_231024A			SeqNo: 10124292		Prep Date: 10/24/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1081	0.00042	0.0050	0.1	0.0000363	108	75-125	0			
Arsenic	0.1051	0.00019	0.0050	0.1	0.0002508	105	75-125	0			
Barium	0.129	0.00057	0.0050	0.1	0.02682	102	75-125	0			
Beryllium	0.1063	0.00013	0.0020	0.1	0.0000649	106	75-125	0			
Boron	0.749	0.015	0.020	0.5	0.205	109	75-125	0			
Cadmium	0.1074	0.00014	0.0020	0.1	0.0000055	107	75-125	0			
Calcium	54.4	0.22	0.50	10	46.87	75.3	75-125	0			O
Chromium	0.1065	0.00061	0.0050	0.1	0.0004477	106	75-125	0			
Cobalt	0.106	0.00027	0.0050	0.1	0.0000913	106	75-125	0			
Lead	0.1029	0.00022	0.0050	0.1	0.0000506	103	75-125	0			
Lithium	0.1058	0.0017	0.010	0.1	0.002826	103	75-125	0			
Magnesium	19.51	0.037	0.20	10	9.755	97.6	75-125	0			
Molybdenum	0.1049	0.00033	0.0050	0.1	0.0002486	105	75-125	0			
Potassium	12.45	0.034	0.20	10	2.484	99.7	75-125	0			
Selenium	0.09831	0.00048	0.0050	0.1	-0.0000407	98.4	75-125	0			
Sodium	35.08	0.13	0.20	10	26.34	87.4	75-125	0			
Thallium	0.09753	0.00015	0.0050	0.1	0.000099	97.4	75-125	0			
Tin	0.1061	0.0013	0.0020	0.1	0.000473	106	75-125	0			

MSD					Sample ID: 23100824-01BMSD			Units: mg/L		Analysis Date: 10/24/2023 07:52 PM		
Client ID: SMMS-MW-9-100923			Run ID: ICPMS3_231024A			SeqNo: 10124293		Prep Date: 10/24/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.11	0.00042	0.0050	0.1	0.0000363	110	75-125	0.1081	1.78	20		
Arsenic	0.1061	0.00019	0.0050	0.1	0.0002508	106	75-125	0.1051	0.959	20		
Barium	0.1314	0.00057	0.0050	0.1	0.02682	105	75-125	0.129	1.84	20		
Beryllium	0.108	0.00013	0.0020	0.1	0.0000649	108	75-125	0.1063	1.62	20		
Boron	0.7595	0.015	0.020	0.5	0.205	111	75-125	0.749	1.39	20		
Cadmium	0.1087	0.00014	0.0020	0.1	0.0000055	109	75-125	0.1074	1.26	20		
Calcium	54.68	0.22	0.50	10	46.87	78.1	75-125	54.4	0.519	20	O	
Chromium	0.1068	0.00061	0.0050	0.1	0.0004477	106	75-125	0.1065	0.28	20		
Cobalt	0.1071	0.00027	0.0050	0.1	0.0000913	107	75-125	0.106	1.07	20		
Lead	0.104	0.00022	0.0050	0.1	0.0000506	104	75-125	0.1029	1.05	20		
Lithium	0.1069	0.0017	0.010	0.1	0.002826	104	75-125	0.1058	0.972	20		
Magnesium	19.49	0.037	0.20	10	9.755	97.3	75-125	19.51	0.129	20		
Molybdenum	0.1069	0.00033	0.0050	0.1	0.0002486	107	75-125	0.1049	1.9	20		
Potassium	12.36	0.034	0.20	10	2.484	98.7	75-125	12.45	0.752	20		
Selenium	0.1004	0.00048	0.0050	0.1	-0.0000407	100	75-125	0.09831	2.1	20		
Sodium	34.82	0.13	0.20	10	26.34	84.8	75-125	35.08	0.748	20		
Thallium	0.09911	0.00015	0.0050	0.1	0.000099	99	75-125	0.09753	1.6	20		
Tin	0.1075	0.0013	0.0020	0.1	0.000473	107	75-125	0.1061	1.29	20		

The following samples were analyzed in this batch:

23100824-01B

Note:

See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227911 Instrument ID ICPMS3 Method: SW6020B

MBLK		Sample ID: MBLK-227911-227911				Units: mg/L		Analysis Date: 10/24/2023 08:40 PM			
Client ID:		Run ID: ICPMS3_231024A				SeqNo: 10124321		Prep Date: 10/24/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	U	0.00022	0.0050								
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	U	0.034	0.20								
Selenium	U	0.00048	0.0050								
Sodium	U	0.13	0.20								
Thallium	U	0.00015	0.0050								
Tin	0.005408	0.0013	0.0020								

LCS		Sample ID: LCS-227911-227911				Units: mg/L		Analysis Date: 10/24/2023 08:42 PM			
Client ID:		Run ID: ICPMS3_231024A				SeqNo: 10124322		Prep Date: 10/24/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1078	0.00042	0.0050	0.1	0	108	80-120	0			
Arsenic	0.1034	0.00019	0.0050	0.1	0	103	80-120	0			
Barium	0.1028	0.00057	0.0050	0.1	0	103	80-120	0			
Beryllium	0.1056	0.00013	0.0020	0.1	0	106	80-120	0			
Boron	0.5422	0.015	0.020	0.5	0	108	80-120	0			
Cadmium	0.1087	0.00014	0.0020	0.1	0	109	80-120	0			
Calcium	10.4	0.22	0.50	10	0	104	80-120	0			
Chromium	0.107	0.00061	0.0050	0.1	0	107	80-120	0			
Cobalt	0.1076	0.00027	0.0050	0.1	0	108	80-120	0			
Lead	0.103	0.00022	0.0050	0.1	0	103	80-120	0			
Lithium	0.1031	0.0017	0.010	0.1	0	103	80-120	0			
Magnesium	10.64	0.037	0.20	10	0	106	80-120	0			
Molybdenum	0.1031	0.00033	0.0050	0.1	0	103	80-120	0			
Potassium	10.2	0.034	0.20	10	0	102	80-120	0			
Selenium	0.09624	0.00048	0.0050	0.1	0	96.2	80-120	0			
Sodium	10.78	0.13	0.20	10	0	108	80-120	0			
Thallium	0.0982	0.00015	0.0050	0.1	0	98.2	80-120	0			
Tin	0.111	0.0013	0.0020	0.1	0	111	80-120	0			B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227911 Instrument ID ICPMS3 Method: SW6020B

MS					Sample ID: 23101970-04AMS			Units: mg/L		Analysis Date: 10/24/2023 09:55 PM		
Client ID:					Run ID: ICPMS3_231024A			SeqNo: 10124364		Prep Date: 10/24/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	1.043	0.0042	0.050	1	0.000869	104	80-120	0				
Arsenic	1.057	0.0019	0.050	1	0.00297	105	80-120	0				
Barium	1.331	0.0057	0.050	1	0.3155	102	80-120	0				
Beryllium	1.062	0.0013	0.020	1	0	106	80-120	0				
Boron	5.528	0.15	0.20	5	0.1158	108	80-120	0				
Cadmium	1.022	0.0014	0.020	1	0.000704	102	80-120	0				
Calcium	788.1	2.2	5.0	100	704.8	83.3	80-120	0			O	
Chromium	1.059	0.0061	0.050	1	0.003498	106	80-120	0				
Cobalt	1.047	0.0027	0.050	1	0.001804	105	80-120	0				
Lead	1.014	0.0022	0.050	1	0.000737	101	80-120	0				
Magnesium	128.6	0.37	2.0	100	25.91	103	80-120	0				
Molybdenum	1.03	0.0033	0.050	1	0.002013	103	80-120	0				
Potassium	105.8	0.34	2.0	100	2.226	104	80-120	0				
Selenium	1.038	0.0048	0.050	1	-0.002255	104	80-120	0				
Sodium	1468	1.3	2.0	100	1415	53.1	80-120	0			SO	
Thallium	0.9672	0.0015	0.050	1	-0.000154	96.7	80-120	0				
Tin	1.098	0.013	0.020	1	0.0164	108	80-120	0			B	

MSD					Sample ID: 23101970-04AMSD			Units: mg/L		Analysis Date: 10/24/2023 09:56 PM		
Client ID:					Run ID: ICPMS3_231024A			SeqNo: 10124365		Prep Date: 10/24/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	1.02	0.0042	0.050	1	0.000869	102	80-120	1.043	2.21	20		
Arsenic	1.052	0.0019	0.050	1	0.00297	105	80-120	1.057	0.521	20		
Barium	1.307	0.0057	0.050	1	0.3155	99.2	80-120	1.331	1.81	20		
Beryllium	1.04	0.0013	0.020	1	0	104	80-120	1.062	2.04	20		
Boron	5.41	0.15	0.20	5	0.1158	106	80-120	5.528	2.16	20		
Cadmium	1.019	0.0014	0.020	1	0.000704	102	80-120	1.022	0.368	20		
Calcium	782.9	2.2	5.0	100	704.8	78.1	80-120	788.1	0.666	20	SO	
Chromium	1.041	0.0061	0.050	1	0.003498	104	80-120	1.059	1.73	20		
Cobalt	1.031	0.0027	0.050	1	0.001804	103	80-120	1.047	1.58	20		
Lead	0.9924	0.0022	0.050	1	0.000737	99.2	80-120	1.014	2.12	20		
Magnesium	125	0.37	2.0	100	25.91	99.1	80-120	128.6	2.81	20		
Molybdenum	1.02	0.0033	0.050	1	0.002013	102	80-120	1.03	0.947	20		
Potassium	102.9	0.34	2.0	100	2.226	101	80-120	105.8	2.82	20		
Selenium	1.067	0.0048	0.050	1	-0.002255	107	80-120	1.038	2.77	20		
Sodium	1439	1.3	2.0	100	1415	23.3	80-120	1468	2.05	20	SO	
Thallium	0.9485	0.0015	0.050	1	-0.000154	94.9	80-120	0.9672	1.95	20		
Tin	1.071	0.013	0.020	1	0.0164	105	80-120	1.098	2.48	20	B	

The following samples were analyzed in this batch: 23100824-02B 23100824-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227233 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227233-227233					Units: mg/L		Analysis Date: 10/17/2023 08:52 A			
Client ID:		Run ID: TDS_231017A					SeqNo: 10092973		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	U	22	30									

LCS		Sample ID: LCS-227233-227233					Units: mg/L		Analysis Date: 10/17/2023 08:52 A			
Client ID:		Run ID: TDS_231017A					SeqNo: 10092972		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	476	22	30	495	0	96.2	85-109	0				

DUP		Sample ID: 23101115-01F DUP					Units: mg/L		Analysis Date: 10/17/2023 08:52 A			
Client ID:		Run ID: TDS_231017A					SeqNo: 10092968		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	1667	74	100	0	0	0	0-0	1653	0.804	10		

DUP		Sample ID: 23101115-02F DUP					Units: mg/L		Analysis Date: 10/17/2023 08:52 A			
Client ID:		Run ID: TDS_231017A					SeqNo: 10092970		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	1460	74	100	0	0	0	0-0	1407	3.72	10		

The following samples were analyzed in this batch: 23100824-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227401 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227401-227401					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101432		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	U	22	30									

LCS		Sample ID: LCS-227401-227401					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101431		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	490	22	30	495	0	99	85-109	0				

DUP		Sample ID: 23101240-01A DUP					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101426		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	1387	74	100	0	0	0	0-0	1433	3.31	10		

DUP		Sample ID: 23101246-01A DUP					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101429		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	2140	74	100	0	0	0	0-0	2147	0.311	10		

The following samples were analyzed in this batch:

23100824-01A	23100824-03A
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Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386174 Instrument ID Titrator 1 Method: A2320 B-11

MBLK		Sample ID: MB-R386174-R386174				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114157		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	U	8.4	10								

LCS		Sample ID: LCS-R386174-R386174				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114158		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	996.7	8.4	10	1000	0	99.7	90-110	0			

DUP		Sample ID: 23101053-01B DUP				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114166		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	100.6	8.4	10	0	0	0	0-0	107.4	6.49	10	

DUP		Sample ID: 23101668-06A DUP				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114181		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	414.7	8.4	10	0	0	0	0-0	415.8	0.282	10	

The following samples were analyzed in this batch: 23100824-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386263 Instrument ID Titrator 1 Method: A2320 B-11

MBLK		Sample ID: MB-R386263-R386263				Units: mg/L		Analysis Date: 10/23/2023 12:56 PM			
Client ID:		Run ID: TITRATOR 1_231023A				SeqNo: 10118261		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	U	8.4	10								

LCS		Sample ID: LCS-R386263-R386263				Units: mg/L		Analysis Date: 10/23/2023 12:56 PM			
Client ID:		Run ID: TITRATOR 1_231023A				SeqNo: 10118262		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	991	8.4	10	1000	0	99.1	90-110	0			

DUP		Sample ID: 23101792-01F DUP				Units: mg/L		Analysis Date: 10/23/2023 12:56 PM			
Client ID:		Run ID: TITRATOR 1_231023A				SeqNo: 10118267		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	613.6	8.4	10	0	0	0	0-0	610.8	0.456	10	

DUP		Sample ID: 23101792-07F DUP				Units: mg/L		Analysis Date: 10/23/2023 12:56 PM			
Client ID:		Run ID: TITRATOR 1_231023A				SeqNo: 10118274		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	449.7	8.4	10	0	0	0	0-0	453.5	0.841	10	

The following samples were analyzed in this batch:

23100824-01A	23100824-03A
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386322B Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-D-R386322B					Units: mg/L		Analysis Date: 10/23/2023 04:58 PM			
Client ID:		Run ID: IC4_231023A				SeqNo: 10121055		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Fluoride	U	0.067	0.10									

MBLK		Sample ID: CCB/MBLK-E-R386322B					Units: mg/L		Analysis Date: 10/23/2023 06:55 PM			
Client ID:		Run ID: IC4_231023A				SeqNo: 10121071		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Fluoride	U	0.067	0.10									

MBLK		Sample ID: CCB/MBLK-F-R386322B					Units: mg/L		Analysis Date: 10/23/2023 08:52 PM			
Client ID:		Run ID: IC4_231023A				SeqNo: 10121086		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Fluoride	U	0.067	0.10									

LCS		Sample ID: MLCCV/LCS-D-R386322B					Units: mg/L		Analysis Date: 10/23/2023 04:48 PM			
Client ID:		Run ID: IC4_231023A				SeqNo: 10121054		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Fluoride	2.031	0.067	0.10	2	0	102	86-121	0				

LCS		Sample ID: MLCCV/LCS-E-R386322B					Units: mg/L		Analysis Date: 10/23/2023 06:45 PM			
Client ID:		Run ID: IC4_231023A				SeqNo: 10121069		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Fluoride	1.883	0.067	0.10	2	0	94.1	86-121	0				

LCS		Sample ID: MLCCV/LCS-F-R386322B					Units: mg/L		Analysis Date: 10/23/2023 08:42 PM			
Client ID:		Run ID: IC4_231023A				SeqNo: 10121085		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Fluoride	1.962	0.067	0.10	2	0	98.1	86-121	0				

The following samples were analyzed in this batch: 23100824-01A 23100824-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386423A Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-A-R386423A					Units: mg/L		Analysis Date: 10/24/2023 12:11 PM			
Client ID:		Run ID: IC4_231024A				SeqNo: 10125275		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Fluoride	U	0.067	0.10									
Sulfate	U	0.19	1.0									

MBLK		Sample ID: CCB/MBLK-B-R386423A					Units: mg/L		Analysis Date: 10/24/2023 04:52 PM			
Client ID:		Run ID: IC4_231024A				SeqNo: 10125287		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Fluoride	U	0.067	0.10									
Sulfate	0.2998	0.19	1.0								J	

MBLK		Sample ID: CCB/MBLK-C-R386423A					Units: mg/L		Analysis Date: 10/24/2023 06:50 PM			
Client ID:		Run ID: IC4_231024A				SeqNo: 10125299		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Fluoride	U	0.067	0.10									
Sulfate	0.363	0.19	1.0								J	

LCS		Sample ID: MLCCV/LCS-A-R386423A					Units: mg/L		Analysis Date: 10/24/2023 12:01 PM			
Client ID:		Run ID: IC4_231024A				SeqNo: 10125274		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.707	0.31	1.0	10	0	97.1	88-110	0				
Fluoride	1.925	0.067	0.10	2	0	96.3	86-121	0				
Sulfate	9.847	0.19	1.0	10	0	98.5	90-110	0				

LCS		Sample ID: MLCCV/LCS-B-R386423A					Units: mg/L		Analysis Date: 10/24/2023 04:43 PM			
Client ID:		Run ID: IC4_231024A				SeqNo: 10125286		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.638	0.31	1.0	10	0	96.4	88-110	0				
Fluoride	1.872	0.067	0.10	2	0	93.6	86-121	0				
Sulfate	10.21	0.19	1.0	10	0	102	90-110	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23100824
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386423A Instrument ID IC4 Method: SW9056A

LCS		Sample ID: MLCCV/LCS-C-R386423A				Units: mg/L		Analysis Date: 10/24/2023 06:40 PM			
Client ID:		Run ID: IC4_231024A				SeqNo: 10125298		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.665	0.31	1.0	10	0	96.7	88-110	0			
Fluoride	2.112	0.067	0.10	2	0	106	86-121	0			
Sulfate	10.11	0.19	1.0	10	0	101	90-110	0			

MS		Sample ID: 23100824-01A MS				Units: mg/L		Analysis Date: 10/24/2023 03:23 PM			
Client ID: SMMS-MW-9-100923		Run ID: IC4_231024A				SeqNo: 10125278		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	131	3.1	10	100	35.82	95.2	88-110	0			
Fluoride	20.49	0.67	1.0	20	0	102	86-121	0			
Sulfate	160	1.9	10	100	59.55	100	90-110	0			

MSD		Sample ID: 23100824-01A MSD				Units: mg/L		Analysis Date: 10/24/2023 03:34 PM			
Client ID: SMMS-MW-9-100923		Run ID: IC4_231024A				SeqNo: 10125279		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	132.3	3.1	10	100	35.82	96.4	88-110	131	0.955	15	
Fluoride	21.47	0.67	1.0	20	0	107	86-121	20.49	4.66	15	
Sulfate	163.2	1.9	10	100	59.55	104	90-110	160	1.96	15	

The following samples were analyzed in this batch:

23100824-01A	23100824-02A	23100824-03A
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

October 30, 2023

Jodi Blouw
ALS Group USA, Corp
3352 128th Ave
Holland, Michigan 49424

Re: Holland - Blouw L2
Work Order: 641088

Dear Jodi Blouw:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 12, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4422.

Sincerely,



Adrian Melendrez for
Jacob Crook
Project Manager

Purchase Order: 20-23100824
Enclosures



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSE001 ALS Environmental

Client SDG: 641088 GEL Work Order: 641088

The Qualifiers in this report are defined as follows:

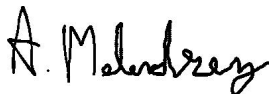
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Jacob Crook.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Report Date: October 30, 2023

Client Sample ID: SMMS-MW-4FB-100923
Sample ID: 641088003
Matrix: Ground Water
Collect Date: 09-OCT-23
Receive Date: 12-OCT-23
Collector: Client

Project: ALSE00923
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	-0.558	+/-1.69	3.16	+/-1.69	3.00	pCi/L			JE1	10/23/23	1114	2511298	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		1.59	+/-0.613	0.569	+/-0.720	1.00	pCi/L			MJ2	10/27/23	0907	2510469	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2511298	81.4	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: October 30, 2023

Page 1 of 2

Client : ALS Group USA, Corp
3352 128th Ave

Holland, Michigan

Contact: Jodi Blouw

Workorder: 641088

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2511298										
QC1205551507	641088003	DUP									
Radium-228		U	-0.558	U	0.753	pCi/L	0		N/A	JE1	10/23/2311:13
		Uncert:	+/-1.69		+/-1.82						
		TPU:	+/-1.69		+/-1.83						
QC1205551508	LCS										
Radium-228		154			138	pCi/L	89.6	(75%-125%)	JE1	10/23/2309:35	
		Uncert:			+/-8.00						
		TPU:			+/-36.3						
QC1205551506	MB										
Radium-228				U	0.818	pCi/L			JE1	10/23/2311:13	
		Uncert:			+/-1.43						
		TPU:			+/-1.44						
Rad Ra-226											
Batch	2510469										
QC1205550035	637536001	DUP									
Radium-226			4.34		3.13	pCi/L	32.5*	(0%-20%)	MJ2	10/27/2310:14	
		Uncert:	+/-0.949		+/-0.843						
		TPU:	+/-1.27		+/-1.03						
QC1205550039	LCS										
Radium-226		26.8			28.5	pCi/L	106	(75%-125%)	MJ2	10/27/2310:49	
		Uncert:			+/-2.29						
		TPU:			+/-7.14						
QC1205550034	MB										
Radium-226				U	0.370	pCi/L			MJ2	10/27/2310:14	
		Uncert:			+/-0.385						
		TPU:			+/-0.392						
QC1205550037	637536001	MS									
Radium-226		128	4.34		152	pCi/L	115	(75%-125%)	MJ2	10/27/2310:14	
		Uncert:	+/-0.949		+/-11.1						
		TPU:	+/-1.27		+/-31.9						

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 641088

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI	Gamma Spectroscopy--Uncertain identification									
BD	Results are either below the MDC or tracer recovery is low									
h	Preparation or preservation holding time was exceeded									
R	Sample results are rejected									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
N/A	RPD or %Recovery limits do not apply.									
ND	Analyte concentration is not detected above the detection limit									
M	M if above MDC and less than LLD									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
FA	Failed analysis.									
UJ	Gamma Spectroscopy--Uncertain identification									
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.									
N1	See case narrative									
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.									
**	Analyte is a Tracer compound									
M	REMP Result > MDC/CL and < RDL									
J	See case narrative for an explanation									

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.



Subcontractor:
GEL Laboratories, LLC
2040 Savage Rd
Charleston, SC 29407

TEL: (843) 556-8171
FAX: (843) 766-1178
Acct #:

CHAIN-OF-CUSTODY RECORD

Date: 10-Oct-23
COC ID: 24111
Due Date: 31-Oct-23

Page 1 of 1

641088

Customer Information		Project Information		Parameter/Method Request for Analysis													
Purchase Order	23100824	Project Name	23100824	A	Radium 226/228 by 903/904												
Work Order		Project Number		B													
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C													
Send Report To	Jodi Blouw	Inv Attn	Accounts Payable	D													
Address	3352 128th Ave	Address	3352 128th Ave	E													
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	F													
Phone	(616) 399-6070	Phone	(616) 399-6070	G													
Fax	(616) 399-6185	Fax	(616) 399-6185	H													
eMail Address	jodi.blouw@alsglobal.com	eMail CC		I													
ALS Sample ID	Client Sample ID	Matrix	Collection Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J			
23100824-01C	SMMS-MW-9-100923	Groundwater	9/Oct/2023 12:35	(2) 1LPNEAT	X												
23100824-02C	SMMS-MW-4-100923	Groundwater	9/Oct/2023 14:05	(2) 1LPNEAT	X												
23100824-03C	SMMS-MW-4FB-100923	Groundwater	9/Oct/2023 14:05	(2) 1LPNEAT	X												

Comments:

Please analyze enclosed samples for Radium 226 and Radium 228. Thank you.

Calvin K...

10-10-23 14:45

10/12/23 1030

Relinquished by:

Received by:

Date/Time

Date/Time

Cooler IDs

Report/QC Level

Relinquished by:

Received by:

Date/Time

Date/Time

10/12/23

9:00

Std

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ALSE</u>		SDG/AR/COC/Work Order: <u>641088</u>	
Received By: <u>MM</u>		Date Received: <u>10/17/25</u>	
Carrier and Tracking Number		Circle Applicable: FedEx Express <input checked="" type="checkbox"/> FedEx Ground <input checked="" type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <input type="checkbox"/>	
		<u>10536 1072 6500 16°</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
A) Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___	
B) Did the client designate the samples are to be received as radioactive?	<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.	
C) Did the RSO classify the samples as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): _____ CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
D) Did the client designate samples are hazardous?	<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.	
E) Did the RSO identify possible hazards?	<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice None <u>Other:</u> _____ *all temperatures are recorded in Celsius TEMP: <u>16°</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: _____ Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe) <u>641-088-002(2)</u> <u>Empty</u>
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
				Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
				Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DD Date 10/16/23 Page 1 of 1

Adrian Melendrez

From: Jodi Blouw <jodi.blouw@ALSGlobal.com>
Sent: Wednesday, October 18, 2023 9:19 AM
To: Adrian Melendrez
Cc: Team Crook
Subject: RE: [EXTERNAL] - RE: Volume issues 641088

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Adrian-

Client resampled MW4 and MW9, we will send those later this week – please just cancel those 2 from this work order and only analyze MW-4FB. Thank you!

Regards,



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TQ% #

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From: Adrian Melendrez <Adrian.Melendrez@gel.com>
Sent: Friday, October 13, 2023 3:26 PM
To: Jodi Blouw <jodi.blouw@ALSGlobal.com>
Cc: Team Crook <Team.Crook@gel.com>
Subject: RE: [EXTERNAL] - RE: Volume issues 641088

Samples have been on hold. Will wait until told otherwise. Thanks!

From: Jodi Blouw <jodi.blouw@ALSGlobal.com>
Sent: Friday, October 13, 2023 3:24 PM
To: Adrian Melendrez <Adrian.Melendrez@gel.com>

Cc: Team Crook <Team.Crook@gel.com>
Subject: RE: [EXTERNAL] - RE: Volume issues 641088

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

I am waiting to hear from our client regarding more sample for these, please hold off on running anything on this work order for now.

Thank you

Regards,



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From: Adrian Melendrez <Adrian.Melendrez@gel.com>
Sent: Thursday, October 12, 2023 4:51 PM
To: Jodi Blouw <jodi.blouw@ALSGlobal.com>
Cc: Team Crook <Team.Crook@gel.com>
Subject: [EXTERNAL] - RE: Volume issues 641088

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

For more clarification the samples lids had come off during shipment.

From: Adrian Melendrez <Adrian.Melendrez@gel.com>
Sent: Thursday, October 12, 2023 4:50 PM
To: jodi.blouw@alsglobal.com
Cc: Team Crook <Team.Crook@gel.com>
Subject: Volume issues 641088

Hello,

We had issues with the following samples:

- SMMS-MW-9-100923 (GEL ID 641088001)
 - Received one empty container
 - Only 250 grams in one container
- SMMS-MW-4-100923 (GEL ID 641088002)
 - Both containers received empty

Please advise on how we should proceed. CoC attached for reference.

Thanks!

-Adrian

Adrian Melendrez
Project Manager Assistant



2040 Savage Road, Charleston, SC 29407 | PO Box 30712, Charleston, SC 29417

Office Main: 843.556.8171 EXT 4409 | Fax: 843.766.1178

E-Mail: Adrian.Melendrez@gel.com | Website: www.gel.com

Analytical Testing



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List of current GEL Certifications as of 30 October 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-00651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	KY90129
Kentucky Wastewater	KY90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2023019
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122024-04
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2023-152
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-23-21
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

**Radiochemistry
Technical Case Narrative
ALS Environmental
SDG #: 641088**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2511298

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
641088003	SMMS-MW-4FB-100923
1205551506	Method Blank (MB)
1205551507	641088003(SMMS-MW-4FB-100923) Sample Duplicate (DUP)
1205551508	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

RDL Met

The following RDLs were met with rounding.

Sample	Analyte	Value
1205551507 (SMMS-MW-4FB-100923DUP)	Radium-228	Result 0.753 < MDA 3.17 > RDL 3 pCi/L
641088003 (SMMS-MW-4FB-100923)	Radium-228	Result -0.558 < MDA 3.16 > RDL 3 pCi/L

Technical Information

Recounts

Sample 1205551506 (MB) was recounted due to a suspected blank false positive. The recount is reported. Samples 1205551507 (SMMS-MW-4FB-100923DUP) and 641088003 (SMMS-MW-4FB-100923) were recounted due to high relative percent difference/relative error ratio. The recounts are reported.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2510469

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
641088003	SMMS-MW-4FB-100923
1205550034	Method Blank (MB)
1205550035	637536001(NonSDG) Sample Duplicate (DUP)
1205550037	637536001(NonSDG) Matrix Spike (MS)
1205550039	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Duplication Criteria between QC Sample and Duplicate Sample

The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1205550035 (Non SDG 637536001DUP)	Radium-226	RPD 32.5* (0%-20%) RER 1.45 (0-3)

Technical Information

Recounts

Samples 1205550034 (MB) and 1205550039 (LCS) were degassed and recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

Miscellaneous Information

Additional Comments

Aliquots for the matrix spikes 1205550037 (Non SDG 637536001MS) were reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

[illegible]

Project Name: Sammis 2023 Sampling
Project Number: SMMS-1004-23

Company: Field & Technical Services
Address: 200 Third Avenue

Laboratory: ALS

Carnegie, PA 15106

Shipment Method FEDEX

(412) 279-3363

Program: Sammis 2023 2SA Sampling

[illegible]

0109	2023	1405	6W	5mmms	4
10/09	123	1405	9W	5mmms - MW - 4FB-10923	4

2111

Relinquished by:

Received by:

Relinquished by:

Received by:

Turnaround Requirements

Signature: 

Signature: 

Signature _____

Rush

Printed Name:

Printed Name:

Printed Name:

Printed Name: _____

Shane Lindquist

Name: Kirk Medlin

Printed Name: Kirk Medlin

Printed Name: John Doe

Firm

Firm

Firm

Firm

FTS

ACS

ACS

Handwritten signature: *[Signature]*

X

Standard

Date/Time:

Date/Time: 10-0-23 1640

Date/Time: 6/23/1700

Date/Time: 2024

ALS Group, USA

Holland, Michigan

Sample Receipt Checklist

Client Name: **ETEM**

Date/Time Received: **10-Oct-23 09:00**

Work Order: **23100824**

Received by: **JD**

Checklist completed by <i>Jason Delinger</i>	10-Oct-23	Reviewed by: <i>Jodi Blauw</i>	10-Oct-23
eSignature	Date	eSignature	Date

Matrices: **Water**

Carrier name: **FedEx**

Shipping container/cooler in good condition? Yes ☒ No ☐ Not Present ☐

Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☒

Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒

Chain of custody present? Yes ☒ No ☐

Chain of custody signed when relinquished and received? Yes ☒ No ☐

Chain of custody agrees with sample labels? Yes ☒ No ☐

Samples in proper container/bottle? Yes ☒ No ☐

Sample containers intact? Yes ☒ No ☐

Sufficient sample volume for indicated test? Yes ☒ No ☐

All samples received within holding time? Yes ☒ No ☐

Container/Temp Blank temperature in compliance? Yes ☒ No ☐

Sample(s) received on ice? Yes ☒ No ☐

Temperature(s)/Thermometer(s):

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

Water - VOA vials have zero headspace? Yes ☐ No ☐ No VOA vials submitted ☒

Water - pH acceptable upon receipt? Yes ☒ No ☐ N/A ☐

pH adjusted? Yes ☐ No ☒ N/A ☐

pH adjusted by:

Login Notes: **ph<2**

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



07-Nov-2023

Brian Spahlinger
ETEM
200 Third Ave.
Carnegie, PA 15106

Re: **Sammis 2023 2SA Sampling**

Work Order: **23101047**

Dear Brian,

ALS Environmental received 5 samples on 11-Oct-2023 09:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 36.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

Certificate No: OH: 87783

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Client: ETEM
Project: Sammis 2023 2SA Sampling
Work Order: 23101047

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
23101047-01	SMMS-MW-5-101023	Groundwater		10/10/2023 10:17	10/11/2023 09:00	<input type="checkbox"/>
23101047-02	SMMS-MW-6-101023	Groundwater		10/10/2023 11:07	10/11/2023 09:00	<input type="checkbox"/>
23101047-03	SMMS-M-99B-101023	Groundwater		10/10/2023 12:00	10/11/2023 09:00	<input type="checkbox"/>
23101047-04	SMMS-P-1-101023	Groundwater		10/10/2023 12:19	10/11/2023 09:00	<input type="checkbox"/>
23101047-05	SMMS-MW-11D-101023	Groundwater		10/10/2023 13:07	10/11/2023 09:00	<input type="checkbox"/>

Client:	ETEM	QUALIFIERS, ACRONYMS, UNITS
Project:	Sammis 2023 2SA Sampling	
WorkOrder:	23101047	

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
as noted	
mg/L	Milligrams per Liter

Client: ETEM
Project: Sammis 2023 2SA Sampling
Work Order: 23101047

Case Narrative

Samples for the above noted Work Order were received on 10/11/2023. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:

No deviations or anomalies were noted.

Wet Chemistry:

Batch R386658A, Method SW9056A, Sample 23101047-01B MS: Matrix spike value was outside upper limit of calibration. Processed at equivalent dilution level as the parent. Sulfate

Batch R386658A, Method SW9056A, Sample 23101047-01B MSD: Matrix spike duplicate value was outside upper limit of calibration. Processed at equivalent dilution level as the parent. Sulfate

No other deviations or anomalies were noted.

Client:	ETEM	Work Order:	23101047
Project:	Sammis 2023 2SA Sampling	Lab ID:	23101047-01
Sample ID:	SMMS-MW-5-101023	Matrix:	GROUNDWATER
Collection Date:	10/10/2023 10:17 AM		

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 13:51
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:10
Arsenic	0.00036	J	0.00019	0.0050	mg/L	1	10/25/2023 19:10
Barium	0.016		0.00057	0.0050	mg/L	1	10/25/2023 19:10
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:10
Boron	0.079		0.015	0.020	mg/L	1	10/25/2023 19:10
Cadmium	0.00031	J	0.00014	0.0020	mg/L	1	10/25/2023 19:10
Calcium	43		0.22	0.50	mg/L	1	10/25/2023 19:10
Chromium	0.0011	J	0.00061	0.0050	mg/L	1	10/25/2023 19:10
Cobalt	0.0032	J	0.00027	0.0050	mg/L	1	10/25/2023 19:10
Lead	0.00039	J	0.00022	0.0050	mg/L	1	10/25/2023 19:10
Lithium	U		0.0017	0.010	mg/L	1	10/25/2023 19:10
Magnesium	10		0.037	0.20	mg/L	1	10/25/2023 19:10
Molybdenum	0.0017	J	0.00033	0.0050	mg/L	1	10/25/2023 19:10
Potassium	2.3		0.034	0.20	mg/L	1	10/25/2023 19:10
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:29
Sodium	36		0.13	0.20	mg/L	1	10/25/2023 19:10
Thallium	0.0054		0.00015	0.0050	mg/L	1	10/25/2023 19:10
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:10
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	60.0		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	44.7		3.1	10	mg/L	10	10/26/2023 15:49
Fluoride	0.241		0.067	0.10	mg/L	1	10/25/2023 17:02
Sulfate	131		1.9	10	mg/L	10	10/26/2023 15:49
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/13/23	Analyst: LAD
Total Dissolved Solids	310		37	50	mg/L	1	10/16/2023 14:02
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 2SA Sampling	Work Order:	23101047
Sample ID:	SMMS-MW-6-101023	Lab ID:	23101047-02
Collection Date:	10/10/2023 11:07 AM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 13:56
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:12
Arsenic	U		0.00019	0.0050	mg/L	1	10/25/2023 19:12
Barium	0.010		0.00057	0.0050	mg/L	1	10/25/2023 19:12
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:12
Boron	0.12		0.015	0.020	mg/L	1	10/25/2023 19:12
Cadmium	0.00028	J	0.00014	0.0020	mg/L	1	10/25/2023 19:12
Calcium	59		0.22	0.50	mg/L	1	10/25/2023 19:12
Chromium	U		0.00061	0.0050	mg/L	1	10/25/2023 19:12
Cobalt	0.010		0.00027	0.0050	mg/L	1	10/25/2023 19:12
Lead	U		0.00022	0.0050	mg/L	1	10/25/2023 19:12
Lithium	U		0.0017	0.010	mg/L	1	10/25/2023 19:12
Magnesium	14		0.037	0.20	mg/L	1	10/25/2023 19:12
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:12
Potassium	2.7		0.034	0.20	mg/L	1	10/25/2023 19:12
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:31
Sodium	51		0.13	0.20	mg/L	1	10/25/2023 19:12
Thallium	0.00064	J	0.00015	0.0050	mg/L	1	10/25/2023 19:12
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:12
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	25.1		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	58.7		3.1	10	mg/L	10	10/26/2023 16:18
Fluoride	U		0.067	0.10	mg/L	1	10/25/2023 17:12
Sulfate	258		7.6	40	mg/L	40	10/26/2023 16:28
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	520		37	50	mg/L	1	10/18/2023 13:37
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: ETEM
 Project: Sammis 2023 2SA Sampling
 Sample ID: SMMS-M-99B-101023
 Collection Date: 10/10/2023 12:00 PM

Work Order: 23101047
 Lab ID: 23101047-03
 Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			Method: SW7470A		Prep: SW7470 / 10/12/23		Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 13:58
METALS BY ICP-MS			Method: SW6020B		Prep: SW3015A / 10/25/23		Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:15
Arsenic	U		0.00019	0.0050	mg/L	1	10/25/2023 19:15
Barium	0.010		0.00057	0.0050	mg/L	1	10/25/2023 19:15
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:15
Boron	0.12		0.015	0.020	mg/L	1	10/25/2023 19:15
Cadmium	0.00027	J	0.00014	0.0020	mg/L	1	10/25/2023 19:15
Calcium	60		0.22	0.50	mg/L	1	10/25/2023 19:15
Chromium	U		0.00061	0.0050	mg/L	1	10/25/2023 19:15
Cobalt	0.010		0.00027	0.0050	mg/L	1	10/25/2023 19:15
Lead	U		0.00022	0.0050	mg/L	1	10/25/2023 19:15
Lithium	U		0.0017	0.010	mg/L	1	10/25/2023 19:15
Magnesium	14		0.037	0.20	mg/L	1	10/25/2023 19:15
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:15
Potassium	2.7		0.034	0.20	mg/L	1	10/25/2023 19:15
Selenium	0.00069	J	0.00048	0.0050	mg/L	1	10/26/2023 13:32
Sodium	52		0.13	0.20	mg/L	1	10/25/2023 19:15
Thallium	0.00022	J	0.00015	0.0050	mg/L	1	10/25/2023 19:15
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:15
ALKALINITY			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO ₃)	25.1		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY			Method: SW9056A				Analyst: QTN
Chloride	57.0		3.1	10	mg/L	10	10/26/2023 16:38
Fluoride	U		0.067	0.10	mg/L	1	10/25/2023 17:22
Sulfate	241		7.6	40	mg/L	40	10/26/2023 17:07
TOTAL DISSOLVED SOLIDS			Method: A2540 C-15		Prep: FILTER / 10/16/23		Analyst: LAD
Total Dissolved Solids	490		37	50	mg/L	1	10/18/2023 13:37
SUBCONTRACTED ANALYSES			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: ETEM
Project: Sammis 2023 2SA Sampling
Sample ID: SMMS-P-1-101023
Collection Date: 10/10/2023 12:19 PM

Work Order: 23101047
Lab ID: 23101047-04
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 13:59
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:16
Arsenic	0.00065	J	0.00019	0.0050	mg/L	1	10/25/2023 19:16
Barium	0.011		0.00057	0.0050	mg/L	1	10/25/2023 19:16
Beryllium	0.00023	J	0.00013	0.0020	mg/L	1	10/25/2023 19:16
Boron	0.16		0.015	0.020	mg/L	1	10/25/2023 19:16
Cadmium	0.00073	J	0.00014	0.0020	mg/L	1	10/25/2023 19:16
Calcium	78		0.22	0.50	mg/L	1	10/25/2023 19:16
Chromium	0.00061	J	0.00061	0.0050	mg/L	1	10/25/2023 19:16
Cobalt	0.021		0.00027	0.0050	mg/L	1	10/25/2023 19:16
Lead	U		0.00022	0.0050	mg/L	1	10/25/2023 19:16
Lithium	0.0047	J	0.0017	0.010	mg/L	1	10/25/2023 19:16
Magnesium	19		0.037	0.20	mg/L	1	10/25/2023 19:16
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:16
Potassium	3.4		0.034	0.20	mg/L	1	10/25/2023 19:16
Selenium	0.00071	J	0.00048	0.0050	mg/L	1	10/26/2023 13:34
Sodium	68		0.13	0.20	mg/L	1	10/25/2023 19:16
Thallium	0.00018	J	0.00015	0.0050	mg/L	1	10/25/2023 19:16
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:16
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	8.92	J	8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	77.9		12	40	mg/L	40	10/26/2023 17:17
Fluoride	U		0.067	0.10	mg/L	1	10/25/2023 17:31
Sulfate	317		7.6	40	mg/L	40	10/26/2023 17:17
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	640		37	50	mg/L	1	10/18/2023 13:37

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 2SA Sampling	Work Order:	23101047
Sample ID:	SMMS-MW-11D-101023	Lab ID:	23101047-05
Collection Date:	10/10/2023 01:07 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:01
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:22
Arsenic	0.0011	J	0.00019	0.0050	mg/L	1	10/25/2023 19:22
Barium	0.019		0.00057	0.0050	mg/L	1	10/25/2023 19:22
Beryllium	0.00045	J	0.00013	0.0020	mg/L	1	10/25/2023 19:22
Boron	0.19		0.015	0.020	mg/L	1	10/25/2023 19:22
Cadmium	0.0014	J	0.00014	0.0020	mg/L	1	10/25/2023 19:22
Calcium	91		0.22	0.50	mg/L	1	10/25/2023 19:22
Chromium	0.0019	J	0.00061	0.0050	mg/L	1	10/25/2023 19:22
Cobalt	0.048		0.00027	0.0050	mg/L	1	10/25/2023 19:22
Lead	0.00084	J	0.00022	0.0050	mg/L	1	10/25/2023 19:22
Lithium	0.015		0.0017	0.010	mg/L	1	10/25/2023 19:22
Magnesium	22		0.037	0.20	mg/L	1	10/25/2023 19:22
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:22
Potassium	4.2		0.034	0.20	mg/L	1	10/25/2023 19:22
Selenium	0.00062	J	0.00048	0.0050	mg/L	1	10/26/2023 13:36
Sodium	77		0.13	0.20	mg/L	1	10/25/2023 19:22
Thallium	0.00021	J	0.00015	0.0050	mg/L	1	10/25/2023 19:22
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:22
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	12.9		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	84.2		12	40	mg/L	40	10/26/2023 17:26
Fluoride	0.215		0.067	0.10	mg/L	1	10/25/2023 17:41
Sulfate	367		7.6	40	mg/L	40	10/26/2023 17:26
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	710		37	50	mg/L	1	10/18/2023 13:37

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: 227191

Instrument ID HG5

Method: SW7470A

MBLK		Sample ID: MBLK-227191-227191					Units: mg/L		Analysis Date: 10/12/2023 01:36 PM		
Client ID:		Run ID: HG5_231012A				SeqNo: 10080065		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.00016	0.00020								

LCS		Sample ID: LCS-227191-227191					Units: mg/L		Analysis Date: 10/12/2023 01:37 PM		
Client ID:		Run ID: HG5_231012A				SeqNo: 10080066		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00204	0.00016	0.00020	0.002	0	102	80-120	0			

MS		Sample ID: 23101047-01CMS					Units: mg/L		Analysis Date: 10/12/2023 01:52 PM		
Client ID: SMMS-MW-5-101023		Run ID: HG5_231012A				SeqNo: 10080074		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002145	0.00016	0.00020	0.002	0.0000465	105	75-125	0			

MSD		Sample ID: 23101047-01CMSD					Units: mg/L		Analysis Date: 10/12/2023 01:54 PM		
Client ID: SMMS-MW-5-101023		Run ID: HG5_231012A				SeqNo: 10080075		Prep Date: 10/12/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00213	0.00016	0.00020	0.002	0.0000465	104	75-125	0.002145	0.702	20	

The following samples were analyzed in this batch:

23101047-01C

23101047-02C

23101047-03C

23101047-04C

23101047-05C

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 228023 Instrument ID ICPMS3 Method: SW6020B

MBLK		Sample ID: MBLK-228023-228023				Units: mg/L		Analysis Date: 10/25/2023 07:06 PM			
Client ID:		Run ID: ICPMS3_231025A				SeqNo: 10128883		Prep Date: 10/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	0.0002904	0.00022	0.0050								J
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	U	0.034	0.20								
Sodium	0.1684	0.13	0.20								J
Thallium	U	0.00015	0.0050								
Tin	U	0.0013	0.0020								

MBLK		Sample ID: MBLK-228023-228023				Units: mg/L		Analysis Date: 10/26/2023 01:26 PM			
Client ID:		Run ID: ICPMS3_231026A				SeqNo: 10134032		Prep Date: 10/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	U	0.00048	0.0050								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 228023 Instrument ID ICPMS3 Method: SW6020B

LCS Sample ID: LCS-228023-228023					Units: mg/L			Analysis Date: 10/25/2023 07:08 PM			
Client ID:		Run ID: ICPMS3_231025A			SeqNo: 10128884		Prep Date: 10/25/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.104	0.00042	0.0050	0.1	0	104	80-120	0			
Arsenic	0.09582	0.00019	0.0050	0.1	0	95.8	80-120	0			
Barium	0.09988	0.00057	0.0050	0.1	0	99.9	80-120	0			
Beryllium	0.1036	0.00013	0.0020	0.1	0	104	80-120	0			
Boron	0.526	0.015	0.020	0.5	0	105	80-120	0			
Cadmium	0.1033	0.00014	0.0020	0.1	0	103	80-120	0			
Calcium	10.25	0.22	0.50	10	0	103	80-120	0			
Chromium	0.09679	0.00061	0.0050	0.1	0	96.8	80-120	0			
Cobalt	0.09731	0.00027	0.0050	0.1	0	97.3	80-120	0			
Lead	0.09904	0.00022	0.0050	0.1	0	99	80-120	0			
Lithium	0.1005	0.0017	0.010	0.1	0	100	80-120	0			
Magnesium	10.17	0.037	0.20	10	0	102	80-120	0			
Molybdenum	0.09966	0.00033	0.0050	0.1	0	99.7	80-120	0			
Potassium	10.1	0.034	0.20	10	0	101	80-120	0			
Sodium	10.36	0.13	0.20	10	0	104	80-120	0			
Thallium	0.09114	0.00015	0.0050	0.1	0	91.1	80-120	0			
Tin	0.1029	0.0013	0.0020	0.1	0	103	80-120	0			

LCS Sample ID: LCS-228023-228023					Units: mg/L			Analysis Date: 10/26/2023 01:27 PM			
Client ID:		Run ID: ICPMS3_231026A			SeqNo: 10134033		Prep Date: 10/25/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.09777	0.00048	0.0050	0.1	0	97.8	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 228023 Instrument ID ICPMS3 Method: SW6020B

MS					Sample ID: 23101756-19AMS			Units: mg/L		Analysis Date: 10/25/2023 07:46 PM		
Client ID:			Run ID: ICPMS3_231025A			SeqNo: 10128905		Prep Date: 10/25/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1095	0.00042	0.0050	0.1	0.0000781	109	75-125	0				
Arsenic	0.1022	0.00019	0.0050	0.1	0.0004345	102	75-125	0				
Barium	0.1624	0.00057	0.0050	0.1	0.05793	104	75-125	0				
Beryllium	0.109	0.00013	0.0020	0.1	0.0000341	109	75-125	0				
Boron	1.38	0.015	0.020	0.5	0.835	109	75-125	0				
Cadmium	0.1064	0.00014	0.0020	0.1	0.0000957	106	75-125	0				
Calcium	122.7	0.22	0.50	10	117.7	49.6	75-125	0			SO	
Chromium	0.1022	0.00061	0.0050	0.1	0.0004356	102	75-125	0				
Cobalt	0.1006	0.00027	0.0050	0.1	0.0000924	101	75-125	0				
Lead	0.1051	0.00022	0.0050	0.1	0.001221	104	75-125	0				
Lithium	0.1067	0.0017	0.010	0.1	0.003034	104	75-125	0				
Magnesium	38.89	0.037	0.20	10	29.93	89.6	75-125	0				
Molybdenum	0.1061	0.00033	0.0050	0.1	-0.0000748	106	75-125	0				
Potassium	11.65	0.034	0.20	10	1.254	104	75-125	0				
Selenium	0.1016	0.00048	0.0050	0.1	0.0001562	101	75-125	0				
Sodium	33.42	0.13	0.20	10	23.68	97.4	75-125	0				
Thallium	0.09913	0.00015	0.0050	0.1	0.0000374	99.1	75-125	0				
Tin	0.109	0.0013	0.0020	0.1	0.0007898	108	75-125	0				

MSD					Sample ID: 23101756-19AMSD			Units: mg/L		Analysis Date: 10/25/2023 07:47 PM		
Client ID:			Run ID: ICPMS3_231025A			SeqNo: 10128906		Prep Date: 10/25/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1055	0.00042	0.0050	0.1	0.0000781	105	75-125	0.1095	3.66	20		
Arsenic	0.09954	0.00019	0.0050	0.1	0.0004345	99.1	75-125	0.1022	2.61	20		
Barium	0.1583	0.00057	0.0050	0.1	0.05793	100	75-125	0.1624	2.53	20		
Beryllium	0.1048	0.00013	0.0020	0.1	0.0000341	105	75-125	0.109	3.93	20		
Boron	1.361	0.015	0.020	0.5	0.835	105	75-125	1.38	1.43	20		
Cadmium	0.1021	0.00014	0.0020	0.1	0.0000957	102	75-125	0.1064	4.18	20		
Calcium	122.5	0.22	0.50	10	117.7	48.1	75-125	122.7	0.117	20	SO	
Chromium	0.09779	0.00061	0.0050	0.1	0.0004356	97.4	75-125	0.1022	4.37	20		
Cobalt	0.0964	0.00027	0.0050	0.1	0.0000924	96.3	75-125	0.1006	4.29	20		
Lead	0.1009	0.00022	0.0050	0.1	0.001221	99.7	75-125	0.1051	4.06	20		
Lithium	0.1024	0.0017	0.010	0.1	0.003034	99.4	75-125	0.1067	4.11	20		
Magnesium	38.62	0.037	0.20	10	29.93	86.9	75-125	38.89	0.714	20		
Molybdenum	0.1018	0.00033	0.0050	0.1	-0.0000748	102	75-125	0.1061	4.13	20		
Potassium	11.18	0.034	0.20	10	1.254	99.3	75-125	11.65	4.12	20		
Selenium	0.09775	0.00048	0.0050	0.1	0.0001562	97.6	75-125	0.1016	3.87	20		
Sodium	32.89	0.13	0.20	10	23.68	92.1	75-125	33.42	1.59	20		
Thallium	0.09641	0.00015	0.0050	0.1	0.0000374	96.4	75-125	0.09913	2.78	20		
Tin	0.1037	0.0013	0.0020	0.1	0.0007898	103	75-125	0.109	4.96	20		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: **228023** Instrument ID **ICPMS3** Method: **SW6020B**

The following samples were analyzed in this batch:

23101047-01C	23101047-02C	23101047-03C
23101047-04C	23101047-05C	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 227317 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227317-227317				Units: mg/L			Analysis Date: 10/16/2023 02:02 PM			
Client ID:		Run ID: TDS_231016B				SeqNo: 10090527			Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	U	22	30									

LCS		Sample ID: LCS-227317-227317				Units: mg/L			Analysis Date: 10/16/2023 02:02 PM			
Client ID:		Run ID: TDS_231016B				SeqNo: 10090526			Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	450	22	30	495	0	90.9	85-109		0			

DUP		Sample ID: 23101047-01B DUP				Units: mg/L			Analysis Date: 10/16/2023 02:02 PM			
Client ID: SMMS-MW-5-101023		Run ID: TDS_231016B				SeqNo: 10090520			Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	303.3	37	50	0	0	0	0-0	306.7	1.09	10		

The following samples were analyzed in this batch: 23101047-01B

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 227401 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227401-227401				Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A				SeqNo: 10101432		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	U	22	30								

LCS		Sample ID: LCS-227401-227401				Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A				SeqNo: 10101431		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	490	22	30	495	0	99	85-109	0			

DUP		Sample ID: 23101240-01A DUP				Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A				SeqNo: 10101426		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	1387	74	100	0	0	0	0-0	1433	3.31	10	

DUP		Sample ID: 23101246-01A DUP				Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A				SeqNo: 10101429		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	2140	74	100	0	0	0	0-0	2147	0.311	10	

The following samples were analyzed in this batch:

23101047-02B	23101047-03B	23101047-04B
23101047-05B		

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: R386174 Instrument ID Titrator 1 Method: A2320 B-11

MBLK		Sample ID: MB-R386174-R386174				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114157		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)		U	8.4	10							

LCS		Sample ID: LCS-R386174-R386174				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114158		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)		996.7	8.4	10	1000	0	99.7	90-110	0		

DUP		Sample ID: 23101053-01B DUP				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114166		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)		100.6	8.4	10	0	0	0	0-0	107.4	6.49	10

DUP		Sample ID: 23101668-06A DUP				Units: mg/L		Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114181		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)		414.7	8.4	10	0	0	0	0-0	415.8	0.282	10

The following samples were analyzed in this batch:	23101047-01B	23101047-02B	23101047-03B
	23101047-04B	23101047-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: R386540A

Instrument ID IC4

Method: SW9056A

MBLK		Sample ID: CCB/MBLK-A-R386540A				Units: mg/L		Analysis Date: 10/25/2023 11:49 A			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130212		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

MBLK		Sample ID: CCB/MBLK-B-R386540A				Units: mg/L		Analysis Date: 10/25/2023 04:52 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130224		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

MBLK		Sample ID: CCB/MBLK-C-R386540A				Units: mg/L		Analysis Date: 10/25/2023 06:49 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130236		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

LCS		Sample ID: MLCCV/LCS-A-R386540A				Units: mg/L		Analysis Date: 10/25/2023 11:40 A			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130211		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	1.924	0.067	0.10	2	0	96.2	86-121	0			

LCS		Sample ID: MLCCV/LCS-B-R386540A				Units: mg/L		Analysis Date: 10/25/2023 04:43 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130223		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.112	0.067	0.10	2	0	106	86-121	0			

LCS		Sample ID: MLCCV/LCS-C-R386540A				Units: mg/L		Analysis Date: 10/25/2023 06:40 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130235		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.188	0.067	0.10	2	0	109	86-121	0			

The following samples were analyzed in this batch:

23101047-01B

23101047-02B

23101047-03B

23101047-04B

23101047-05B

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: R386658A Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-A-R386658A				Units: mg/L		Analysis Date: 10/26/2023 11:51 A			
Client ID:		Run ID: IC4_231026A				SeqNo: 10135937		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-B-R386658A				Units: mg/L		Analysis Date: 10/26/2023 04:57 PM			
Client ID:		Run ID: IC4_231026A				SeqNo: 10135949		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-C-R386658A				Units: mg/L		Analysis Date: 10/26/2023 06:54 PM			
Client ID:		Run ID: IC4_231026A				SeqNo: 10135961		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Sulfate	U	0.19	1.0								

LCS		Sample ID: MLCCV/LCS-A-R386658A				Units: mg/L		Analysis Date: 10/26/2023 11:42 A			
Client ID:		Run ID: IC4_231026A				SeqNo: 10135936		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.767	0.31	1.0	10	0	97.7	88-110	0			
Sulfate	9.988	0.19	1.0	10	0	99.9	90-110	0			

LCS		Sample ID: MLCCV/LCS-B-R386658A				Units: mg/L		Analysis Date: 10/26/2023 04:48 PM			
Client ID:		Run ID: IC4_231026A				SeqNo: 10135948		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.648	0.31	1.0	10	0	96.5	88-110	0			
Sulfate	10.06	0.19	1.0	10	0	101	90-110	0			

LCS		Sample ID: MLCCV/LCS-C-R386658A				Units: mg/L		Analysis Date: 10/26/2023 06:44 PM			
Client ID:		Run ID: IC4_231026A				SeqNo: 10135960		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.613	0.31	1.0	10	0	96.1	88-110	0			
Sulfate	10.08	0.19	1.0	10	0	101	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101047
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: R386658A Instrument ID IC4 Method: SW9056A

MS					Sample ID: 23101047-01B MS				Units: mg/L			Analysis Date: 10/26/2023 03:59 PM		
Client ID: SMMS-MW-5-101023				Run ID: IC4_231026A				SeqNo: 10135943		Prep Date:			DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual			
Chloride	140.5	3.1	10	100	44.72	95.8	88-110	0						
Sulfate	233.7	1.9	10	100	131	103	90-110	0			E			

MSD					Sample ID: 23101047-01B MSD				Units: mg/L			Analysis Date: 10/26/2023 04:08 PM			
Client ID: SMMS-MW-5-101023					Run ID: IC4_231026A				SeqNo: 10135944			Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual				
Chloride	141.8	3.1	10	100	44.72	97.1	88-110	140.5	0.947	15					
Sulfate	236.3	1.9	10	100	131	105	90-110	233.7	1.12	15	E				

The following samples were analyzed in this batch:	23101047-01B	23101047-02B	23101047-03B
	23101047-04B	23101047-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

October 26, 2023

Jodi Blouw
ALS Group USA, Corp
3352 128th Ave
Holland, Michigan 49424

Re: Holland - Blouw L2
Work Order: 641360

Dear Jodi Blouw:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 14, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4422.

Sincerely,



Jacob Crook
Project Manager

Purchase Order: 20-23101047
Chain of Custody: 24147
Enclosures



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSE001 ALS Environmental

Client SDG: 641360 GEL Work Order: 641360

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Jacob Crook.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Report Date: October 26, 2023

Client Sample ID: SMMS-MW-5-101023
Sample ID: 641360001
Matrix: Ground Water
Collect Date: 10-OCT-23
Receive Date: 14-OCT-23
Collector: Client

Project: ALSE00923
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.700	+/-1.08	1.87	+/-1.09	3.00	pCi/L			JE1	10/19/23	1037	2509206	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.326	+/-0.302	0.446	+/-0.312	1.00	pCi/L			LXP1	10/26/23	1022	2508816	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2509206	72	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Client Sample ID: SMMS-MW-6-101023

Sample ID: 641360002

Matrix: Ground Water

Collect Date: 10-OCT-23

Receive Date: 14-OCT-23

Collector: Client

Report Date: October 26, 2023

Project: ALSE00923

Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.934	+/-0.903	1.47	+/-0.934	3.00	pCi/L			JE1	10/19/23	1038	2509206	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.514	+/-0.349	0.393	+/-0.357	1.00	pCi/L			LXP1	10/26/23	1022	2508816	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2509206	74.1	(15%-125%)

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Client Sample ID: SMMS-MW-99B-101023

Sample ID: 641360003

Matrix: Ground Water

Collect Date: 10-OCT-23

Receive Date: 14-OCT-23

Collector: Client

Report Date: October 26, 2023

Project: ALSE00923

Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.981	+/-0.851	1.35	+/-0.887	3.00	pCi/L			JE1	10/19/23	1038	2509206	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.569	+/-0.465	0.694	+/-0.478	1.00	pCi/L			LXP1	10/26/23	1022	2508816	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2509206	78.9	(15%-125%)

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: October 26, 2023

Page 1 of 2

Client : ALS Group USA, Corp
3352 128th Ave

Holland, Michigan

Contact: Jodi Blouw

Workorder: 641360

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2509206										
QC1205547711	641080001	DUP									
Radium-228		U	1.48	2.36	pCi/L	46.3		(0% - 100%)	JE1	10/19/23	10:36
		Uncert:	+/-1.48	+/-1.16							
		TPU:	+/-1.53	+/-1.30							
QC1205547712	LCS										
Radium-228	77.9			70.6	pCi/L		90.6	(75%-125%)	JE1	10/19/23	10:36
		Uncert:		+/-4.16							
		TPU:		+/-18.5							
QC1205547710	MB										
Radium-228		U		-0.898	pCi/L				JE1	10/19/23	10:36
		Uncert:		+/-1.11							
		TPU:		+/-1.11							
Rad Ra-226											
Batch	2508816										
QC1205546790	640509001	DUP									
Radium-226			0.783	0.531	pCi/L	38.3		(0% - 100%)	LXP1	10/26/23	10:22
		Uncert:	+/-0.407	+/-0.315							
		TPU:	+/-0.447	+/-0.325							
QC1205546792	LCS										
Radium-226	26.9			33.2	pCi/L		123	(75%-125%)	LXP1	10/26/23	10:57
		Uncert:		+/-2.56							
		TPU:		+/-5.63							
QC1205546789	MB										
Radium-226		U		0.306	pCi/L				LXP1	10/26/23	10:22
		Uncert:		+/-0.284							
		TPU:		+/-0.291							
QC1205546791	640509001	MS									
Radium-226	131		0.783	154	pCi/L		117	(75%-125%)	LXP1	10/26/23	10:22
		Uncert:	+/-0.407	+/-11.7							
		TPU:	+/-0.447	+/-31.1							

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 641360

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI	Gamma Spectroscopy--Uncertain identification									
BD	Results are either below the MDC or tracer recovery is low									
h	Preparation or preservation holding time was exceeded									
R	Sample results are rejected									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
N/A	RPD or %Recovery limits do not apply.									
ND	Analyte concentration is not detected above the detection limit									
M	M if above MDC and less than LLD									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
FA	Failed analysis.									
UJ	Gamma Spectroscopy--Uncertain identification									
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.									
N1	See case narrative									
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.									
**	Analyte is a Tracer compound									
M	REMP Result > MDC/CL and < RDL									
J	See case narrative for an explanation									

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

641360



Subcontractor:
GEL Laboratories, LLC
2040 Savage Rd
Charleston, SC 29407

TEL: (843) 556-8171
FAX: (843) 766-1178
Acct #:

CHAIN-OF-CUSTODY RECORD

Date: 12-Oct-23
COC ID: 24147
Due Date: 02-Nov-23

Page 1 of 1

Customer Information		Project Information		Parameter/Method Request for Analysis												
Purchase Order	23101047	Project Name	23101047	A Ra226, Ra228 by 903/904												
Work Order		Project Number		B												
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C												
Send Report To	Jodi Blouw	Inv Attn	Accounts Payable	D												
Address	3352 128th Ave	Address	3352 128th Ave	E												
				F												
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	G												
Phone	(616) 399-6070	Phone	(616) 399-6070	H												
Fax	(616) 399-6185	Fax	(616) 399-6185	I												
eMail Address	jodi.blouw@alsglobal.com	eMail CC		J												
ALS Sample ID	Client Sample ID	Matrix	Collection Date	Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J	
23101047-01A	SMMS-MW-5-101023	Groundwater	10/Oct/2023	10:17	(2) 1LPNEAT	X										
23101047-02A	SMMS-MW-6-101023	Groundwater	10/Oct/2023	11:07	(2) 1LPNEAT	X										
23101047-03A	SMMS-M-99B-101023	Groundwater	10/Oct/2023	12:00	(2) 1LPNEAT	X										

Comments:

Please analyze enclosed samples for Radium 226 and Radium 228. Thank you.

Relinquished by: *[Signature]* Date/Time: 10-12-23 9:00 PM Received by: *[Signature]* Date/Time: 10/14/23 9:15

Report/QC Level

Std

Cooler IDs

Relinquished by:

Date/Time

Received by:

Date/Time

SAMPLE RECEIPT & REVIEW FORM

JK

Client: <u>ALSE</u>		SDG/AR/COC/Work Order: <u>641360</u>	
Received By: <u>Thyasia Tatum JW</u>		Date Received: <u>10/14/23</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>TRACKING TAG LOST - NOT ON COOLER AT ARRIVAL</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
A) Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___	
B) Did the client designate the samples to be received as radioactive?	<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.	
C) Did the RSO classify the samples as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>00</u> CPM/Am/Hr Classified as: Rad 1 Rad 2 Rad 3	
D) Did the client designate samples are hazardous?	<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.	
E) Did the RSO identify possible hazards?	<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>6</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR2-23</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials AM Date 10/17/23 Page 1 of 1

PURCHASE ORDER

The following number must appear on all related correspondence, shipping papers, and invoices:

P.O. NUMBER: 20-23101047

To: GEL Laboratories, LLC
Jake Crook
2040 Savage Rd
Charleston, SC 29407
Ph: (843) 556-8171 Fax: (843) 766-1178

Bill To: **ALS Group USA, Corp**
10450 Stancliff Rd, Suite 210
Houston, TX 77099
TEL 281-530-5656 FAX 281-530-5887

Ship To: ALS Group, USA
3352 128th Ave
Holland, Michigan 49424
TEL (616) 399-6070 FAX (616) 399-6185

Acct #:

P.O. DATE	REQUISITIONER	Ship VIA	Department	TERMS
10/12/2023	jblouw	FedEx Ground	Z-SUB	NET 30

Item	Catalog No.	QTY	Unit Price	Total Price
Radium 226,228	DOE EML HASL 30	3	\$216.00	\$648.00

Comments: 23101047

Sales Tax:	\$0.00
Shipping/Handling:	\$0.00
Other:	\$0.00

OrderAmount: \$648.00

Authorized by

Date

ALS Group USA, Corp
Part of the **ALS Laboratory Group**
A Campbell Brothers Limited Company

List of current GEL Certifications as of 26 October 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-00651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	KY90129
Kentucky Wastewater	KY90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2023019
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122024-04
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2023-152
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-23-21
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

**Radiochemistry
Technical Case Narrative
ALS Environmental
SDG #: 641360**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2509206

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
641360001	SMMS-MW-5-101023
641360002	SMMS-MW-6-101023
641360003	SMMS-MW-99B-101023
1205547710	Method Blank (MB)
1205547711	641080001(Pine Ridge) Sample Duplicate (DUP)
1205547712	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Samples 641360001 (SMMS-MW-5-101023), 641360002 (SMMS-MW-6-101023) and 641360003 (SMMS-MW-99B-101023) were non-homogenous matrix.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2508816

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
641360001	SMMS-MW-5-101023
641360002	SMMS-MW-6-101023
641360003	SMMS-MW-99B-101023
1205546789	Method Blank (MB)
1205546790	640509001(NonSDG) Sample Duplicate (DUP)
1205546791	640509001(NonSDG) Matrix Spike (MS)
1205546792	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Samples were non-homogenous matrix.

Miscellaneous Information

Additional Comments

The matrix spike, 1205546791 (Non SDG 640509001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.



Ref 210311

CHAIN OF CUSTODY RECORD/LABORATORY ANALYSIS
REQUEST FORM

REF.# 502122



Project Name: Sammis 2023 Sampling
Project Number: SMMS-1004-23
Laboratory: ALS
Shipment Method: FEDEX
Program: Sammis 2023 2SA Sampling

Company: Field & Technical Services
Address: 200 Third Avenue
Carnegie, PA 15106
(412) 279-3363

Client: ETEM
Contact: slindquist.2006@f-ts.com

Sample Date	Sample Time	Matrix	Sample Identification	Analysis	903_904-Radium 226&228	2320B_9056A-2540C	6020B_7470A-Total Metals												
				Preservative	None	None	HNO3												
				Total Bottle Count															Notes:
10/10/2023	1017	GW	SMMS-MW-5-101023	4	2	1	1												
10/10/2023	1107	GW	SMMS-MW-6-101023	4	2	1	1												
10/10/2023	1200	GW	SMMS-M-99B-101023	4	2	1	1												
10/10/2023	1219	GW	SMMS-P-1-101023	2	0	1	1												
10/10/2023	1307	GW	SMMS-MW-11D-101023	2	0	1	1												

23101047

ETEM: ETEM
Project: Sammis 2023 Sampling

Relinquished by:	Received by:	Relinquished by:	Received by:	Turnaround Requirements
	Signature:	Signature:	Signature:	<input type="checkbox"/> Rush <input checked="" type="checkbox"/> Standard
Printed Name: Shane Lindquist	Printed Name: Kirk Mechlin	Printed Name: Kirk Mechlin	Printed Name: Weston Kotick	
Firm: FTS	Firm: ALS	Firm: ALS	Firm: ALS-HOLLAND	
Date/Time: 10/10/2023 10:55	Date/Time: 10-10-23 1625	Date/Time: 10-10-23 1700	Date/Time: 10/11/23 900	

ALS Group, USA

Holland, Michigan

Sample Receipt Checklist

Client Name: **ETEM**

Date/Time Received: **11-Oct-23 09:00**

Work Order: **23101047**

Received by: **WSK**

Checklist completed by Wiston Kotecki
eSignature

11-Oct-23
Date

Reviewed by: Jodi Blauw
eSignature

12-Oct-23
Date

Matrices: **Groundwater**

Carrier name: **FedEx**

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☒

No ☐

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Container/Temp Blank temperature in compliance?

Yes ☒

No ☐

Sample(s) received on ice?

Yes ☒

No ☐

Temperature(s)/Thermometer(s):

2.3/2.3C

DF2

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

10/11/2023 3:04:26 PM

Water - VOA vials have zero headspace?

Yes ☐

No ☐

No VOA vials submitted ☒

Water - pH acceptable upon receipt?

Yes ☒

No ☐

N/A ☐

pH adjusted?

Yes ☐

No ☒

N/A ☐

pH adjusted by:

-

Login Notes: **pH checked <2**

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



07-Nov-2023

Brian Spahlinger
ETEM
200 Third Ave.
Carnegie, PA 15106

Re: **Sammis 2023 Sampling**

Work Order: **23101053**

Dear Brian,

ALS Environmental received 8 samples on 11-Oct-2023 09:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 43.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

Certificate No: OH: 87783

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Client: ETEM
Project: Sammis 2023 Sampling
Work Order: 23101053

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
23101053-01	SMMS-MW-3-101023	Groundwater		10/10/2023 10:10	10/11/2023 09:00	<input type="checkbox"/>
23101053-02	SMMS-MW-2-101023	Groundwater		10/10/2023 11:05	10/11/2023 09:00	<input type="checkbox"/>
23101053-03	SMMS-MW-1-101023	Groundwater		10/10/2023 12:02	10/11/2023 09:00	<input type="checkbox"/>
23101053-04	SMMS-MW-14S-101023	Groundwater		10/10/2023 12:52	10/11/2023 09:00	<input type="checkbox"/>
23101053-05	SMMS-MW-99A-101023	Groundwater		10/10/2023 13:00	10/11/2023 09:00	<input type="checkbox"/>
23101053-06	SMMS-MW-12S FB-101023	Groundwater		10/10/2023 14:23	10/11/2023 09:00	<input type="checkbox"/>
23101053-07	SMMS-MW-12S-101023	Groundwater		10/10/2023 14:23	10/11/2023 09:00	<input type="checkbox"/>
23101053-08	SMMS-MW-13S-101023	Groundwater		10/10/2023 15:10	10/11/2023 09:00	<input type="checkbox"/>

Client: ETEM
Project: Sammis 2023 Sampling
WorkOrder: 23101053

QUALIFIERS,
ACRONYMS, UNITS

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
as noted	
mg/L	Milligrams per Liter

Client: ETEM
Project: Sammis 2023 Sampling
Work Order: 23101053

Case Narrative

Samples for the above noted Work Order were received on 10/11/2023. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:

No deviations or anomalies were noted.

Wet Chemistry:

No deviations or anomalies were noted.

Client:	ETEM		
Project:	Sammis 2023 Sampling	Work Order:	23101053
Sample ID:	SMMS-MW-3-101023	Lab ID:	23101053-01
Collection Date:	10/10/2023 10:10 AM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:03
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:23
Arsenic	0.00028	J	0.00019	0.0050	mg/L	1	10/25/2023 19:23
Barium	0.030		0.00057	0.0050	mg/L	1	10/25/2023 19:23
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:23
Boron	0.076		0.015	0.020	mg/L	1	10/25/2023 19:23
Cadmium	U		0.00014	0.0020	mg/L	1	10/25/2023 19:23
Calcium	39		0.22	0.50	mg/L	1	10/25/2023 19:23
Chromium	U		0.00061	0.0050	mg/L	1	10/25/2023 19:23
Cobalt	U		0.00027	0.0050	mg/L	1	10/25/2023 19:23
Lead	U		0.00022	0.0050	mg/L	1	10/25/2023 19:23
Lithium	0.0021	J	0.0017	0.010	mg/L	1	10/25/2023 19:23
Magnesium	8.8		0.037	0.20	mg/L	1	10/25/2023 19:23
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:23
Potassium	2.3		0.034	0.20	mg/L	1	10/25/2023 19:23
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:38
Sodium	24		0.13	0.20	mg/L	1	10/25/2023 19:23
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:23
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:23
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	107		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	29.3		1.2	4.0	mg/L	4	10/26/2023 17:36
Fluoride	0.123		0.067	0.10	mg/L	1	10/25/2023 17:51
Sulfate	49.3		0.76	4.0	mg/L	4	10/26/2023 17:36
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/13/23	Analyst: LAD
Total Dissolved Solids	200		37	50	mg/L	1	10/16/2023 14:02
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 Sampling	Work Order:	23101053
Sample ID:	SMMS-MW-2-101023	Lab ID:	23101053-02
Collection Date:	10/10/2023 11:05 AM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:05
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:25
Arsenic	0.00032	J	0.00019	0.0050	mg/L	1	10/25/2023 19:25
Barium	0.030		0.00057	0.0050	mg/L	1	10/25/2023 19:25
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:25
Boron	0.065		0.015	0.020	mg/L	1	10/25/2023 19:25
Cadmium	U		0.00014	0.0020	mg/L	1	10/25/2023 19:25
Calcium	39		0.22	0.50	mg/L	1	10/25/2023 19:25
Chromium	0.00063	J	0.00061	0.0050	mg/L	1	10/25/2023 19:25
Cobalt	U		0.00027	0.0050	mg/L	1	10/25/2023 19:25
Lead	0.00044	J	0.00022	0.0050	mg/L	1	10/25/2023 19:25
Lithium	U		0.0017	0.010	mg/L	1	10/25/2023 19:25
Magnesium	8.8		0.037	0.20	mg/L	1	10/25/2023 19:25
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:25
Potassium	2.3		0.034	0.20	mg/L	1	10/25/2023 19:25
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:39
Sodium	24		0.13	0.20	mg/L	1	10/25/2023 19:25
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:25
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:25
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	113		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	28.3		1.2	4.0	mg/L	4	10/26/2023 17:46
Fluoride	0.134		0.067	0.10	mg/L	1	10/25/2023 18:01
Sulfate	49.4		0.76	4.0	mg/L	4	10/26/2023 17:46
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	260		37	50	mg/L	1	10/18/2023 13:37
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: ETEM
 Project: Sammis 2023 Sampling
 Sample ID: SMMS-MW-1-101023
 Collection Date: 10/10/2023 12:02 PM

Work Order: 23101053
 Lab ID: 23101053-03
 Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:13
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:27
Arsenic	0.0041	J	0.00019	0.0050	mg/L	1	10/25/2023 19:27
Barium	0.072		0.00057	0.0050	mg/L	1	10/25/2023 19:27
Beryllium	0.00036	J	0.00013	0.0020	mg/L	1	10/25/2023 19:27
Boron	0.16		0.015	0.020	mg/L	1	10/25/2023 19:27
Cadmium	U		0.00014	0.0020	mg/L	1	10/25/2023 19:27
Calcium	42		0.22	0.50	mg/L	1	10/25/2023 19:27
Chromium	0.0094		0.00061	0.0050	mg/L	1	10/25/2023 19:27
Cobalt	0.0028	J	0.00027	0.0050	mg/L	1	10/25/2023 19:27
Lead	0.0045	J	0.00022	0.0050	mg/L	1	10/25/2023 19:27
Lithium	0.0086	J	0.0017	0.010	mg/L	1	10/25/2023 19:27
Magnesium	9.1		0.037	0.20	mg/L	1	10/25/2023 19:27
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:27
Potassium	4.5		0.034	0.20	mg/L	1	10/25/2023 19:27
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:41
Sodium	25		0.13	0.20	mg/L	1	10/25/2023 19:27
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:27
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:27
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	107		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	27.6		1.2	4.0	mg/L	4	10/26/2023 17:56
Fluoride	0.249		0.067	0.10	mg/L	1	10/25/2023 18:10
Sulfate	51.2		0.76	4.0	mg/L	4	10/26/2023 17:56
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	260		37	50	mg/L	1	10/18/2023 13:37
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 Sampling	Work Order:	23101053
Sample ID:	SMMS-MW-14S-101023	Lab ID:	23101053-04
Collection Date:	10/10/2023 12:52 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:15
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:28
Arsenic	0.00029	J	0.00019	0.0050	mg/L	1	10/25/2023 19:28
Barium	0.034		0.00057	0.0050	mg/L	1	10/25/2023 19:28
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:28
Boron	0.064		0.015	0.020	mg/L	1	10/25/2023 19:28
Cadmium	U		0.00014	0.0020	mg/L	1	10/25/2023 19:28
Calcium	60		0.22	0.50	mg/L	1	10/25/2023 19:28
Chromium	U		0.00061	0.0050	mg/L	1	10/25/2023 19:28
Cobalt	0.00048	J	0.00027	0.0050	mg/L	1	10/25/2023 19:28
Lead	U		0.00022	0.0050	mg/L	1	10/25/2023 19:28
Lithium	0.0032	J	0.0017	0.010	mg/L	1	10/25/2023 19:28
Magnesium	11		0.037	0.20	mg/L	1	10/25/2023 19:28
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:28
Potassium	2.5		0.034	0.20	mg/L	1	10/25/2023 19:28
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:46
Sodium	33		0.13	0.20	mg/L	1	10/25/2023 19:28
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:28
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:28
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	136		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	40.4		3.1	10	mg/L	10	10/26/2023 18:06
Fluoride	0.227		0.067	0.10	mg/L	1	10/25/2023 18:20
Sulfate	79.4		1.9	10	mg/L	10	10/26/2023 18:06
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	340		37	50	mg/L	1	10/18/2023 13:37

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM	Work Order:	23101053
Project:	Sammis 2023 Sampling	Lab ID:	23101053-05
Sample ID:	SMMS-MW-99A-101023	Matrix:	GROUNDWATER
Collection Date:	10/10/2023 01:00 PM		

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:16
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:30
Arsenic	0.00026	J	0.00019	0.0050	mg/L	1	10/25/2023 19:30
Barium	0.030		0.00057	0.0050	mg/L	1	10/25/2023 19:30
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:30
Boron	0.074		0.015	0.020	mg/L	1	10/25/2023 19:30
Cadmium	U		0.00014	0.0020	mg/L	1	10/25/2023 19:30
Calcium	40		0.22	0.50	mg/L	1	10/25/2023 19:30
Chromium	U		0.00061	0.0050	mg/L	1	10/25/2023 19:30
Cobalt	U		0.00027	0.0050	mg/L	1	10/25/2023 19:30
Lead	U		0.00022	0.0050	mg/L	1	10/25/2023 19:30
Lithium	0.0020	J	0.0017	0.010	mg/L	1	10/25/2023 19:30
Magnesium	8.9		0.037	0.20	mg/L	1	10/25/2023 19:30
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:30
Potassium	2.3		0.034	0.20	mg/L	1	10/25/2023 19:30
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:48
Sodium	24		0.13	0.20	mg/L	1	10/25/2023 19:30
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:30
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:30
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	110		8.4	10	mg/L	1	10/21/2023 13:46
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	28.3		1.2	4.0	mg/L	4	10/26/2023 18:15
Fluoride	0.132		0.067	0.10	mg/L	1	10/25/2023 18:30
Sulfate	48.6		0.76	4.0	mg/L	4	10/26/2023 18:15
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	250		37	50	mg/L	1	10/18/2023 13:37
SUBCONTRACTED ANALYSES							
			Method: SUBCONTRACT				Analyst: GEL
Subcontracted Analyses	See attached		0		as noted	1	11/2/2023

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 Sampling	Work Order:	23101053
Sample ID:	SMMS-MW-12S FB-101023	Lab ID:	23101053-06
Collection Date:	10/10/2023 02:23 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:18
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:32
Arsenic	U		0.00019	0.0050	mg/L	1	10/25/2023 19:32
Barium	U		0.00057	0.0050	mg/L	1	10/25/2023 19:32
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:32
Boron	U		0.015	0.020	mg/L	1	10/25/2023 19:32
Cadmium	U		0.00014	0.0020	mg/L	1	10/25/2023 19:32
Calcium	U		0.22	0.50	mg/L	1	10/25/2023 19:32
Chromium	U		0.00061	0.0050	mg/L	1	10/25/2023 19:32
Cobalt	U		0.00027	0.0050	mg/L	1	10/25/2023 19:32
Lead	U		0.00022	0.0050	mg/L	1	10/25/2023 19:32
Lithium	U		0.0017	0.010	mg/L	1	10/25/2023 19:32
Magnesium	U		0.037	0.20	mg/L	1	10/25/2023 19:32
Molybdenum	U		0.00033	0.0050	mg/L	1	10/25/2023 19:32
Potassium	U		0.034	0.20	mg/L	1	10/25/2023 19:32
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:49
Sodium	0.29		0.13	0.20	mg/L	1	10/25/2023 19:32
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:32
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:32
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	11.4		8.4	10	mg/L	1	10/21/2023 16:21
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	U		0.31	1.0	mg/L	1	10/25/2023 20:37
Fluoride	U		0.067	0.10	mg/L	1	10/25/2023 20:37
Sulfate	U		0.19	1.0	mg/L	1	10/25/2023 20:37
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	U		22	30	mg/L	1	10/18/2023 13:56

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 Sampling	Work Order:	23101053
Sample ID:	SMMS-MW-12S-101023	Lab ID:	23101053-07
Collection Date:	10/10/2023 02:23 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:20
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:33
Arsenic	0.024		0.00019	0.0050	mg/L	1	10/25/2023 19:33
Barium	0.022		0.00057	0.0050	mg/L	1	10/25/2023 19:33
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:33
Boron	0.16		0.015	0.020	mg/L	1	10/25/2023 19:33
Cadmium	0.0035		0.00014	0.0020	mg/L	1	10/25/2023 19:33
Calcium	130		0.22	0.50	mg/L	1	10/25/2023 19:33
Chromium	0.00062	J	0.00061	0.0050	mg/L	1	10/25/2023 19:33
Cobalt	0.019		0.00027	0.0050	mg/L	1	10/25/2023 19:33
Lead	0.00025	J	0.00022	0.0050	mg/L	1	10/25/2023 19:33
Lithium	0.013		0.0017	0.010	mg/L	1	10/25/2023 19:33
Magnesium	24		0.037	0.20	mg/L	1	10/25/2023 19:33
Molybdenum	0.0011	J	0.00033	0.0050	mg/L	1	10/25/2023 19:33
Potassium	3.0		0.034	0.20	mg/L	1	10/25/2023 19:33
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:51
Sodium	65		0.13	0.20	mg/L	1	10/25/2023 19:33
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:33
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:33
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	138		8.4	10	mg/L	1	10/21/2023 16:21
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	80.2		12	40	mg/L	40	10/26/2023 18:25
Fluoride	0.331		0.067	0.10	mg/L	1	10/25/2023 20:46
Sulfate	327		7.6	40	mg/L	40	10/26/2023 18:25
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	710		37	50	mg/L	1	10/18/2023 13:56

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 Sampling	Work Order:	23101053
Sample ID:	SMMS-MW-13S-101023	Lab ID:	23101053-08
Collection Date:	10/10/2023 03:10 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/12/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/12/2023 14:22
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/25/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/25/2023 19:35
Arsenic	0.041		0.00019	0.0050	mg/L	1	10/25/2023 19:35
Barium	0.15		0.00057	0.0050	mg/L	1	10/25/2023 19:35
Beryllium	U		0.00013	0.0020	mg/L	1	10/25/2023 19:35
Boron	0.12		0.015	0.020	mg/L	1	10/25/2023 19:35
Cadmium	0.0015	J	0.00014	0.0020	mg/L	1	10/25/2023 19:35
Calcium	140		0.22	0.50	mg/L	1	10/25/2023 19:35
Chromium	U		0.00061	0.0050	mg/L	1	10/25/2023 19:35
Cobalt	0.0026	J	0.00027	0.0050	mg/L	1	10/25/2023 19:35
Lead	0.00054	J	0.00022	0.0050	mg/L	1	10/25/2023 19:35
Lithium	0.0079	J	0.0017	0.010	mg/L	1	10/25/2023 19:35
Magnesium	25		0.037	0.20	mg/L	1	10/25/2023 19:35
Molybdenum	0.0029	J	0.00033	0.0050	mg/L	1	10/25/2023 19:35
Potassium	2.1		0.034	0.20	mg/L	1	10/25/2023 19:35
Selenium	U		0.00048	0.0050	mg/L	1	10/26/2023 13:52
Sodium	55		0.13	0.20	mg/L	1	10/25/2023 19:35
Thallium	U		0.00015	0.0050	mg/L	1	10/25/2023 19:35
Tin	U		0.0013	0.0020	mg/L	1	10/25/2023 19:35
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	190		8.4	10	mg/L	1	10/21/2023 16:21
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	83.4		12	40	mg/L	40	10/26/2023 18:35
Fluoride	U		0.067	0.10	mg/L	1	10/25/2023 20:56
Sulfate	272		7.6	40	mg/L	40	10/26/2023 18:35
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/16/23	Analyst: LAD
Total Dissolved Solids	660		37	50	mg/L	1	10/18/2023 13:56

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: 227191

Instrument ID HG5

Method: SW7470A

MBLK		Sample ID: MBLK-227191-227191					Units: mg/L		Analysis Date: 10/12/2023 01:36 PM			
Client ID:		Run ID: HG5_231012A				SeqNo: 10080065		Prep Date: 10/12/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	U	0.00016	0.00020									

LCS		Sample ID: LCS-227191-227191					Units: mg/L		Analysis Date: 10/12/2023 01:37 PM			
Client ID:		Run ID: HG5_231012A				SeqNo: 10080066		Prep Date: 10/12/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	0.00204	0.00016	0.00020	0.002	0	102	80-120		0			

MS		Sample ID: 23101047-01CMS					Units: mg/L		Analysis Date: 10/12/2023 01:52 PM			
Client ID:		Run ID: HG5_231012A				SeqNo: 10080074		Prep Date: 10/12/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	0.002145	0.00016	0.00020	0.002	0.0000465	105	75-125		0			

MSD		Sample ID: 23101047-01CMSD					Units: mg/L		Analysis Date: 10/12/2023 01:54 PM			
Client ID:		Run ID: HG5_231012A				SeqNo: 10080075		Prep Date: 10/12/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	0.00213	0.00016	0.00020	0.002	0.0000465	104	75-125	0.002145	0.702	20		

The following samples were analyzed in this batch:

23101053-01C	23101053-02C	23101053-03C
23101053-04C	23101053-05C	23101053-06C
23101053-07C	23101053-08C	

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 228023 Instrument ID ICPMS3 Method: SW6020B

MBLK		Sample ID: MBLK-228023-228023				Units: mg/L		Analysis Date: 10/25/2023 07:06 PM			
Client ID:		Run ID: ICPMS3_231025A				SeqNo: 10128883		Prep Date: 10/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	0.0002904	0.00022	0.0050								J
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	U	0.034	0.20								
Sodium	0.1684	0.13	0.20								J
Thallium	U	0.00015	0.0050								
Tin	U	0.0013	0.0020								

MBLK		Sample ID: MBLK-228023-228023				Units: mg/L		Analysis Date: 10/26/2023 01:26 PM			
Client ID:		Run ID: ICPMS3_231026A				SeqNo: 10134032		Prep Date: 10/25/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	U	0.00048	0.0050								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 228023 Instrument ID ICPMS3 Method: SW6020B

LCS					Sample ID: LCS-228023-228023			Units: mg/L		Analysis Date: 10/25/2023 07:08 PM		
Client ID:					Run ID: ICPMS3_231025A			SeqNo: 10128884		Prep Date: 10/25/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.104	0.00042	0.0050	0.1	0	104	80-120	0				
Arsenic	0.09582	0.00019	0.0050	0.1	0	95.8	80-120	0				
Barium	0.09988	0.00057	0.0050	0.1	0	99.9	80-120	0				
Beryllium	0.1036	0.00013	0.0020	0.1	0	104	80-120	0				
Boron	0.526	0.015	0.020	0.5	0	105	80-120	0				
Cadmium	0.1033	0.00014	0.0020	0.1	0	103	80-120	0				
Calcium	10.25	0.22	0.50	10	0	103	80-120	0				
Chromium	0.09679	0.00061	0.0050	0.1	0	96.8	80-120	0				
Cobalt	0.09731	0.00027	0.0050	0.1	0	97.3	80-120	0				
Lead	0.09904	0.00022	0.0050	0.1	0	99	80-120	0				
Lithium	0.1005	0.0017	0.010	0.1	0	100	80-120	0				
Magnesium	10.17	0.037	0.20	10	0	102	80-120	0				
Molybdenum	0.09966	0.00033	0.0050	0.1	0	99.7	80-120	0				
Potassium	10.1	0.034	0.20	10	0	101	80-120	0				
Sodium	10.36	0.13	0.20	10	0	104	80-120	0				
Thallium	0.09114	0.00015	0.0050	0.1	0	91.1	80-120	0				
Tin	0.1029	0.0013	0.0020	0.1	0	103	80-120	0				

LCS					Sample ID: LCS-228023-228023			Units: mg/L		Analysis Date: 10/26/2023 01:27 PM		
Client ID:					Run ID: ICPMS3_231026A			SeqNo: 10134033		Prep Date: 10/25/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Selenium	0.09777	0.00048	0.0050	0.1	0	97.8	80-120	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: 228023

Instrument ID ICPMS3

Method: SW6020B

MS					Sample ID: 23101756-19AMS			Units: mg/L		Analysis Date: 10/25/2023 07:46 PM		
Client ID:			Run ID: ICPMS3_231025A			SeqNo: 10128905		Prep Date: 10/25/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1095	0.00042	0.0050	0.1	0.0000781	109	75-125	0				
Arsenic	0.1022	0.00019	0.0050	0.1	0.0004345	102	75-125	0				
Barium	0.1624	0.00057	0.0050	0.1	0.05793	104	75-125	0				
Beryllium	0.109	0.00013	0.0020	0.1	0.0000341	109	75-125	0				
Boron	1.38	0.015	0.020	0.5	0.835	109	75-125	0				
Cadmium	0.1064	0.00014	0.0020	0.1	0.0000957	106	75-125	0				
Calcium	122.7	0.22	0.50	10	117.7	49.6	75-125	0			SO	
Chromium	0.1022	0.00061	0.0050	0.1	0.0004356	102	75-125	0				
Cobalt	0.1006	0.00027	0.0050	0.1	0.0000924	101	75-125	0				
Lead	0.1051	0.00022	0.0050	0.1	0.001221	104	75-125	0				
Lithium	0.1067	0.0017	0.010	0.1	0.003034	104	75-125	0				
Magnesium	38.89	0.037	0.20	10	29.93	89.6	75-125	0				
Molybdenum	0.1061	0.00033	0.0050	0.1	-0.0000748	106	75-125	0				
Potassium	11.65	0.034	0.20	10	1.254	104	75-125	0				
Selenium	0.1016	0.00048	0.0050	0.1	0.0001562	101	75-125	0				
Sodium	33.42	0.13	0.20	10	23.68	97.4	75-125	0				
Thallium	0.09913	0.00015	0.0050	0.1	0.0000374	99.1	75-125	0				
Tin	0.109	0.0013	0.0020	0.1	0.0007898	108	75-125	0				

MSD					Sample ID: 23101756-19AMSD			Units: mg/L		Analysis Date: 10/25/2023 07:47 PM		
Client ID:			Run ID: ICPMS3_231025A			SeqNo: 10128906		Prep Date: 10/25/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1055	0.00042	0.0050	0.1	0.0000781	105	75-125	0.1095	3.66	20		
Arsenic	0.09954	0.00019	0.0050	0.1	0.0004345	99.1	75-125	0.1022	2.61	20		
Barium	0.1583	0.00057	0.0050	0.1	0.05793	100	75-125	0.1624	2.53	20		
Beryllium	0.1048	0.00013	0.0020	0.1	0.0000341	105	75-125	0.109	3.93	20		
Boron	1.361	0.015	0.020	0.5	0.835	105	75-125	1.38	1.43	20		
Cadmium	0.1021	0.00014	0.0020	0.1	0.0000957	102	75-125	0.1064	4.18	20		
Calcium	122.5	0.22	0.50	10	117.7	48.1	75-125	122.7	0.117	20	SO	
Chromium	0.09779	0.00061	0.0050	0.1	0.0004356	97.4	75-125	0.1022	4.37	20		
Cobalt	0.0964	0.00027	0.0050	0.1	0.0000924	96.3	75-125	0.1006	4.29	20		
Lead	0.1009	0.00022	0.0050	0.1	0.001221	99.7	75-125	0.1051	4.06	20		
Lithium	0.1024	0.0017	0.010	0.1	0.003034	99.4	75-125	0.1067	4.11	20		
Magnesium	38.62	0.037	0.20	10	29.93	86.9	75-125	38.89	0.714	20		
Molybdenum	0.1018	0.00033	0.0050	0.1	-0.0000748	102	75-125	0.1061	4.13	20		
Potassium	11.18	0.034	0.20	10	1.254	99.3	75-125	11.65	4.12	20		
Selenium	0.09775	0.00048	0.0050	0.1	0.0001562	97.6	75-125	0.1016	3.87	20		
Sodium	32.89	0.13	0.20	10	23.68	92.1	75-125	33.42	1.59	20		
Thallium	0.09641	0.00015	0.0050	0.1	0.0000374	96.4	75-125	0.09913	2.78	20		
Tin	0.1037	0.0013	0.0020	0.1	0.0007898	103	75-125	0.109	4.96	20		

Note:

See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: **228023** Instrument ID **ICPMS3** Method: **SW6020B**

The following samples were analyzed in this batch:

23101053-01C	23101053-02C	23101053-03C
23101053-04C	23101053-05C	23101053-06C
23101053-07C	23101053-08C	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227317 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227317-227317				Units: mg/L		Analysis Date: 10/16/2023 02:02 PM			
Client ID:		Run ID: TDS_231016B				SeqNo: 10090527		Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	U	22	30								

LCS		Sample ID: LCS-227317-227317				Units: mg/L		Analysis Date: 10/16/2023 02:02 PM			
Client ID:		Run ID: TDS_231016B				SeqNo: 10090526		Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	450	22	30	495	0	90.9	85-109	0			

DUP		Sample ID: 23101047-01B DUP				Units: mg/L		Analysis Date: 10/16/2023 02:02 PM			
Client ID:		Run ID: TDS_231016B				SeqNo: 10090520		Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	303.3	37	50	0	0	0	0-0	306.7	1.09	10	

The following samples were analyzed in this batch: 23101053-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227401 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227401-227401					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101432		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	U	22	30									

LCS		Sample ID: LCS-227401-227401					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101431		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	490	22	30	495	0	99	85-109	0				

DUP		Sample ID: 23101240-01A DUP					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101426		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	1387	74	100	0	0	0	0-0	1433	3.31	10		

DUP		Sample ID: 23101246-01A DUP					Units: mg/L		Analysis Date: 10/18/2023 01:37 PM			
Client ID:		Run ID: TDS_231018A					SeqNo: 10101429		Prep Date: 10/16/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	2140	74	100	0	0	0	0-0	2147	0.311	10		

The following samples were analyzed in this batch:

23101053-02B	23101053-03B	23101053-04B
23101053-05B		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: 227418 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227418-227418					Units: mg/L		Analysis Date: 10/18/2023 01:56 PM			
Client ID:		Run ID: TDS_231018B				SeqNo: 10101453		Prep Date: 10/16/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	U	22	30									

LCS		Sample ID: LCS-227418-227418					Units: mg/L		Analysis Date: 10/18/2023 01:56 PM			
Client ID:		Run ID: TDS_231018B				SeqNo: 10101452		Prep Date: 10/16/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	484	22	30	495	0	97.8	85-109	0				

DUP		Sample ID: 23101246-05A DUP					Units: mg/L		Analysis Date: 10/18/2023 01:56 PM			
Client ID:		Run ID: TDS_231018B				SeqNo: 10101444		Prep Date: 10/16/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	2167	74	100	0	0	0	0-0	2160	0.308	10		

DUP		Sample ID: 23101263-02A DUP					Units: mg/L		Analysis Date: 10/18/2023 01:56 PM			
Client ID:		Run ID: TDS_231018B				SeqNo: 10101451		Prep Date: 10/16/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	1893	74	100	0	0	0	0-0	1867	1.42	10		

The following samples were analyzed in this batch:

23101053-06B	23101053-07B	23101053-08B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386174 Instrument ID Titrator 1 Method: A2320 B-11

MBLK		Sample ID: MB-R386174-R386174				Units: mg/L			Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114157			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		U	8.4	10								

LCS		Sample ID: LCS-R386174-R386174				Units: mg/L			Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114158			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		996.7	8.4	10	1000	0	99.7	90-110	0			

DUP		Sample ID: 23101053-01B DUP				Units: mg/L			Analysis Date: 10/21/2023 01:46 PM			
Client ID: SMMS-MW-3-101023		Run ID: TITRATOR 1_231021B				SeqNo: 10114166			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		100.6	8.4	10	0	0	0	0-0	107.4	6.49	10	

DUP		Sample ID: 23101668-06A DUP				Units: mg/L			Analysis Date: 10/21/2023 01:46 PM			
Client ID:		Run ID: TITRATOR 1_231021B				SeqNo: 10114181			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		414.7	8.4	10	0	0	0	0-0	415.8	0.282	10	

The following samples were analyzed in this batch:	23101053-01B	23101053-02B	23101053-03B
	23101053-04B	23101053-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386177 Instrument ID Titrator 1 Method: A2320 B-11

MBLK		Sample ID: MB-R386177-R386177				Units: mg/L			Analysis Date: 10/21/2023 04:21 PM			
Client ID:		Run ID: TITRATOR 1_231021C				SeqNo: 10114218			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		U	8.4	10								

LCS		Sample ID: LCS-R386177-R386177				Units: mg/L			Analysis Date: 10/21/2023 04:21 PM			
Client ID:		Run ID: TITRATOR 1_231021C				SeqNo: 10114219			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		984.9	8.4	10	1000	0	98.5	90-110	0			

DUP		Sample ID: 23101719-03D DUP				Units: mg/L			Analysis Date: 10/21/2023 04:21 PM			
Client ID:		Run ID: TITRATOR 1_231021C				SeqNo: 10114231			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		371.4	8.4	10	0	0	0	0-0	382.9	3.04	10	

DUP		Sample ID: 23101765-01D DUP				Units: mg/L			Analysis Date: 10/21/2023 04:21 PM			
Client ID:		Run ID: TITRATOR 1_231021C				SeqNo: 10114241			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)		535.2	8.4	10	0	0	0	0-0	498.3	7.15	10	

The following samples were analyzed in this batch:

23101053-06B	23101053-07B	23101053-08B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386540A Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-A-R386540A				Units: mg/L		Analysis Date: 10/25/2023 11:49 A			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130212		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

MBLK		Sample ID: CCB/MBLK-B-R386540A				Units: mg/L		Analysis Date: 10/25/2023 04:52 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130224		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

MBLK		Sample ID: CCB/MBLK-C-R386540A				Units: mg/L		Analysis Date: 10/25/2023 06:49 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130236		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	U	0.067	0.10								

LCS		Sample ID: MLCCV/LCS-A-R386540A				Units: mg/L		Analysis Date: 10/25/2023 11:40 A			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130211		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	1.924	0.067	0.10	2	0	96.2	86-121	0			

LCS		Sample ID: MLCCV/LCS-B-R386540A				Units: mg/L		Analysis Date: 10/25/2023 04:43 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130223		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.112	0.067	0.10	2	0	106	86-121	0			

LCS		Sample ID: MLCCV/LCS-C-R386540A				Units: mg/L		Analysis Date: 10/25/2023 06:40 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130235		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.188	0.067	0.10	2	0	109	86-121	0			

The following samples were analyzed in this batch:	23101053-01B	23101053-02B	23101053-03B
	23101053-04B	23101053-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386540B Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-D-R386540B					Units: mg/L		Analysis Date: 10/25/2023 07:28 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130240		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Fluoride	U	0.067	0.10									
Sulfate	U	0.19	1.0									

MBLK		Sample ID: CCB/MBLK-E-R386540B					Units: mg/L		Analysis Date: 10/25/2023 09:15 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130254		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Fluoride	U	0.067	0.10									
Sulfate	U	0.19	1.0									

LCS		Sample ID: MLCCV/LCS-D-R386540B					Units: mg/L		Analysis Date: 10/25/2023 07:19 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130239		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.74	0.31	1.0	10	0	97.4	88-110	0				
Fluoride	2.102	0.067	0.10	2	0	105	86-121	0				
Sulfate	10.4	0.19	1.0	10	0	104	90-110	0				

LCS		Sample ID: MLCCV/LCS-E-R386540B					Units: mg/L		Analysis Date: 10/25/2023 09:06 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130253		Prep Date:		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.72	0.31	1.0	10	0	97.2	88-110	0				
Fluoride	2.186	0.067	0.10	2	0	109	86-121	0				
Sulfate	10.35	0.19	1.0	10	0	103	90-110	0				

MS		Sample ID: 23101854-01A MS					Units: mg/L		Analysis Date: 10/25/2023 07:48 PM			
Client ID:		Run ID: IC4_231025A				SeqNo: 10130242		Prep Date:		DF: 160		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	5557	50	160	1600	4128	89.3	88-110	0			E	
Fluoride	356.4	11	16	320	0	111	86-121	0				
Sulfate	2239	30	160	1600	645.1	99.6	90-110	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386540B Instrument ID IC4 Method: SW9056A

MSD		Sample ID: 23101854-01A MSD					Units: mg/L		Analysis Date: 10/25/2023 07:58 PM			
Client ID:			Run ID: IC4_231025A			SeqNo: 10130243		Prep Date:		DF: 160		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	5664	50	160	1600	4128	96	88-110	5557	1.9	15	E	
Fluoride	360.4	11	16	320	0	113	86-121	356.4	1.12	15		
Sulfate	2266	30	160	1600	645.1	101	90-110	2239	1.18	15		

The following samples were analyzed in this batch:

23101053-06B	23101053-07B	23101053-08B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386658A Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-A-R386658A					Units: mg/L		Analysis Date: 10/26/2023 11:51 A			
Client ID:		Run ID: IC4_231026A					SeqNo: 10135937		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Sulfate	U	0.19	1.0									

MBLK		Sample ID: CCB/MBLK-B-R386658A					Units: mg/L		Analysis Date: 10/26/2023 04:57 PM			
Client ID:		Run ID: IC4_231026A					SeqNo: 10135949		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Sulfate	U	0.19	1.0									

MBLK		Sample ID: CCB/MBLK-C-R386658A					Units: mg/L		Analysis Date: 10/26/2023 06:54 PM			
Client ID:		Run ID: IC4_231026A					SeqNo: 10135961		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	U	0.31	1.0									
Sulfate	U	0.19	1.0									

LCS		Sample ID: MLCCV/LCS-A-R386658A					Units: mg/L		Analysis Date: 10/26/2023 11:42 A			
Client ID:		Run ID: IC4_231026A					SeqNo: 10135936		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.767	0.31	1.0	10	0	97.7	88-110	0				
Sulfate	9.988	0.19	1.0	10	0	99.9	90-110	0				

LCS		Sample ID: MLCCV/LCS-B-R386658A					Units: mg/L		Analysis Date: 10/26/2023 04:48 PM			
Client ID:		Run ID: IC4_231026A					SeqNo: 10135948		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.648	0.31	1.0	10	0	96.5	88-110	0				
Sulfate	10.06	0.19	1.0	10	0	101	90-110	0				

LCS		Sample ID: MLCCV/LCS-C-R386658A					Units: mg/L		Analysis Date: 10/26/2023 06:44 PM			
Client ID:		Run ID: IC4_231026A					SeqNo: 10135960		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.613	0.31	1.0	10	0	96.1	88-110	0				
Sulfate	10.08	0.19	1.0	10	0	101	90-110	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101053
Project: Sammis 2023 Sampling

QC BATCH REPORT

Batch ID: R386658A Instrument ID IC4 Method: SW9056A

MS					Sample ID: 23101047-01B MS			Units: mg/L		Analysis Date: 10/26/2023 03:59 PM		
Client ID:					Run ID: IC4_231026A			SeqNo: 10135943		Prep Date:		DF: 10
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	140.5	3.1	10	100	44.72	95.8	88-110	0				
Sulfate	233.7	1.9	10	100	131	103	90-110	0			E	

MSD					Sample ID: 23101047-01B MSD			Units: mg/L		Analysis Date: 10/26/2023 04:08 PM		
Client ID:					Run ID: IC4_231026A			SeqNo: 10135944		Prep Date:		DF: 10
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	141.8	3.1	10	100	44.72	97.1	88-110	140.5	0.947	15		
Sulfate	236.3	1.9	10	100	131	105	90-110	233.7	1.12	15	E	

The following samples were analyzed in this batch:	23101053-01B	23101053-02B	23101053-03B
	23101053-04B	23101053-05B	23101053-07B
	23101053-08B		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

October 26, 2023

Jodi Blouw
ALS Group USA, Corp
3352 128th Ave
Holland, Michigan 49424

Re: Holland - Blouw L2
Work Order: 641359

Dear Jodi Blouw:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 14, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4422.

Sincerely,



Jacob Crook
Project Manager

Purchase Order: 20-23101053
Chain of Custody: 24148
Enclosures



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSE001 ALS Environmental

Client SDG: 641359 GEL Work Order: 641359

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Jacob Crook.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Report Date: October 26, 2023

Client Sample ID: SMMS-MW-3-101023
Sample ID: 641359001
Matrix: Ground Water
Collect Date: 10-OCT-23
Receive Date: 14-OCT-23
Collector: Client

Project: ALSE00923
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	1.56	+/-1.14	1.80	+/-1.21	3.00	pCi/L			JE1	10/19/23	1037	2509206	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.233	+/-0.323	0.559	+/-0.327	1.00	pCi/L			LXP1	10/26/23	0950	2508816	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2509206	82.9	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Client Sample ID: SMMS-MW-2-101023

Sample ID: 641359002

Matrix: Ground Water

Collect Date: 10-OCT-23

Receive Date: 14-OCT-23

Collector: Client

Report Date: October 26, 2023

Project: ALSE00923

Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	1.34	+/-1.11	1.77	+/-1.16	3.00	pCi/L			JE1	10/19/23	1037	2509206	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		2.03	+/-0.633	0.500	+/-0.802	1.00	pCi/L			LXP1	10/26/23	0950	2508816	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2509206	80.2	(15%-125%)

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Client Sample ID: SMMS-MW-1-101023

Sample ID: 641359003

Matrix: Ground Water

Collect Date: 10-OCT-23

Receive Date: 14-OCT-23

Collector: Client

Report Date: October 26, 2023

Project: ALSE00923

Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	0.703	+/-1.36	2.38	+/-1.37	3.00	pCi/L			JE1	10/19/23	1037	2509206	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.632	+/-0.415	0.538	+/-0.436	1.00	pCi/L			LXP1	10/26/23	0950	2508816	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2509206	77.8	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Client Sample ID: SMMS-MW-99A-101023

Sample ID: 641359004

Matrix: Ground Water

Collect Date: 10-OCT-23

Receive Date: 14-OCT-23

Collector: Client

Report Date: October 26, 2023

Project: ALSE00923

Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228	U	1.47	+/-1.14	1.80	+/-1.20	3.00	pCi/L			JE1	10/19/23	1037	2509206	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226	U	0.328	+/-0.372	0.605	+/-0.375	1.00	pCi/L			LXP1	10/26/23	0950	2508816	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2509206	76.7	(15%-125%)

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: October 26, 2023

Page 1 of 2

Client : ALS Group USA, Corp
3352 128th Ave

Holland, Michigan

Contact: Jodi Blouw

Workorder: 641359

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2509206										
QC1205547711	641080001	DUP									
Radium-228		U	1.48	2.36	pCi/L	46.3		(0% - 100%)	JE1	10/19/23	10:36
		Uncert:	+/-1.48	+/-1.16							
		TPU:	+/-1.53	+/-1.30							
QC1205547712	LCS										
Radium-228		77.9		70.6	pCi/L		90.6	(75%-125%)	JE1	10/19/23	10:36
		Uncert:		+/-4.16							
		TPU:		+/-18.5							
QC1205547710	MB										
Radium-228			U	-0.898	pCi/L				JE1	10/19/23	10:36
		Uncert:		+/-1.11							
		TPU:		+/-1.11							
Rad Ra-226											
Batch	2508816										
QC1205546790	640509001	DUP									
Radium-226			0.783	0.531	pCi/L	38.3		(0% - 100%)	LXP1	10/26/23	10:22
		Uncert:	+/-0.407	+/-0.315							
		TPU:	+/-0.447	+/-0.325							
QC1205546792	LCS										
Radium-226		26.9		33.2	pCi/L		123	(75%-125%)	LXP1	10/26/23	10:57
		Uncert:		+/-2.56							
		TPU:		+/-5.63							
QC1205546789	MB										
Radium-226			U	0.306	pCi/L				LXP1	10/26/23	10:22
		Uncert:		+/-0.284							
		TPU:		+/-0.291							
QC1205546791	640509001	MS									
Radium-226		131	0.783	154	pCi/L		117	(75%-125%)	LXP1	10/26/23	10:22
		Uncert:	+/-0.407	+/-11.7							
		TPU:	+/-0.447	+/-31.1							

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 641359

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI	Gamma Spectroscopy--Uncertain identification									
BD	Results are either below the MDC or tracer recovery is low									
h	Preparation or preservation holding time was exceeded									
R	Sample results are rejected									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
N/A	RPD or %Recovery limits do not apply.									
ND	Analyte concentration is not detected above the detection limit									
M	M if above MDC and less than LLD									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
FA	Failed analysis.									
UJ	Gamma Spectroscopy--Uncertain identification									
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.									
N1	See case narrative									
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.									
**	Analyte is a Tracer compound									
M	REMP Result > MDC/CL and < RDL									
J	See case narrative for an explanation									

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

641359

Subcontractor:
GEL Laboratories, LLC
2040 Savage Rd
Charleston, SC 29407



CHAIN-OF-CUSTODY RECORD

Date: 12-Oct-23
COC ID: 24148
Due Date: 02-Nov-23

Page 1 of 1

TEL: (843) 556-8171
FAX: (843) 766-1178
Acct #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order	23101053	Project Name	23101053	A	Ra226, Ra228 by 903/904
Work Order		Project Number		B	
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C	
Send Report To	Jodi Blouw	Inv Attn	Accounts Payable	D	
Address	3352 128th Ave	Address	3352 128th Ave	E	
				F	
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	G	
Phone	(616) 399-6070	Phone	(616) 399-6070	H	
Fax	(616) 399-6185	Fax	(616) 399-6185	I	
eMail Address	jodi.blouw@alsglobal.com	eMail CC		J	

ALS Sample ID	Client Sample ID	Matrix	Collection Date	24hr	Bottle	A	B	C	D	E	F	G	H	I	J
23101053-01A	SMMS-MW-3-101023	Groundwater	10/Oct/2023	10:10	(2) 1LPNEAT	X									
23101053-02A	SMMS-MW-2-101023	Groundwater	10/Oct/2023	11:05	(2) 1LPNEAT	X									
23101053-03A	SMMS-MW-1-101023	Groundwater	10/Oct/2023	12:02	(2) 1LPNEAT	X									
23101053-05A	SMMS-MW-99A-101023	Groundwater	10/Oct/2023	13:00	(2) 1LPNEAT	X									

Comments:

Please analyze enclosed samples for Radium 226 and Radium 228. Thank you.

Relinquished by: *[Signature]* Date/Time: 10-12-23 9:00
Received by: *[Signature]* Date/Time: 10/14/23 9:15

Relinquished by:	Date/Time	Received by:	Date/Time	Cooler IDs	Report/QC Level
					Std

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ALSE</u>		SDG/AR/COC/Work Order: <u>641359</u>	
Received By: <u>Thyasia Tatum JW</u>		Date Received: <u>10/14/23</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>TRACKING TAG LOST - NOT ON COOLER AT ARRIVAL</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
A) Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___	
B) Did the client designate the samples are to be received as radioactive?	<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.	
C) Did the RSO classify the samples as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>00</u> CPM /mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
D) Did the client designate samples are hazardous?	<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.	
E) Did the RSO identify possible hazards?	<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:	
Sample Receipt Criteria	Yes <input type="checkbox"/> NA <input checked="" type="checkbox"/> No <input type="checkbox"/>	Comments/Qualifiers (Required for Non-Conforming Items)	
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)	
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>6</u>	
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	Temperature Device Serial #: <u>IR2-23</u> Secondary Temperature Device Serial # (If Applicable):	
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)	
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#:	
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)	
		Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)	
		Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected:	
8 Samples received within holding time?	<input checked="" type="checkbox"/>	ID's and tests affected:	
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	ID's and containers affected:	
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)	
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)	
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>		
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)	
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials Am Date 10/17/23 Page 1 of 1

List of current GEL Certifications as of 26 October 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-00651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	KY90129
Kentucky Wastewater	KY90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2023019
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122024-04
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2023-152
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-23-21
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

**Radiochemistry
Technical Case Narrative
ALS Environmental
SDG #: 641359**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2509206

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
641359001	SMMS-MW-3-101023
641359002	SMMS-MW-2-101023
641359003	SMMS-MW-1-101023
641359004	SMMS-MW-99A-101023
1205547710	Method Blank (MB)
1205547711	641080001(Pine Ridge) Sample Duplicate (DUP)
1205547712	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Sample 641359003 (SMMS-MW-1-101023) was non-homogenous matrix.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2508816

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
641359001	SMMS-MW-3-101023
641359002	SMMS-MW-2-101023
641359003	SMMS-MW-1-101023
641359004	SMMS-MW-99A-101023
1205546789	Method Blank (MB)
1205546790	640509001(NonSDG) Sample Duplicate (DUP)
1205546791	640509001(NonSDG) Matrix Spike (MS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information**Homogenous Matrix**

Samples were non-homogenous matrix.

Miscellaneous Information**Additional Comments**

The matrix spike, 1205546791 (Non SDG 640509001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.



Ref 210311

CHAIN OF CUSTODY RECORD/LABORATORY ANALYSIS REQUEST FORM

REF.# 502022



Project Name: Sammis 2023 Sampling
Project Number: SMMS-1004-23
Laboratory: ALS
Shipment Method: FEDEX
Program: Sammis 2023 2SA Sampling

Company: Field & Technical Services
Address: 200 Third Avenue
Carnegie, PA 15106
(412) 279-3363

Client: ETEM
Contact: aslaubaugh.2006@f-ts.com

Sample Date	Sample Time	Matrix	Sample Identification	Analysis	2320B_9056A-2540C	903_904-Radium 226&228	6020B_7470A-Total Metals												
				Preservative	None	None	HNO3												
				Total Bottle Count															Notes:
10/10/2023	1010	GW	SMMS-MW-3-101023	4	1	2	1												
10/10/2023	1105	GW	SMMS-MW-2-101023	4	1	2	1												
10/10/2023	1202	GW	SMMS-MW-1-101023	4	1	2	1												
10/10/2023	1252	GW	SMMS-MW-14S-101023	2	1	0	1												
10/10/2023	1300	GW	SMMS-MW-99A-101023	4	1	2	1												
10/10/2023	1423	GW	SMMS-MW-12S FB-101023	2	1	0	1												
10/10/2023	1423	GW	SMMS-MW-12S-101023	2	1	0	1												
10/10/2023	1510	GW	SMMS-MW-13S-101023	2	1	0	1												



Relinquished by:	Received by:	Relinquished by:	Received by:	Turnaround Requirements
	Signature:	Signature:	Signature:	<input type="checkbox"/> Rush <input checked="" type="checkbox"/> Standard
Printed Name: Abigail Slaubaugh	Printed Name: Kirk Mechlin	Printed Name: Kirk Mechlin	Printed Name: Weston Kotecki	
Firm: FTS	Firm: ALS	Firm: ALS	Firm: ALS-HOLLAND	
Date/Time: 10/10/2023 1510	Date/Time: 10-10-23 1625	Date/Time: 10-10-23 1700	Date/Time: 10/11/23 900	

ALS Group, USA

Holland, Michigan

Sample Receipt Checklist

Client Name: **ETEM**

Date/Time Received: **11-Oct-23 09:00**

Work Order: **23101053**

Received by: **WSK**

Checklist completed by Wiston Kotecki
eSignature

11-Oct-23

Date

Reviewed by: Jodi Blauw
eSignature

12-Oct-23

Date

Matrices: **Groundwater**

Carrier name: **FedEx**

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☐

No ☐

Not Present ☒

Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☒

No ☐

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Container/Temp Blank temperature in compliance?

Yes ☒

No ☐

Sample(s) received on ice?

Yes ☒

No ☐

Temperature(s)/Thermometer(s):

2.3/2.3C

DF2

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

10/11/2023 3:11:39 PM

Water - VOA vials have zero headspace?

Yes ☐

No ☐

No VOA vials submitted ☒

Water - pH acceptable upon receipt?

Yes ☒

No ☐

N/A ☐

pH adjusted?

Yes ☐

No ☒

N/A ☐

pH adjusted by:

-

Login Notes: **pH checked <2**

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



20-Oct-2023

Brian Spahlinger
ETEM
200 Third Ave.
Carnegie, PA 15106

Re: **Sammis 2023 2SA Sampling**

Work Order: **23101123**

Dear Brian,

ALS Environmental received 5 samples on 12-Oct-2023 09:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 20.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

Certificate No: OH: 87783

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Client: ETEM
Project: Sammis 2023 2SA Sampling
Work Order: 23101123

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
23101123-01	SMMS-P-2-101123	Groundwater		10/11/2023 10:47	10/12/2023 09:00	<input type="checkbox"/>
23101123-02	SMMS-MW-13BR-101123	Groundwater		10/11/2023 11:58	10/12/2023 09:00	<input type="checkbox"/>
23101123-03	SMMS-FB-03-101123	Groundwater		10/11/2023 12:00	10/12/2023 09:00	<input type="checkbox"/>
23101123-04	SMMS-MW-11S-101123	Groundwater		10/11/2023 13:16	10/12/2023 09:00	<input type="checkbox"/>
23101123-05	SMMS-MW-10D-101123	Groundwater		10/11/2023 14:11	10/12/2023 09:00	<input type="checkbox"/>

Client: ETEM
Project: Sammis 2023 2SA Sampling
WorkOrder: 23101123

**QUALIFIERS,
ACRONYMS, UNITS**

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.
<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III
<u>Units Reported</u>	<u>Description</u>
mg/L	Milligrams per Liter

Client: ETEM
Project: Sammis 2023 2SA Sampling
Work Order: 23101123

Case Narrative

Samples for the above noted Work Order were received on 10/12/2023. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:

Batch 227307, Method SW6020B, Sample 23101123-05BMS: The MS recovery was outside of the control limit; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required for this analyte: Na

Batch 227307, Method SW6020B, Sample 23101123-05BMSSD: The MSD recovery was outside of the control limit; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required for this analyte: Mg

Batch 227307, Method SW6020B, Sample 23101123-05BMSSD: The MSD recovery was outside of the control limit; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required for this analyte: Na

No other deviations or anomalies were noted.

Wet Chemistry:

No deviations or anomalies were noted.

Client:	ETEM	Work Order:	23101123
Project:	Sammis 2023 2SA Sampling	Lab ID:	23101123-01
Sample ID:	SMMS-P-2-101123	Matrix:	GROUNDWATER
Collection Date:	10/11/2023 10:47 AM		

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			Method: SW7470A		Prep: SW7470 / 10/13/23	Analyst: KRA	
Mercury	U		0.00016	0.00020	mg/L	1	10/13/2023 15:33
METALS BY ICP-MS			Method: SW6020B		Prep: SW3015A / 10/13/23	Analyst: STP	
Antimony	U		0.00042	0.0050	mg/L	1	10/13/2023 21:46
Arsenic	U		0.00019	0.0050	mg/L	1	10/13/2023 21:46
Barium	0.024		0.00057	0.0050	mg/L	1	10/13/2023 21:46
Beryllium	U		0.00013	0.0020	mg/L	1	10/13/2023 21:46
Boron	0.057		0.015	0.020	mg/L	1	10/16/2023 14:50
Cadmium	U		0.00014	0.0020	mg/L	1	10/13/2023 21:46
Calcium	46		0.22	0.50	mg/L	1	10/13/2023 21:46
Chromium	U		0.00061	0.0050	mg/L	1	10/13/2023 21:46
Cobalt	0.00093	J	0.00027	0.0050	mg/L	1	10/13/2023 21:46
Lead	U		0.00022	0.0050	mg/L	1	10/13/2023 21:46
Lithium	0.0021	J	0.0017	0.010	mg/L	1	10/13/2023 21:46
Magnesium	10		0.037	0.20	mg/L	1	10/13/2023 21:46
Molybdenum	U		0.00033	0.0050	mg/L	1	10/13/2023 21:46
Potassium	2.4		0.034	0.20	mg/L	1	10/13/2023 21:46
Selenium	U		0.00048	0.0050	mg/L	1	10/13/2023 21:46
Sodium	32		0.13	0.20	mg/L	1	10/13/2023 21:46
Thallium	U		0.00015	0.0050	mg/L	1	10/13/2023 21:46
Tin	U		0.0013	0.0020	mg/L	1	10/13/2023 21:46
ALKALINITY			Method: A2320 B-11			Analyst: CLJ	
Alkalinity, Total (as CaCO3)	115		8.4	10	mg/L	1	10/15/2023 12:51
ANIONS BY ION CHROMATOGRAPHY			Method: SW9056A			Analyst: QTN	
Chloride	38.7		3.1	10	mg/L	10	10/16/2023 12:54
Fluoride	0.280		0.067	0.10	mg/L	1	10/16/2023 12:44
Sulfate	83.1		1.9	10	mg/L	10	10/16/2023 12:54
TOTAL DISSOLVED SOLIDS			Method: A2540 C-15		Prep: FILTER / 10/17/23	Analyst: LAD	
Total Dissolved Solids	280		37	50	mg/L	1	10/19/2023 13:11

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: ETEM
Project: Sammis 2023 2SA Sampling
Sample ID: SMMS-MW-13BR-101123
Collection Date: 10/11/2023 11:58 AM

Work Order: 23101123
Lab ID: 23101123-02
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/13/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/13/2023 15:39
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/13/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/13/2023 21:47
Arsenic	0.0026	J	0.00019	0.0050	mg/L	1	10/13/2023 21:47
Barium	0.076		0.00057	0.0050	mg/L	1	10/13/2023 21:47
Beryllium	U		0.00013	0.0020	mg/L	1	10/13/2023 21:47
Boron	0.23		0.015	0.020	mg/L	1	10/16/2023 14:52
Cadmium	U		0.00014	0.0020	mg/L	1	10/13/2023 21:47
Calcium	4.0		0.22	0.50	mg/L	1	10/13/2023 21:47
Chromium	0.00085	J	0.00061	0.0050	mg/L	1	10/13/2023 21:47
Cobalt	U		0.00027	0.0050	mg/L	1	10/13/2023 21:47
Lead	0.00046	J	0.00022	0.0050	mg/L	1	10/13/2023 21:47
Lithium	0.0054	J	0.0017	0.010	mg/L	1	10/13/2023 21:47
Magnesium	0.87		0.037	0.20	mg/L	1	10/13/2023 21:47
Molybdenum	0.0019	J	0.00033	0.0050	mg/L	1	10/13/2023 21:47
Potassium	1.6		0.034	0.20	mg/L	1	10/13/2023 21:47
Selenium	U		0.00048	0.0050	mg/L	1	10/13/2023 21:47
Sodium	160		0.13	0.20	mg/L	1	10/13/2023 21:47
Thallium	U		0.00015	0.0050	mg/L	1	10/13/2023 21:47
Tin	U		0.0013	0.0020	mg/L	1	10/13/2023 21:47
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	299		8.4	10	mg/L	1	10/15/2023 12:51
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	43.8		3.1	10	mg/L	10	10/16/2023 13:33
Fluoride	1.14		0.067	0.10	mg/L	1	10/16/2023 13:23
Sulfate	4.02		0.19	1.0	mg/L	1	10/13/2023 17:15
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/17/23	Analyst: LAD
Total Dissolved Solids	390		37	50	mg/L	1	10/19/2023 13:11

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM	Work Order:	23101123
Project:	Sammis 2023 2SA Sampling	Lab ID:	23101123-03
Sample ID:	SMMS-FB-03-101123	Matrix:	GROUNDWATER
Collection Date:	10/11/2023 12:00 PM		

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			Method: SW7470A		Prep: SW7470 / 10/13/23		Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/13/2023 15:40
METALS BY ICP-MS			Method: SW6020B		Prep: SW3015A / 10/13/23		Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/13/2023 21:49
Arsenic	U		0.00019	0.0050	mg/L	1	10/13/2023 21:49
Barium	U		0.00057	0.0050	mg/L	1	10/13/2023 21:49
Beryllium	U		0.00013	0.0020	mg/L	1	10/13/2023 21:49
Boron	U		0.015	0.020	mg/L	1	10/13/2023 21:49
Cadmium	U		0.00014	0.0020	mg/L	1	10/13/2023 21:49
Calcium	U		0.22	0.50	mg/L	1	10/13/2023 21:49
Chromium	U		0.00061	0.0050	mg/L	1	10/13/2023 21:49
Cobalt	U		0.00027	0.0050	mg/L	1	10/13/2023 21:49
Lead	0.00032	J	0.00022	0.0050	mg/L	1	10/13/2023 21:49
Lithium	U		0.0017	0.010	mg/L	1	10/13/2023 21:49
Magnesium	U		0.037	0.20	mg/L	1	10/13/2023 21:49
Molybdenum	U		0.00033	0.0050	mg/L	1	10/13/2023 21:49
Potassium	0.056	J	0.034	0.20	mg/L	1	10/13/2023 21:49
Selenium	U		0.00048	0.0050	mg/L	1	10/13/2023 21:49
Sodium	U		0.13	0.20	mg/L	1	10/13/2023 21:49
Thallium	U		0.00015	0.0050	mg/L	1	10/13/2023 21:49
Tin	U		0.0013	0.0020	mg/L	1	10/13/2023 21:49
ALKALINITY			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	U		8.4	10	mg/L	1	10/15/2023 12:51
ANIONS BY ION CHROMATOGRAPHY			Method: SW9056A				Analyst: QTN
Chloride	U		0.31	1.0	mg/L	1	10/16/2023 13:43
Fluoride	U		0.067	0.10	mg/L	1	10/16/2023 13:43
Sulfate	U		0.19	1.0	mg/L	1	10/16/2023 13:43
TOTAL DISSOLVED SOLIDS			Method: A2540 C-15		Prep: FILTER / 10/17/23		Analyst: LAD
Total Dissolved Solids	U		22	30	mg/L	1	10/19/2023 13:11

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 2SA Sampling	Work Order:	23101123
Sample ID:	SMMS-MW-11S-101123	Lab ID:	23101123-04
Collection Date:	10/11/2023 01:16 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/13/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/13/2023 15:48
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/13/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/13/2023 21:51
Arsenic	0.0087		0.00019	0.0050	mg/L	1	10/13/2023 21:51
Barium	0.033		0.00057	0.0050	mg/L	1	10/13/2023 21:51
Beryllium	U		0.00013	0.0020	mg/L	1	10/13/2023 21:51
Boron	0.16		0.015	0.020	mg/L	1	10/16/2023 14:53
Cadmium	U		0.00014	0.0020	mg/L	1	10/13/2023 21:51
Calcium	170		0.22	0.50	mg/L	1	10/13/2023 21:51
Chromium	0.0013	J	0.00061	0.0050	mg/L	1	10/13/2023 21:51
Cobalt	0.0098		0.00027	0.0050	mg/L	1	10/13/2023 21:51
Lead	0.00067	J	0.00022	0.0050	mg/L	1	10/13/2023 21:51
Lithium	0.013		0.0017	0.010	mg/L	1	10/13/2023 21:51
Magnesium	26		0.037	0.20	mg/L	1	10/13/2023 21:51
Molybdenum	0.00050	J	0.00033	0.0050	mg/L	1	10/13/2023 21:51
Potassium	3.5		0.034	0.20	mg/L	1	10/13/2023 21:51
Selenium	U		0.00048	0.0050	mg/L	1	10/13/2023 21:51
Sodium	74		0.13	0.20	mg/L	1	10/13/2023 21:51
Thallium	U		0.00015	0.0050	mg/L	1	10/13/2023 21:51
Tin	U		0.0013	0.0020	mg/L	1	10/13/2023 21:51
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	215		8.4	10	mg/L	1	10/15/2023 12:51
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	92.8		12	40	mg/L	40	10/16/2023 14:22
Fluoride	U		0.067	0.10	mg/L	1	10/16/2023 13:53
Sulfate	373		7.6	40	mg/L	40	10/16/2023 14:22
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/17/23	Analyst: LAD
Total Dissolved Solids	850		37	50	mg/L	1	10/19/2023 13:11

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	ETEM		
Project:	Sammis 2023 2SA Sampling	Work Order:	23101123
Sample ID:	SMMS-MW-10D-101123	Lab ID:	23101123-05
Collection Date:	10/11/2023 02:11 PM	Matrix:	GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA							
			Method: SW7470A			Prep: SW7470 / 10/13/23	Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	10/13/2023 15:49
METALS BY ICP-MS							
			Method: SW6020B			Prep: SW3015A / 10/13/23	Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	10/13/2023 21:52
Arsenic	0.0048	J	0.00019	0.0050	mg/L	1	10/13/2023 21:52
Barium	2.7		0.0057	0.050	mg/L	10	10/16/2023 14:55
Beryllium	U		0.00013	0.0020	mg/L	1	10/13/2023 21:52
Boron	0.20		0.15	0.20	mg/L	10	10/16/2023 14:55
Cadmium	U		0.00014	0.0020	mg/L	1	10/13/2023 21:52
Calcium	200		2.2	5.0	mg/L	10	10/16/2023 14:55
Chromium	0.00081	J	0.00061	0.0050	mg/L	1	10/13/2023 21:52
Cobalt	0.00036	J	0.00027	0.0050	mg/L	1	10/13/2023 21:52
Lead	U		0.00022	0.0050	mg/L	1	10/13/2023 21:52
Lithium	0.024		0.0017	0.010	mg/L	1	10/13/2023 21:52
Magnesium	56		0.037	0.20	mg/L	1	10/13/2023 21:52
Molybdenum	0.0023	J	0.00033	0.0050	mg/L	1	10/13/2023 21:52
Potassium	7.4		0.034	0.20	mg/L	1	10/13/2023 21:52
Selenium	U		0.00048	0.0050	mg/L	1	10/13/2023 21:52
Sodium	800		1.3	2.0	mg/L	10	10/16/2023 14:55
Thallium	U		0.00015	0.0050	mg/L	1	10/13/2023 21:52
Tin	U		0.0013	0.0020	mg/L	1	10/13/2023 21:52
ALKALINITY							
			Method: A2320 B-11				Analyst: CLJ
Alkalinity, Total (as CaCO3)	193		8.4	10	mg/L	1	10/15/2023 12:51
ANIONS BY ION CHROMATOGRAPHY							
			Method: SW9056A				Analyst: QTN
Chloride	1,750		50	160	mg/L	160	10/16/2023 14:41
Fluoride	U		0.067	0.10	mg/L	1	10/16/2023 14:32
Sulfate	4.11		0.19	1.0	mg/L	1	10/13/2023 17:44
TOTAL DISSOLVED SOLIDS							
			Method: A2540 C-15			Prep: FILTER / 10/17/23	Analyst: LAD
Total Dissolved Solids	3,000		220	300	mg/L	1	10/19/2023 13:11

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: 227289

Instrument ID HG5

Method: SW7470A

MBLK		Sample ID: MBLK-227289-227289					Units: mg/L		Analysis Date: 10/13/2023 03:28 PM		
Client ID:		Run ID: HG5_231013B				SeqNo: 10088725		Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury

U

0.00016

0.00020

LCS		Sample ID: LCS-227289-227289					Units: mg/L		Analysis Date: 10/13/2023 03:30 PM		
Client ID:		Run ID: HG5_231013B				SeqNo: 10088726		Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury

0.00186

0.00016

0.00020

0.002

0

93

80-120

0

MS		Sample ID: 23101123-01BMS					Units: mg/L		Analysis Date: 10/13/2023 03:35 PM		
Client ID: SMMS-P-2-101123		Run ID: HG5_231013B				SeqNo: 10088729		Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury

0.00201

0.00016

0.00020

0.002

0.000024

99.3

75-125

0

MSD		Sample ID: 23101123-01BMSD					Units: mg/L		Analysis Date: 10/13/2023 03:37 PM		
Client ID: SMMS-P-2-101123		Run ID: HG5_231013B				SeqNo: 10088730		Prep Date: 10/13/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury

0.002025

0.00016

0.00020

0.002

0.000024

100

75-125

0.00201

0.743

20

The following samples were analyzed in this batch:

23101123-01B

23101123-02B

23101123-03B

23101123-04B

23101123-05B

Client: ETEM
Work Order: 23101123
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 227307 Instrument ID ICPMS3 Method: SW6020B

Sample ID: MBLK-227307-227307					Units: mg/L			Analysis Date: 10/13/2023 09:05 PM			
Client ID:		Run ID: ICPMS3_231013A			SeqNo: 10088352		Prep Date: 10/13/2023		DF: 1		
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	U	0.00022	0.0050								
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	U	0.034	0.20								
Selenium	U	0.00048	0.0050								
Sodium	U	0.13	0.20								
Thallium	U	0.00015	0.0050								
Tin	U	0.0013	0.0020								

LCS					Sample ID: LCS-227307-227307			Units: mg/L			Analysis Date: 10/13/2023 09:07 PM		
Client ID:			Run ID: ICPMS3_231013A			SeqNo: 10088353		Prep Date: 10/13/2023		DF: 1			
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Antimony	0.112	0.00042	0.0050	0.1	0	112	80-120	0					
Arsenic	0.108	0.00019	0.0050	0.1	0	108	80-120	0					
Barium	0.108	0.00057	0.0050	0.1	0	108	80-120	0					
Beryllium	0.1106	0.00013	0.0020	0.1	0	111	80-120	0					
Boron	0.5627	0.015	0.020	0.5	0	113	80-120	0					
Cadmium	0.1106	0.00014	0.0020	0.1	0	111	80-120	0					
Calcium	10.99	0.22	0.50	10	0	110	80-120	0					
Chromium	0.1052	0.00061	0.0050	0.1	0	105	80-120	0					
Cobalt	0.1088	0.00027	0.0050	0.1	0	109	80-120	0					
Lead	0.1074	0.00022	0.0050	0.1	0	107	80-120	0					
Lithium	0.1067	0.0017	0.010	0.1	0	107	80-120	0					
Magnesium	10.94	0.037	0.20	10	0	109	80-120	0					
Molybdenum	0.1072	0.00033	0.0050	0.1	0	107	80-120	0					
Potassium	11.02	0.034	0.20	10	0	110	80-120	0					
Selenium	0.09963	0.00048	0.0050	0.1	0	99.6	80-120	0					
Sodium	11.1	0.13	0.20	10	0	111	80-120	0					
Thallium	0.1031	0.00015	0.0050	0.1	0	103	80-120	0					
Tin	0.1082	0.0013	0.0020	0.1	0	108	80-120	0					

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: 227307

Instrument ID ICPMS3

Method: SW6020B

MS					Sample ID: 23101123-05BMS			Units: mg/L		Analysis Date: 10/13/2023 09:54 PM		
Client ID: SMMS-MW-10D-101123					Run ID: ICPMS3_231013A			SeqNo: 10088379		Prep Date: 10/13/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1107	0.00042	0.0050	0.1	0.0000132	111	75-125	0				
Arsenic	0.1174	0.00019	0.0050	0.1	0.004787	113	75-125	0				
Beryllium	0.1143	0.00013	0.0020	0.1	-0.0000033	114	75-125	0				
Cadmium	0.1056	0.00014	0.0020	0.1	0.0000055	106	75-125	0				
Chromium	0.109	0.00061	0.0050	0.1	0.0008074	108	75-125	0				
Cobalt	0.1088	0.00027	0.0050	0.1	0.000363	108	75-125	0				
Lead	0.1108	0.00022	0.0050	0.1	0.0001595	111	75-125	0				
Lithium	0.1321	0.0017	0.010	0.1	0.02422	108	75-125	0				
Magnesium	63.84	0.037	0.20	10	56.25	75.9	75-125	0			O	
Molybdenum	0.1133	0.00033	0.0050	0.1	0.00231	111	75-125	0				
Potassium	18.06	0.034	0.20	10	7.446	106	75-125	0				
Selenium	0.1088	0.00048	0.0050	0.1	0.000088	109	75-125	0				
Thallium	0.107	0.00015	0.0050	0.1	-0.0000473	107	75-125	0				
Tin	0.1105	0.0013	0.0020	0.1	0.0002662	110	75-125	0				

MS					Sample ID: 23101123-05BMS			Units: mg/L		Analysis Date: 10/16/2023 02:57 PM		
Client ID: SMMS-MW-10D-101123					Run ID: ICPMS3_231016A			SeqNo: 10091525		Prep Date: 10/13/2023		DF: 10
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Barium	2.794	0.0057	0.050	0.1	2.692	102	75-125	0			O	
Boron	0.6692	0.15	0.20	0.5	0.2034	93.2	75-125	0				
Calcium	209.8	2.2	5.0	10	201.6	81.9	75-125	0			O	
Sodium	785.2	1.3	2.0	10	802.4	-172	75-125	0			SO	

MSD					Sample ID: 23101123-05BMSD			Units: mg/L		Analysis Date: 10/13/2023 09:56 PM		
Client ID: SMMS-MW-10D-101123					Run ID: ICPMS3_231013A			SeqNo: 10088380		Prep Date: 10/13/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1081	0.00042	0.0050	0.1	0.0000132	108	75-125	0.1107	2.44	20		
Arsenic	0.1145	0.00019	0.0050	0.1	0.004787	110	75-125	0.1174	2.47	20		
Beryllium	0.113	0.00013	0.0020	0.1	-0.0000033	113	75-125	0.1143	1.09	20		
Cadmium	0.1046	0.00014	0.0020	0.1	0.0000055	105	75-125	0.1056	1.01	20		
Chromium	0.1071	0.00061	0.0050	0.1	0.0008074	106	75-125	0.109	1.76	20		
Cobalt	0.1071	0.00027	0.0050	0.1	0.000363	107	75-125	0.1088	1.59	20		
Lead	0.1091	0.00022	0.0050	0.1	0.0001595	109	75-125	0.1108	1.55	20		
Lithium	0.1306	0.0017	0.010	0.1	0.02422	106	75-125	0.1321	1.08	20		
Magnesium	63.48	0.037	0.20	10	56.25	72.3	75-125	63.84	0.564	20	SO	
Molybdenum	0.1116	0.00033	0.0050	0.1	0.00231	109	75-125	0.1133	1.51	20		
Potassium	17.75	0.034	0.20	10	7.446	103	75-125	18.06	1.72	20		
Selenium	0.1074	0.00048	0.0050	0.1	0.000088	107	75-125	0.1088	1.29	20		
Thallium	0.106	0.00015	0.0050	0.1	-0.0000473	106	75-125	0.107	0.873	20		
Tin	0.1082	0.0013	0.0020	0.1	0.0002662	108	75-125	0.1105	2.07	20		

Client: ETEM
Work Order: 23101123
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 227307 Instrument ID ICPMS3 Method: SW6020B

MSD					Sample ID: 23101123-05BMSD				Units: mg/L			Analysis Date: 10/16/2023 02:58 PM			
Client ID: SMMS-MW-10D-101123					Run ID: ICPMS3_231016A				SeqNo: 10091526		Prep Date: 10/13/2023			DF: 10	
Analyte		Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual			
Barium		2.814	0.0057	0.050	0.1	2.692	122	75-125	2.794	0.716	20	O			
Boron		0.6654	0.15	0.20	0.5	0.2034	92.4	75-125	0.6692	0.567	20				
Calcium		213.3	2.2	5.0	10	201.6	117	75-125	209.8	1.64	20	O			
Sodium		802.8	1.3	2.0	10	802.4	4.4	75-125	785.2	2.23	20	SO			

The following samples were analyzed in this batch:	23101123-01B	23101123-02B	23101123-03B
	23101123-04B	23101123-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101123
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: 227486 Instrument ID TDS Method: A2540 C-15

MBLK		Sample ID: MBLK-227486-227486					Units: mg/L		Analysis Date: 10/19/2023 01:11 PM			
Client ID:		Run ID: TDS_231019A					SeqNo: 10106012		Prep Date: 10/17/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	U	22	30									

LCS		Sample ID: LCS-227486-227486					Units: mg/L		Analysis Date: 10/19/2023 01:11 PM			
Client ID:		Run ID: TDS_231019A					SeqNo: 10106011		Prep Date: 10/17/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	480	22	30	495	0	97	85-109	0				

DUP		Sample ID: 23101202-01F DUP					Units: mg/L		Analysis Date: 10/19/2023 01:11 PM			
Client ID:		Run ID: TDS_231019A					SeqNo: 10105995		Prep Date: 10/17/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	2273	74	100	0	0	0	0-0	2293	0.876	10		

DUP		Sample ID: 23101202-02F DUP					Units: mg/L		Analysis Date: 10/19/2023 01:11 PM			
Client ID:		Run ID: TDS_231019A					SeqNo: 10105997		Prep Date: 10/17/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Total Dissolved Solids	1003	37	50	0	0	0	0-0	983.3	2.01	10		

The following samples were analyzed in this batch:	23101123-01A	23101123-02A	23101123-03A
	23101123-04A	23101123-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101123
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: R385624A Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-A-R385624A					Units: mg/L		Analysis Date: 10/13/2023 01:02 PM			
Client ID:		Run ID: IC4_231013A					SeqNo: 10086674		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	U	0.19	1.0									

MBLK		Sample ID: CCB/MBLK-B-R385624A					Units: mg/L		Analysis Date: 10/13/2023 05:05 PM			
Client ID:		Run ID: IC4_231013A					SeqNo: 10086686		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	U	0.19	1.0									

MBLK		Sample ID: CCB/MBLK-C-R385624A					Units: mg/L		Analysis Date: 10/13/2023 07:02 PM			
Client ID:		Run ID: IC4_231013A					SeqNo: 10086698		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	U	0.19	1.0									

LCS		Sample ID: MLCCV/LCS-A-R385624A					Units: mg/L		Analysis Date: 10/13/2023 12:52 PM			
Client ID:		Run ID: IC4_231013A					SeqNo: 10086673		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	10.29	0.19	1.0	10	0	103	90-110	0				

LCS		Sample ID: MLCCV/LCS-B-R385624A					Units: mg/L		Analysis Date: 10/13/2023 04:55 PM			
Client ID:		Run ID: IC4_231013A					SeqNo: 10086685		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	10.16	0.19	1.0	10	0	102	90-110	0				

MS		Sample ID: 2310430-01B MS					Units: mg/L		Analysis Date: 10/13/2023 01:31 PM			
Client ID:		Run ID: IC4_231013A					SeqNo: 10086677		Prep Date:		DF: 160	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	4116	30	160	1600	2424	106	90-110	0			E	

MSD		Sample ID: 2310430-01B MSD					Units: mg/L		Analysis Date: 10/13/2023 01:40 PM			
Client ID:		Run ID: IC4_231013A					SeqNo: 10086678		Prep Date:		DF: 160	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	4164	30	160	1600	2424	109	90-110	4116	1.15	15	E	

The following samples were analyzed in this batch:	23101123-01A	23101123-02A	23101123-03A
	23101123-04A	23101123-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101123
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: R385648 Instrument ID Titrator 1 Method: A2320 B-11

MBLK		Sample ID: MB-R385648-R385648				Units: mg/L			Analysis Date: 10/15/2023 12:51 PM			
Client ID:		Run ID: TITRATOR 1_231015B				SeqNo: 10087348			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Alkalinity, Total (as CaCO3) U 8.4 10

LCS		Sample ID: LCS-R385648-R385648				Units: mg/L			Analysis Date: 10/15/2023 12:51 PM			
Client ID:		Run ID: TITRATOR 1_231015B				SeqNo: 10087349			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Alkalinity, Total (as CaCO3) 999 8.4 10 1000 0 99.9 90-110 0

DUP		Sample ID: 23100986-12B DUP				Units: mg/L			Analysis Date: 10/15/2023 12:51 PM			
Client ID:		Run ID: TITRATOR 1_231015B				SeqNo: 10087351			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Alkalinity, Total (as CaCO3) 290.2 8.4 10 0 0 0 0-0 281.8 2.95 10

DUP		Sample ID: 23100995-02B DUP				Units: mg/L			Analysis Date: 10/15/2023 12:51 PM			
Client ID:		Run ID: TITRATOR 1_231015B				SeqNo: 10087356			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Alkalinity, Total (as CaCO3) 358 8.4 10 0 0 0 0-0 356.7 0.361 10

DUP		Sample ID: 23101230-01D DUP				Units: mg/L			Analysis Date: 10/15/2023 12:51 PM			
Client ID:		Run ID: TITRATOR 1_231015B				SeqNo: 10087363			Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Alkalinity, Total (as CaCO3) 558.7 8.4 10 0 0 0 0-0 522.4 6.7 10

The following samples were analyzed in this batch:	23101123-01A	23101123-02A	23101123-03A
	23101123-04A	23101123-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101123
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: R385777A Instrument ID IC4 Method: SW9056A

MBLK		Sample ID: CCB/MBLK-A-R385777A				Units: mg/L		Analysis Date: 10/16/2023 11:33 A			
Client ID:		Run ID: IC4_231016A				SeqNo: 10094160		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-B-R385777A				Units: mg/L		Analysis Date: 10/16/2023 02:12 PM			
Client ID:		Run ID: IC4_231016A				SeqNo: 10094172		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

MBLK		Sample ID: CCB/MBLK-C-R385777A				Units: mg/L		Analysis Date: 10/16/2023 04:09 PM			
Client ID:		Run ID: IC4_231016A				SeqNo: 10094184		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.31	1.0								
Fluoride	U	0.067	0.10								
Sulfate	U	0.19	1.0								

LCS		Sample ID: MLCCV/LCS-A-R385777A				Units: mg/L		Analysis Date: 10/16/2023 11:23 A			
Client ID:		Run ID: IC4_231016A				SeqNo: 10094159		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.641	0.31	1.0	10	0	96.4	88-110	0			
Fluoride	2.006	0.067	0.10	2	0	100	86-121	0			
Sulfate	9.652	0.19	1.0	10	0	96.5	90-110	0			

LCS		Sample ID: MLCCV/LCS-B-R385777A				Units: mg/L		Analysis Date: 10/16/2023 02:02 PM			
Client ID:		Run ID: IC4_231016A				SeqNo: 10094171		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.844	0.31	1.0	10	0	98.4	88-110	0			
Fluoride	2.179	0.067	0.10	2	0	109	86-121	0			
Sulfate	10.18	0.19	1.0	10	0	102	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23101123
Project: Sammis 2023 2SA Sampling

QC BATCH REPORT

Batch ID: R385777A Instrument ID IC4 Method: SW9056A

LCS		Sample ID: MLCCV/LCS-C-R385777A				Units: mg/L		Analysis Date: 10/16/2023 03:59 PM			
Client ID:		Run ID: IC4_231016A				SeqNo: 10094183		Prep Date:		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.865	0.31	1.0	10	0	98.6	88-110	0			
Fluoride	2.184	0.067	0.10	2	0	109	86-121	0			
Sulfate	10.16	0.19	1.0	10	0	102	90-110	0			

MS		Sample ID: 23101123-01A MS				Units: mg/L		Analysis Date: 10/16/2023 01:04 PM			
Client ID: SMMS-P-2-101123		Run ID: IC4_231016A				SeqNo: 10094165		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	138.5	3.1	10	100	38.74	99.8	88-110	0			
Fluoride	21.4	0.67	1.0	20	0	107	86-121	0			
Sulfate	186.3	1.9	10	100	83.12	103	90-110	0			

MSD		Sample ID: 23101123-01A MSD				Units: mg/L		Analysis Date: 10/16/2023 01:14 PM			
Client ID: SMMS-P-2-101123		Run ID: IC4_231016A				SeqNo: 10094166		Prep Date:		DF: 10	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	138.1	3.1	10	100	38.74	99.3	88-110	138.5	0.352	15	
Fluoride	21.35	0.67	1.0	20	0	107	86-121	21.4	0.239	15	
Sulfate	185.8	1.9	10	100	83.12	103	90-110	186.3	0.267	15	

The following samples were analyzed in this batch:

23101123-01A	23101123-02A	23101123-03A
23101123-04A	23101123-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



CHAIN OF CUSTODY RECORD/LABORATORY ANALYSIS REQUEST FORM

23101123

ETEM: ETEM
Project: Sammis 2023 Sampling



sinaquist.2000@j-is.com

Ref 210311

Project Name: Sammis 2023 Sampling
Project Number: SMMS-1004-23
Laboratory: ALS
Shipment Method: FEDEX
Program: Sammis 2023 2SA Sampling

Company: Field & Technical Services
Address: 200 Third Avenue
Carnegie, PA 15106
(412) 279-3363

Sample Date	Sample Time	Matrix	Sample Identification	Analysis	6020B_7470A-Total Metals	2320B_9056A-2540C														
				Preservative	HNO3	None														
				Total Bottle Count																Notes:
10/11/2023	1047	GW	SMMS-P-2-101123	2	1	1														
10/11/2023	1158	GW	SMMS-MW-13BR-101123	2	1	1														
10/11/2023	1200	GW	SMMS-FB-03-101123	2	1	1														
10/11/2023	1316	GW	SMMS-MW-11S-101123	2	1	1														
10/11/2023	1411	GW	SMMS-MW-10D-101123	2	1	1														

Relinquished by:	Received by:	Relinquished by:	Received by:	Turnaround Requirements
	Signature:	Signature: FED EX	Signature:	<input type="checkbox"/> Rush
Printed Name: Shane Lindquist	Printed Name: Patrick McAdams	Printed Name:	Printed Name: Diane F. Shan	<input checked="" type="checkbox"/> Standard
Firm: FTS	Firm: ALS	Firm:	Firm: ALS	
Date/Time: 10/11/2023 1534	Date/Time: 10/11/23 1534	Date/Time:	Date/Time: 10/12/23 0900	

IR3
1.5°C
pH35

ALS Group, USA

Holland, Michigan

Sample Receipt Checklist

Client Name: **ETEM**

Date/Time Received: **12-Oct-23 09:00**

Work Order: **23101123**

Received by: **DS**

Checklist completed by Diane Shaw 12-Oct-23 Reviewed by: Jodi Blauw 12-Oct-23
eSignature Date eSignature Date

Matrices: **Groundwater**

Carrier name: **FedEx**

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☐

No ☐

Not Present ☒

Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☒

No ☐

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Container/Temp Blank temperature in compliance?

Yes ☒

No ☐

Sample(s) received on ice?

Yes ☒

No ☐

Temperature(s)/Thermometer(s):

1.5/2.5 c

IR3

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

10/12/2023 12:27:47 PM

Water - VOA vials have zero headspace?

Yes ☐

No ☐

No VOA vials submitted ☒

Water - pH acceptable upon receipt?

Yes ☒

No ☐

N/A ☐

pH adjusted?

Yes ☐

No ☒

N/A ☐

pH adjusted by:

-

Login Notes: **pH check <2.**

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



15-Nov-2023

Angela Gatchie
ETEM
200 Third Ave.
Carnegie, PA 15106

Re: **Sammis 2023**

Work Order: **23101667**

Dear Angela,

ALS Environmental received 2 samples on 18-Oct-2023 09:15 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 17.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

Certificate No: OH: 87783

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Client: ETEM
Project: Sammis 2023
Work Order: 23101667

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
23101667-01	MW-9-101723	Groundwater		10/17/2023 13:30	10/18/2023 09:15	<input type="checkbox"/>
23101667-02	MW-4-101723	Groundwater		10/17/2023 14:05	10/18/2023 09:15	<input type="checkbox"/>

November 12, 2023

Jodi Blouw
ALS Group USA, Corp
3352 128th Ave
Holland, Michigan 49424

Re: Holland - Blouw L2
Work Order: 642149

Dear Jodi Blouw:

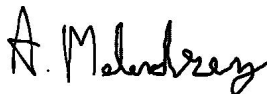
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 20, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4422.

Sincerely,



Adrian Melendrez for
Jacob Crook
Project Manager

Purchase Order: 20-23101667
Enclosures



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for

ALSE001 ALS Environmental

Client SDG: 642149 GEL Work Order: 642149

The Qualifiers in this report are defined as follows:

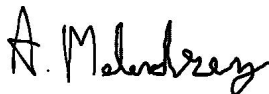
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Jacob Crook.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424
Contact: Jodi Blouw
Project: Holland - Blouw L2

Report Date: November 12, 2023

Client Sample ID: MW-9-101723
Sample ID: 642149001
Matrix: Ground Water
Collect Date: 17-OCT-23
Receive Date: 20-OCT-23
Collector: Client

Project: ALSE00923
Client ID: ALSE001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228		2.29	+/-1.09	1.56	+/-1.24	3.00	pCi/L			JE1	11/06/23	0837	2515277	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.308	+/-0.222	0.262	+/-0.232	1.00	pCi/L			LXP1	11/07/23	1007	2515281	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2515277	87.9	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ALS Group USA, Corp
Address : 3352 128th Ave

Holland, Michigan 49424

Contact: Jodi Blouw

Project: Holland - Blouw L2

Client Sample ID: MW-4-101723
Sample ID: 642149002
Matrix: Ground Water
Collect Date: 17-OCT-23
Receive Date: 20-OCT-23
Collector: Client

Project: ALSE00923
Client ID: ALSE001

Report Date: November 12, 2023

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFPC Ra228, Liquid "As Received"</i>														
Radium-228		4.07	+/-1.65	2.16	+/-1.96	3.00	pCi/L			JE1	11/06/23	0837	2515277	1
Rad Radium-226														
<i>Lucas Cell, Ra226, Liquid "As Received"</i>														
Radium-226		0.775	+/-0.356	0.373	+/-0.387	1.00	pCi/L			LXP1	11/07/23	1007	2515281	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"	2515277	62	(15%-125%)

Notes:
The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Mtd.: Method
DL: Detection Limit	PF: Prep Factor
Lc/LC: Critical Level	RL: Reporting Limit
MDA: Minimum Detectable Activity	TPU: Total Propagated Uncertainty
MDC: Minimum Detectable Concentration	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: November 12, 2023

Page 1 of 2

Client : ALS Group USA, Corp
3352 128th Ave

Holland, Michigan

Contact: Jodi Blouw

Workorder: 642149

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow									
Batch	2515277								
QC1205558586	642149001	DUP							
Radium-228		2.29	2.08	pCi/L	9.2	(0% - 100%)	JE1	11/06/2308:37	
		Uncert:	+/-1.09	+/-1.17					
		TPU:	+/-1.24	+/-1.29					
QC1205558587	LCS								
Radium-228		26.1	24.7	pCi/L	94.6	(75%-125%)	JE1	11/06/2308:37	
		Uncert:	+/-1.44						
		TPU:	+/-6.53						
QC1205558585	MB								
Radium-228			0.671	pCi/L			JE1	11/06/2308:36	
		Uncert:	+/-0.424						
		TPU:	+/-0.457						
Rad Ra-226									
Batch	2515281								
QC1205558597	642149001	DUP							
Radium-226		0.308	0.478	pCi/L	43.4	(0% - 100%)	LXP1	11/07/2310:46	
		Uncert:	+/-0.222	+/-0.297					
		TPU:	+/-0.232	+/-0.311					
QC1205558599	LCS								
Radium-226		27.0	25.9	pCi/L	95.9	(75%-125%)	LXP1	11/07/2311:28	
		Uncert:	+/-1.94						
		TPU:	+/-6.07						
QC1205558596	MB								
Radium-226			U 0.176	pCi/L			LXP1	11/07/2310:46	
		Uncert:	+/-0.182						
		TPU:	+/-0.184						
QC1205558598	642149001	MS							
Radium-226		127	0.308	106	pCi/L	83.7	(75%-125%)	LXP1	11/07/2311:28
		Uncert:	+/-0.222	+/-7.92					
		TPU:	+/-0.232	+/-19.7					

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 642149

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI	Gamma Spectroscopy--Uncertain identification									
BD	Results are either below the MDC or tracer recovery is low									
h	Preparation or preservation holding time was exceeded									
R	Sample results are rejected									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
N/A	RPD or %Recovery limits do not apply.									
ND	Analyte concentration is not detected above the detection limit									
M	M if above MDC and less than LLD									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
FA	Failed analysis.									
UJ	Gamma Spectroscopy--Uncertain identification									
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.									
N1	See case narrative									
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.									
**	Analyte is a Tracer compound									
M	REMP Result > MDC/CL and < RDL									
J	See case narrative for an explanation									

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

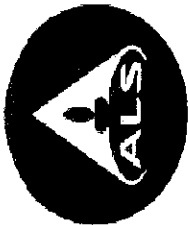
** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

642149



Subcontractor:
GEL Laboratories, LLC
2040 Savage Rd
Charleston, SC 29407

TEL: (843) 556-8171
FAX: (843) 766-1178
Acct #:

CHAIN-OF-CUSTODY RECORD

Date: 19-Oct-23
COC ID: 24204
Due Date: 06-Nov-23

Page 1 of 1

Customer Information		ALS Account		Project Information		Parameter/Method Request for Analysis										
Purchase Order	23101667	Project Name	23101667	A	Ra226, Ra228											
Work Order		Project Number		B												
Company Name	ALS Group USA Corp	Bill To Company	ALS Group USA, Corp	C												
Send Report To	Jodi Blouw	Inv Attn	Accounts Payable	D												
Address	3352 128th Ave	Address	3352 128th Ave	E												
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	F												
Phone	(616) 399-6070	Phone	(616) 399-6070	G												
Fax	(616) 399-6185	Fax	(616) 399-6185	H												
eMail Address	jodi.blouw@alsglobal.com	eMail CC		I												
ALS Sample ID	Client Sample ID	Matrix	Collection Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J		
23101667-01A	MW-9-101723	Groundwater	17/Oct/2023 13:30	(2) 1LPNEAT	X											
23101667-02A	MW-4-101723	Groundwater	17/Oct/2023 14:05	(2) 1LPNEAT	X											

Comments:

Please analyze enclosed samples for Radium 226 and Radium 228. Thank you.

[Signature]

10/24/23 14:00

[Signature]

10/26/23 7:30

Relinquished by:

Date/Time

Received by:

Date/Time

Cooler IDs

Report/QC Level

Relinquished by:

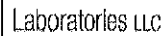
Date/Time

Received by:

Date/Time

Cooler IDs

Report/QC Level



Client: ALSE		SDG/AR/Work Order: 642152 / 642149	
Received By: Me'Shafia Mckelvey		Date Received: 10/20/23	
Carrier and Tracking Number		Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other	
		65316 1072 7529 210	
Suspected Hazard Information		Yes	No
A) Shipped as a DOT Hazardous?			
B) Did the client designate the samples are to be received as radioactive?			
C) Did the RSO classify the samples as radioactive?			
D) Did the client designate samples are hazardous?			
E) Did the RSO identify possible hazards?			
Sample Receipt Criteria		Yes	NA
1 Shipping containers received intact and sealed?			
2 Chain of custody documents included with shipment?			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*			
4 Daily check performed and passed on IR temperature gun?			
5 Sample containers intact and sealed?			
6 Samples requiring chemical preservation at proper pH?			
7 Do any samples require Volatile Analysis?			
8 Samples received within holding time?			
9 Sample ID's on COC match ID's on bottles?			
10 Date & time on COC match date & time on bottles?			
11 Number of containers received match number indicated on COC?			
12 Are sample containers identifiable as GEL provided by use of GEL labels?			
13 COC form is properly signed in relinquished/received sections?			
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials AT Date 10/25/23 Page 1 of 1

GL-CHL-SR-001 Rev 7

642149



Subcontractor:
GEL Laboratories, LLC
2040 Savage Rd
Charleston, SC 29407

TEL: (843) 556-8171
FAX: (843) 766-1178
Acct #:

CHAIN-OF-CUSTODY RECORD

Date: 19-Oct-23
COC ID: 24204
Due Date: 06-Nov-23

Page 1 of 1

Customer Information		ALSIN Account		Project Information		Parameter/Method Request for Analysis										
Purchase Order	23101667	Project Name	23101667	A	Ra226, Ra228	A	B	C	D	E	F	G	H	I	J	
Work Order		Project Number		B		B										
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C		C										
Send Report To	Jodi Blouw	Inv Attn	Accounts Payable	D		D										
Address	3352 128th Ave	Address	3352 128th Ave	E		E										
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	F		F										
Phone	(616) 399-6070	Phone	(616) 399-6070	G		G										
Fax	(616) 399-6185	Fax	(616) 399-6185	H		H										
eMail Address	jodi.blouw@alsglobal.com	eMail CC		I		I										
ALS Sample ID	Client Sample ID	Matrix	Collection Date 24hr	Bottle		J										
23101667-01A	MW-9-101723	Groundwater	17/Oct/2023 13:30	(2) 1LPNEAT	X											
23101667-02A	MW-4-101723	Groundwater	17/Oct/2023 14:05	(2) 1LPNEAT	X											

Comments:

Please analyze enclosed samples for Radium 226 and Radium 228. Thank you.

[Signature]

Relinquished by:

Date/Time

Received by:

Date/Time

Cooler IDs

Report/QC Level

Relinquished by:

Date/Time

Received by:

Date/Time

Cooler IDs

Report/QC Level

Std

10/20/23 2300

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ALSE</u>		SDG/AR/COC/Work Order: <u>642152 / 642149</u>	
Received By: <u>Me'Shalia Mckelvey</u>		Date Received: <u>10/20/23</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="radio"/> FedEx Express <input type="radio"/> FedEx Ground <input type="radio"/> UPS <input type="radio"/> Field Services <input type="radio"/> Courier <input type="radio"/> Other	
		<u>65310 1072 7529 210</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
A) Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___	
B) Did the client designate the samples are to be received as radioactive?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.	
C) Did the RSO classify the samples as radioactive?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM/mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
D) Did the client designate samples are hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.	
E) Did the RSO identify possible hazards?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	
Sample Receipt Criteria		Yes	NA
Comments/Qualifiers (Required for Non-Conforming Items)			
1 Shipping containers received intact and sealed?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe) _____	
2 Chain of custody documents included with shipment?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice <input checked="" type="radio"/> None Other: _____ *all temperatures are recorded in Celsius	
4 Daily check performed and passed on IR temperature gun?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Temperature Device Serial #: <u>IR6-23</u> Secondary Temperature Device Serial # (If Applicable): _____	
5 Sample containers intact and sealed?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe) _____ <u>TOP SCREWED OFF SUBSTANCE SPILLED OUT</u>	
6 Samples requiring chemical preservation at proper pH?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____	
7 Do any samples require Volatile Analysis?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____	
8 Samples received within holding time?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	ID's and tests affected: _____	
9 Sample ID's on COC match ID's on bottles?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	ID's and containers affected: _____	
10 Date & time on COC match date & time on bottles?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe) _____	
11 Number of containers received match number indicated on COC?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe) _____	
12 Are sample containers identifiable as GEL provided by use of GEL labels?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
13 COC form is properly signed in relinquished/received sections?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe) _____	
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials AM Date 10/25/23 Page 1 of 1

List of current GEL Certifications as of 12 November 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-00651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	KY90129
Kentucky Wastewater	KY90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2023019
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122024-04
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2023-152
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-23-21
Utah NELAP	SC000122023-38
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

**Radiochemistry
Technical Case Narrative
ALS Environmental
SDG #: 642149**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2515277

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
642149001	MW-9-101723
642149002	MW-4-101723
1205558585	Method Blank (MB)
1205558586	642149001(MW-9-101723) Sample Duplicate (DUP)
1205558587	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Method Blank Criteria

The blank result (See Below) is greater than the MDC but less than the required detection limit.

Sample	Analyte	Value
1205558585 (MB)	Radium-228	Result: 0.671 pCi/L > MDA: 0.645 pCi/L <= RDL: 3.00 pCi/L

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2515281

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
642149001	MW-9-101723
642149002	MW-4-101723
1205558596	Method Blank (MB)
1205558597	642149001(MW-9-101723) Sample Duplicate (DUP)

1205558598	642149001(MW-9-101723) Matrix Spike (MS)
1205558599	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205558598 (MW-9-101723MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.



Chain of Custody Record

ALS ENVIRONMENTAL

3352 1258th Avenue

Holland, MI 49424

(616) 399-6070

Page 1 of 1

ALS Project Manager:

Les Arnold

ALS Work Order #:

Customer Information

Purchase Order

Work Order

Company Name

Send Report To

Address

City/State/Zip

Phone

Cell

e-Mail Address

Project Information

Project Name

Project Number

Bill To Company

Invoice Attn.

Address

City/State/Zip

Phone

Fax

Parameter/Method Request for Analysis

A

B

C

D

E

F

G

H

I

J

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	J	Comments
1	MW-9-101723	10/17/23	1330	GW	NA	2	X						
2	MW-4-101723	10/17/23	1405	GW	NA	2	X						
3													
4													
5													
6													
7													
8													
9													
10													

Field Comments:

Sampler(s): Please Print & Sign

Shipment Method:

Required Turnaround Time: (Check Box)

☐ 10 Wk Days ☐ 5 Wk Days ☐ 3 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other _____

Relinquished by:

Date:

Time:

Received by:

Date:

Time:

Relinquished by:

Date:

Time:

Received by:

Date:

Time:

Logged by (Laboratory):

Date:

Time:

Checked by (Laboratory):

ALS Cooler ID

Cooler Temp

QC Package:

☐ Level II: Standard QC

☐ Level III: Raw Data

☐ Level IV: SW846 Methods/CLP like

☐ Other: _____

Preservative Key: 1-HCl 2-HNO₃ 3-H₂SO₄ 4-NaOH 5-Na₂S₂O₃ 6-NaHSO₄ 7-Other 8-None (4°C)

ALS Group, USA

Holland, Michigan

Sample Receipt Checklist

Client Name: **ETEM**

Date/Time Received: **18-Oct-23 09:15**

Work Order: **23101667**

Received by: **WSK**

Checklist completed by Wiston Kotecki
eSignature

18-Oct-23

Date

Reviewed by: Jodi Blauw
eSignature

19-Oct-23

Date

Matrices: **Groundwater**

Carrier name: **FedEx**

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☐

No ☐

Not Present ☒

Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☒

No ☐

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Container/Temp Blank temperature in compliance?

Yes ☒

No ☐

Sample(s) received on ice?

Yes ☒

No ☐

Temperature(s)/Thermometer(s):

2.5/3.5C

IR3

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

10/18/2023 3:59:59 PM

Water - VOA vials have zero headspace?

Yes ☐

No ☐

No VOA vials submitted ☒

Water - pH acceptable upon receipt?

Yes ☐

No ☐

N/A ☒

pH adjusted?

Yes ☐

No ☐

N/A ☒

pH adjusted by:

-

Login Notes:

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



27-Dec-2023

Angela Gatchie
ETEM
200 Third Ave.
Carnegie, PA 15106

Re: **Sammis 2023 2SA Resampling**

Work Order: **23121498**

Dear Angela,

ALS Environmental received 1 sample on 16-Dec-2023 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 11.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

Certificate No: OH: 87783

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Client: ETEM
Project: Sammis 2023 2SA Resampling
Work Order: 23121498

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
23121498-01	SMMS-MW-5-121523	Groundwater		12/15/2023 12:06	12/16/2023 10:00	<input type="checkbox"/>

Client: ETEM
Project: Sammis 2023 2SA Resampling
WorkOrder: 23121498

QUALIFIERS, ACRONYMS, UNITS

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
mg/L	Milligrams per Liter

Client: ETEM
Project: Sammis 2023 2SA Resampling
Work Order: 23121498

Case Narrative

Samples for the above noted Work Order were received on 12/16/2023. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:

No deviations or anomalies were noted.

Client:	ETEM	
Project:	Sammis 2023 2SA Resampling	Work Order: 23121498
Sample ID:	SMMS-MW-5-121523	Lab ID: 23121498-01
Collection Date:	12/15/2023 12:06 PM	Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			Method: SW7470A		Prep: SW7470 / 12/19/23		Analyst: KRA
Mercury	U		0.00016	0.00020	mg/L	1	12/19/2023 17:07
METALS BY ICP-MS			Method: SW6020B		Prep: SW3015A / 12/26/23		Analyst: STP
Antimony	U		0.00042	0.0050	mg/L	1	12/26/2023 18:57
Arsenic	0.00021	J	0.00019	0.0050	mg/L	1	12/26/2023 18:57
Barium	0.018		0.00057	0.0050	mg/L	1	12/26/2023 18:57
Beryllium	U		0.00013	0.0020	mg/L	1	12/26/2023 18:57
Boron	0.081		0.015	0.020	mg/L	1	12/26/2023 18:57
Cadmium	0.00033	J	0.00014	0.0020	mg/L	1	12/26/2023 18:57
Calcium	50		0.22	0.50	mg/L	1	12/26/2023 18:57
Chromium	0.00072	J	0.00061	0.0050	mg/L	1	12/26/2023 18:57
Cobalt	0.0033	J	0.00027	0.0050	mg/L	1	12/26/2023 18:57
Lead	0.00023	J	0.00022	0.0050	mg/L	1	12/26/2023 18:57
Lithium	U		0.0017	0.010	mg/L	1	12/26/2023 18:57
Magnesium	12		0.037	0.20	mg/L	1	12/26/2023 18:57
Molybdenum	U		0.00033	0.0050	mg/L	1	12/26/2023 18:57
Potassium	2.8		0.034	0.20	mg/L	1	12/26/2023 18:57
Selenium	U		0.00048	0.0050	mg/L	1	12/26/2023 18:57
Sodium	41		0.13	0.20	mg/L	1	12/26/2023 18:57
Thallium	U		0.00015	0.0050	mg/L	1	12/26/2023 18:57
Tin	U		0.0013	0.0020	mg/L	1	12/26/2023 18:57

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: 231204

Instrument ID HG5

Method: SW7470A

MBLK		Sample ID: MBLK-231204-231204					Units: mg/L		Analysis Date: 12/19/2023 04:45 PM		
Client ID:		Run ID: HG5_231219B				SeqNo: 10333015		Prep Date: 12/19/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.00016	0.00020								

LCS		Sample ID: LCS-231204-231204					Units: mg/L		Analysis Date: 12/19/2023 04:47 PM		
Client ID:		Run ID: HG5_231219B				SeqNo: 10333016		Prep Date: 12/19/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002055	0.00016	0.00020	0.002	0	103	80-120	0			

MS		Sample ID: 23121498-01AMS					Units: mg/L		Analysis Date: 12/19/2023 05:08 PM		
Client ID: SMMS-MW-5-121523		Run ID: HG5_231219B				SeqNo: 10333028		Prep Date: 12/19/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00198	0.00016	0.00020	0.002	0.000027	97.6	75-125	0			

MSD		Sample ID: 23121498-01AMSD					Units: mg/L		Analysis Date: 12/19/2023 05:10 PM		
Client ID: SMMS-MW-5-121523		Run ID: HG5_231219B				SeqNo: 10333029		Prep Date: 12/19/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.001935	0.00016	0.00020	0.002	0.000027	95.4	75-125	0.00198	2.3	20	

The following samples were analyzed in this batch:

23121498-01A

Client: ETEM
Work Order: 23121498
Project: Sammis 2023 2SA Resampling

QC BATCH REPORT

Batch ID: 231573 Instrument ID ICPMS3 Method: SW6020B

MBLK		Sample ID: MBLK-231573-231573				Units: mg/L		Analysis Date: 12/26/2023 06:13 PM			
Client ID:		Run ID: ICPMS3_231226A				SeqNo: 10354609		Prep Date: 12/26/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00042	0.0050								
Arsenic	U	0.00019	0.0050								
Barium	U	0.00057	0.0050								
Beryllium	U	0.00013	0.0020								
Boron	U	0.015	0.020								
Cadmium	U	0.00014	0.0020								
Calcium	U	0.22	0.50								
Chromium	U	0.00061	0.0050								
Cobalt	U	0.00027	0.0050								
Lead	U	0.00022	0.0050								
Lithium	U	0.0017	0.010								
Magnesium	U	0.037	0.20								
Molybdenum	U	0.00033	0.0050								
Potassium	0.03696	0.034	0.20								J
Selenium	U	0.00048	0.0050								
Sodium	U	0.13	0.20								
Thallium	U	0.00015	0.0050								
Tin	U	0.0013	0.0020								

LCS		Sample ID: LCS-231573-231573				Units: mg/L		Analysis Date: 12/26/2023 06:14 PM			
Client ID:		Run ID: ICPMS3_231226A				SeqNo: 10354610		Prep Date: 12/26/2023		DF: 1	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1032	0.00042	0.0050	0.1	0	103	80-120	0			
Arsenic	0.1004	0.00019	0.0050	0.1	0	100	80-120	0			
Barium	0.1001	0.00057	0.0050	0.1	0	100	80-120	0			
Beryllium	0.1001	0.00013	0.0020	0.1	0	100	80-120	0			
Boron	0.5281	0.015	0.020	0.5	0	106	80-120	0			
Cadmium	0.1015	0.00014	0.0020	0.1	0	101	80-120	0			
Calcium	10.37	0.22	0.50	10	0	104	80-120	0			
Chromium	0.103	0.00061	0.0050	0.1	0	103	80-120	0			
Cobalt	0.1044	0.00027	0.0050	0.1	0	104	80-120	0			
Lead	0.1021	0.00022	0.0050	0.1	0	102	80-120	0			
Lithium	0.1013	0.0017	0.010	0.1	0	101	80-120	0			
Magnesium	10.56	0.037	0.20	10	0	106	80-120	0			
Molybdenum	0.1	0.00033	0.0050	0.1	0	100	80-120	0			
Potassium	10.33	0.034	0.20	10	0	103	80-120	0			
Selenium	0.09791	0.00048	0.0050	0.1	0	97.9	80-120	0			
Sodium	10.46	0.13	0.20	10	0	105	80-120	0			
Thallium	0.09706	0.00015	0.0050	0.1	0	97.1	80-120	0			
Tin	0.1048	0.0013	0.0020	0.1	0	105	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23121498
Project: Sammis 2023 2SA Resampling

QC BATCH REPORT

Batch ID: 231573 Instrument ID ICPMS3 Method: SW6020B

MS					Sample ID: 23121379-02BMS			Units: mg/L		Analysis Date: 12/26/2023 06:44 PM		
Client ID:					Run ID: ICPMS3_231226A			SeqNo: 10354628		Prep Date: 12/26/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09701	0.00042	0.0050	0.1	0.0000242	97	75-125	0				
Arsenic	0.1029	0.00019	0.0050	0.1	0.001888	101	75-125	0				
Barium	1.534	0.00057	0.0050	0.1	1.497	36.4	75-125	0			SO	
Beryllium	0.1038	0.00013	0.0020	0.1	0.004525	99.2	75-125	0				
Boron	0.5328	0.015	0.020	0.5	0.008647	105	75-125	0				
Cadmium	0.09644	0.00014	0.0020	0.1	0.001992	94.4	75-125	0				
Calcium	100.1	0.22	0.50	10	93.91	61.9	75-125	0			SO	
Chromium	0.1011	0.00061	0.0050	0.1	0.0004576	101	75-125	0				
Cobalt	0.2565	0.00027	0.0050	0.1	0.1579	98.6	75-125	0				
Lead	0.1005	0.00022	0.0050	0.1	0.0001705	100	75-125	0				
Lithium	0.1177	0.0017	0.010	0.1	0.02076	97	75-125	0				
Magnesium	49.97	0.037	0.20	10	41.94	80.3	75-125	0			O	
Molybdenum	0.09724	0.00033	0.0050	0.1	0.0000539	97.2	75-125	0				
Potassium	16.46	0.034	0.20	10	6.691	97.6	75-125	0				
Selenium	0.1012	0.00048	0.0050	0.1	0.0005324	101	75-125	0				
Sodium	165.9	0.13	0.20	10	163.8	20.8	75-125	0			SO	
Thallium	0.09544	0.00015	0.0050	0.1	0.0000242	95.4	75-125	0				
Tin	0.1028	0.0013	0.0020	0.1	0.0002332	103	75-125	0				

MSD					Sample ID: 23121379-02BMSD			Units: mg/L		Analysis Date: 12/26/2023 06:46 PM		
Client ID:					Run ID: ICPMS3_231226A			SeqNo: 10354629		Prep Date: 12/26/2023		DF: 1
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09904	0.00042	0.0050	0.1	0.0000242	99	75-125	0.09701	2.07	20		
Arsenic	0.1041	0.00019	0.0050	0.1	0.001888	102	75-125	0.1029	1.12	20		
Barium	1.541	0.00057	0.0050	0.1	1.497	43.2	75-125	1.534	0.443	20	SO	
Beryllium	0.1071	0.00013	0.0020	0.1	0.004525	103	75-125	0.1038	3.16	20		
Boron	0.5456	0.015	0.020	0.5	0.008647	107	75-125	0.5328	2.37	20		
Cadmium	0.09957	0.00014	0.0020	0.1	0.001992	97.6	75-125	0.09644	3.2	20		
Calcium	100.1	0.22	0.50	10	93.91	61.8	75-125	100.1	0.017	20	SO	
Chromium	0.1029	0.00061	0.0050	0.1	0.0004576	102	75-125	0.1011	1.78	20		
Cobalt	0.2594	0.00027	0.0050	0.1	0.1579	101	75-125	0.2565	1.1	20		
Lead	0.1029	0.00022	0.0050	0.1	0.0001705	103	75-125	0.1005	2.39	20		
Lithium	0.1204	0.0017	0.010	0.1	0.02076	99.6	75-125	0.1177	2.19	20		
Magnesium	49.49	0.037	0.20	10	41.94	75.5	75-125	49.97	0.964	20	O	
Molybdenum	0.1015	0.00033	0.0050	0.1	0.0000539	101	75-125	0.09724	4.32	20		
Potassium	16.48	0.034	0.20	10	6.691	97.8	75-125	16.46	0.119	20		
Selenium	0.1041	0.00048	0.0050	0.1	0.0005324	104	75-125	0.1012	2.83	20		
Sodium	164.6	0.13	0.20	10	163.8	7.52	75-125	165.9	0.804	20	SO	
Thallium	0.1008	0.00015	0.0050	0.1	0.0000242	101	75-125	0.09544	5.48	20		
Tin	0.1057	0.0013	0.0020	0.1	0.0002332	105	75-125	0.1028	2.79	20		

The following samples were analyzed in this batch: 23121498-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: ETEM
Work Order: 23121498
Project: Sammis 2023 2SA Resampling

QC BATCH REPORT

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Ref 210311

CHAIN OF CUSTODY RECORD/LABORATORY ANALYSIS REQUEST FORM

23121498

ETEM: ETEM
Project: Sammis 2023 2SA Resampling







cauch.2U06@f-ts.com

Project Name: Sammis 2023 Sampling
Project Number: SMMS-1004-23
Laboratory: ALS
Shipment Method: FTS
Program: Sammis 2023 2SA Resampling

Company: Field & Technical Services
Address: 200 Third Avenue
Carnegie, PA 15106
(412) 279-3363

Sample Date	Sample Time	Matrix	Sample Identification	Analysis	6020B_7470A-Total Metals																	
				Preservative		HNO3																
				Total Bottle Count																	Notes:	
12/15/2023	1206	GW	SMMS-MW-5-121523	1	1																	

DF2
2.3°C
pH36

Relinquished by:	Received by:	Relinquished by:	Received by:	Turnaround Requirements
	Signature: 	Signature: 	Signature: 	<input type="checkbox"/> Rush <input checked="" type="checkbox"/> Standard
Printed Name: Carter Auch	Printed Name: Kirk Mechlin	Printed Name: Kirk Mechlin	Printed Name: Diane F. Shae	
Firm: FTS	Firm: ALS	Firm: ALS	Firm: ALS	
Date/Time: 12/15/23 1403	Date/Time: 12-15-23 1400	Date/Time: 12-15-23 1700	Date/Time: 12/16/23 1000	

ALS Group, USA

Holland, Michigan

Sample Receipt Checklist

Client Name: **ETEM**

Date/Time Received: **16-Dec-23 10:00**

Work Order: **23121498**

Received by: **DS**

Checklist completed by Diane Shaw 18-Dec-23 Reviewed by: Jodi Blauw 18-Dec-23
eSignature Date eSignature Date

Matrices: **Groundwater**

Carrier name: **FedEx**

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☐

No ☐

Not Present ☒

Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☒

No ☐

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Container/Temp Blank temperature in compliance?

Yes ☒

No ☐

Sample(s) received on ice?

Yes ☒

No ☐

Temperature(s)/Thermometer(s):

2.3/2.3 c

DF2

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

12/18/2023 12:16:36 PM

Water - VOA vials have zero headspace?

Yes ☐

No ☐

No VOA vials submitted ☒

Water - pH acceptable upon receipt?

Yes ☒

No ☐

N/A ☐

pH adjusted?

Yes ☐

No ☒

N/A ☐

pH adjusted by:

-

Login Notes: **pH check <2.**

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction: