Groundwater Monitoring 2021 Annual Report

for Compliance with the Coal Combustion Residuals (CCR) Rule

Erickson Station

Lansing Board of Water & Light

January 31, 2022

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Table of Abbreviations and Acronyms

Abbreviation	Definition
BTV	background threshold value
BWL	Board of Water & Light
cm/s	centimeters per second
CCR	coal combustion residuals
COC	constituents of concern
COI	constituent of interest
CWP	Clear Water Pond
EPA	Environmental Protection Agency
GPS	groundwater protection standard
LCL	lower confidence limit
LCS	laboratory control samples
MDL	method detection limit
MS/MSD	matrix spike/duplicate
QC	quality control
RPD	relative percent difference
SOP	standard operating procedure
SSI/SSL	statistically significant increase/statistically significant level
TDS	total dissolved solids
TSS	total suspended solids
UTL	upper tolerance limit

Summary of 40 CFR Section § 257.90(e)(6) Groundwater Monitoring System Requirements and Site-Specific Compliance at Erickson Station		
40 CFR Section § 257.90(e)(6) Requirement		**CCR Impoundments Status**
§ 257.90(e)(6) *A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:*		
§257.90(e)(6)(i)	*At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95.*	Assessment Monitoring Program and Evaluation of Potential Remedies
§257.90(e)(6)(ii)	*At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95.*	Assessment Monitoring Program and Evaluation of Potential Remedies
§257.90(e)(6)(iii)	*If it was determined that there was a statistically significant increase over background for one or more constituents listed in appendix III to this part pursuant to § 257.94(e):*	Yes
§257.90(e)(6)(iii)(A)	*Identify those constituents listed in appendix III to this part and the names of the monitoring wells associated with such an increase.* These SSIs are from the original triggering event.	• MW-2 – boron, calcium, chloride, sulfate, total dissolved solids (TDS) • MW-5 – boron, calcium, sulfate, TDS • MW-6 - boron, sulfate, TDS
§257.90(e)(6)(iii)(B)	*Provide the date when the assessment monitoring program was initiated for the CCR unit.*	November 19, 2020
§257.90(e)(6)(iv)	*If it was determined that there was a statistically significant level above the groundwater protection standard for one or more constituents listed in appendix IV to this part pursuant to § 257.95(g) include all of the following:*	Yes
§257.90(e)(6)(iv)(A)	*Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase.* *These SSLs for MW-2, MW-5 and MW-6 are based on the August 2021 sample event*	• MW-2 – lithium • MW-5 – lithium • MW-6 – lithium • MW-7 – lithium and molybdenum (only 4 sample events after Sept 2021 event)
§257.90(e)(6)(iv)(B)	*Provide the date when the assessment of corrective measures was initiated for the CCR unit.*	November 23, 2020
§257.90(e)(6)(iv)(C)	*Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit.*	Required 30 days prior to remedy selection
§257.90(e)(6)(iv)(D)	*Provide the date when the assessment of corrective measures was completed for the CCR unit.*	October 1, 2021
§257.90(e)(6)(v)	*Whether a remedy was selected pursuant to § 257.97 during the current annual reporting period, and if so, the date of remedy selection.*	Evaluation of potential remedies ongoing
§257.90(e)(6)(vi)	*(vi) Whether remedial activities were initiated or are ongoing pursuant to § 257.98 during the current annual reporting period.*	Evaluation of potential remedies ongoing

1.0 Introduction

The U.S. Environmental Protection Agency's (EPA) final Coal Combustion Residuals (CCR) Rule 40 CFR §257 establishes a comprehensive set of requirements for the management and disposal of CCR (or coal ash) in surface impoundments by electric utilities. Erickson Power Station (Erickson or Site) is an electrical power generation facility located at 3725 South Canal Road in Delta Township, Eaton County, Michigan owned and operated by Lansing Board of Water & Light (BWL) (**Figure 1**). The Erickson Power Station contains a single coal-fired generator capable of producing 165 megawatts of electricity. CCR generated at Erickson is stored in dewatering tanks (hydro-bins) and three active CCR impoundments: the Forebay, Retention Basin, and Clear Water Pond (CWP) (**Figure 2**). A detailed facility description is provided in the *Groundwater Monitoring System Certification* (HDR, 2020). The three CCR impoundments are active.

In 2019, BWL completed a hydrogeologic characterization study in order to develop a certified groundwater monitoring network. BWL drilled three monitoring wells in 2019 and begun initial groundwater monitoring efforts. Three additional monitoring wells were drilled in 2020 and added to the certified monitoring network. The monitoring wells were sampled for CCR constituents of interest (COIs) background water quality between April and October 2020 and background threshold values (BTVs) were developed. Detection monitoring was completed in October 2020 and statistically significant increases (SSIs) of constituents of interest (COIs) over BTVs were identified (CCR Rule Part §257.94). The initial assessment monitoring event was in November 2020, and statistically significant levels (SSL) of COIs were observed over groundwater protection standards (GPS). The SSL over GPS triggered the assessment of corrective measures and BWL completed the Assessment of Corrective Measures (ACM) on October 1, 2021. This Annual Groundwater Monitoring Report presents the sampling and analysis completed in 2021:

- The status of the groundwater monitoring program for the ash impoundment multi-unit at the end of 2021 is assessment monitoring, and evaluation of potential remedies.

1.1 Monitoring Well Network

Three wells (MW-1, MW-2, and MW-3) were drilled in October 2019 around the impoundments at Erickson to determine the uppermost aquifer under the impoundments, evaluate the groundwater flow direction, and to serve as monitoring wells for the Federal CCR Rule compliance groundwater monitoring network for the CCR impoundments (**Figure 2**). During well drilling, the uppermost groundwater at the site was found to be in the glacial deposits and therefore monitoring wells are screened at the top of the saturated glacial units (layered sand, gravel, and clay lenses). The depth to the uppermost aquifer under the impoundments was determined to be approximately 14 to 20 feet below surface.

In January 2020 three additional monitoring wells were drilled around the impoundments to serve as the multiunit monitoring network for the CCR Rule compliance (MW-4, MW-5, and MW-6) (**Figure 3**). The groundwater flow direction is northeast under the impoundments and remains similar flow direction throughout the year (**Appendix A**). Monitoring wells MW-1 and MW-4

serve as upgradient wells and wells MW-2, MW-5, and MW-6 serve as downgradient wells (**Figure 3**). Section §257.9 of the Rule states that the operator: "*…may install a multiunit groundwater monitoring system instead of separate groundwater monitoring systems for each CCR unit."* In addition, the CCR Rule states that downgradient monitoring wells should be installed to: *"accurately represent the quality of groundwater passing the waste boundary of the CCR unit. The downgradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer."* The flow of groundwater under the CCR impoundments is east-northeast, such that waste boundary wells would have to installed on the embankments to the east of the impoundments. Geotechnical engineers reviewed the embankment construction and recommended that monitoring wells should not be installed on the impoundment embankments. Therefore the closest downgradient well locations (MW-2, MW-5, and MW-6) were on the east side of the Former Impoundment and serve as a multiunit groundwater monitoring system for the three impoundments (**Figure 3**).

Well MW-3 is cross-gradient to the impoundments and is not currently part of the certified monitoring network; however, it is sampled in compliance with the State groundwater compliance program and therefore the sampling results are provided herein. The well construction details are provided in the *Groundwater Monitoring System Certification* (HDR, 2021).

In 2021, in response to the assessment monitoring results identifying a statistical exceedance of GPS, four new wells were installed (MW-7, MW-8, MW-9, and MW-10) in June 2021 to delineate the extents of the GPS exceedances as close to the eastern, downgradient facility boundary of the station property as possible (due to wetlands and thick brush) to comply with §257.95(g)(1)(iii) (**Figure 3**).

Figure 1. Vicinity Map for Erickson Station

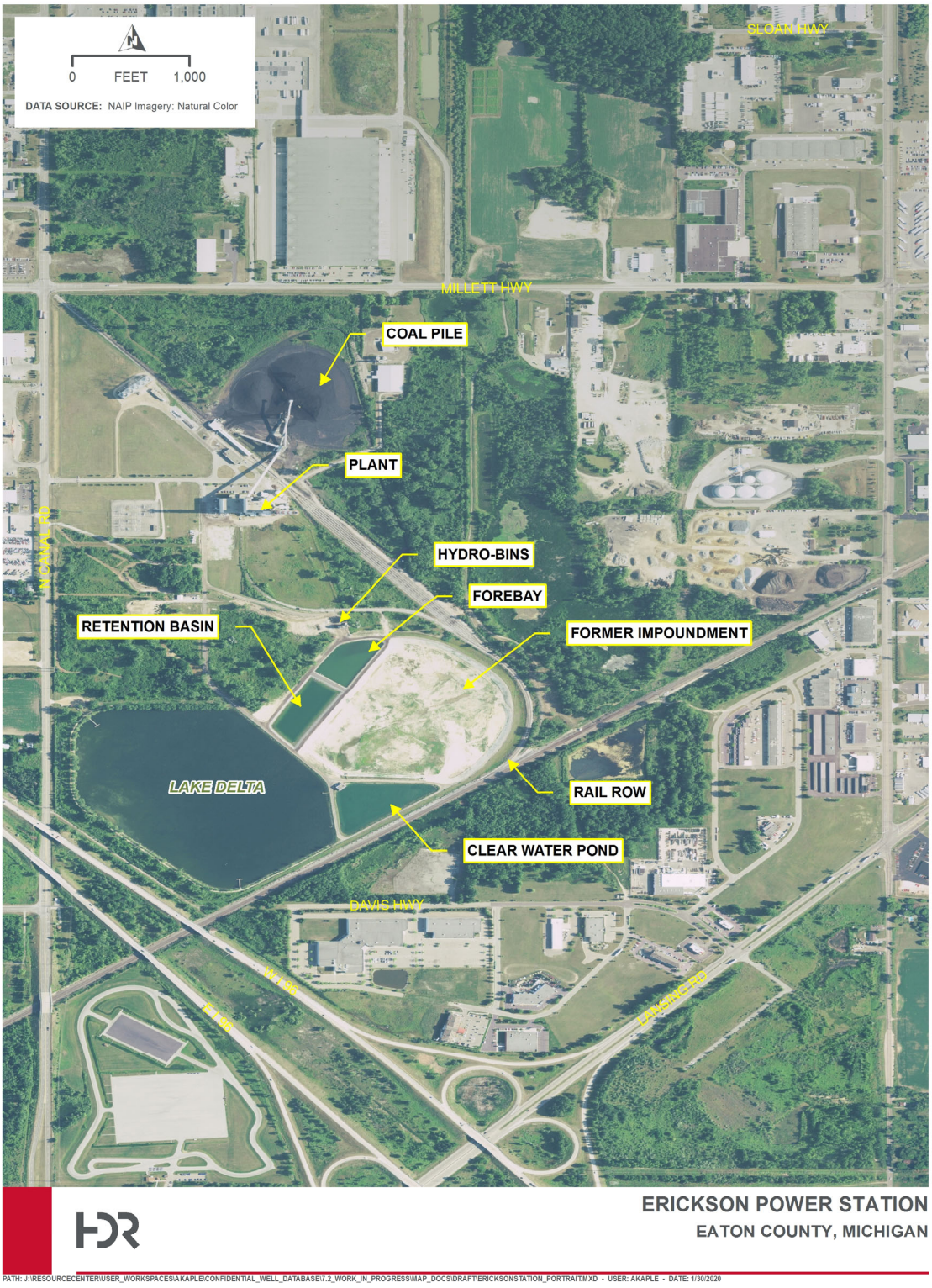

Figure 2. Erickson Station Facility Layout

Figure 3. Erickson Station CCR Units and Monitoring Wells

2.0 Monitoring

3.1 Frequency

Eight rounds of groundwater sampling for background monitoring were conducted on wells MW-1, MW-2, MW-4, MW-5, and MW-6 between April and October 2020. The initial detection monitoring event was in October 2020. November 6, 2020 was the initial assessment monitoring event for wells MW-1, MW-2, MW-4, MW-5, and MW-6. The second assessment monitoring event was in January 2021. The semi-annual assessment monitoring schedule for the Federal groundwater compliance monitoring program was shifted to coincide with the State program and assessment monitoring occurred in May and August 2021. **Table 1** provides the well identification number, well location, the dates the samples were collected, and whether the sample was required by the CCR Rule for the background sampling, detection monitoring or assessment monitoring programs. Cross-gradient well MW-3 is not currently part of the Federal compliance program certified monitoring network; however, in compliance with the State groundwater compliance program, it was sampled for the first time in May and August 2021.

In June 2021, four new wells were installed (MW-7, MW-8, MW-9, and MW-10) (**Figure 3**). These were installed to delineate the extents of the GPS exceedances as close to the downgradient facility boundary of the station property as possible (§257.95(g)(1)(iii)). Since installation, samples have been collected on a five-week frequency for the new 2021 wells in order to achieve statistical strength in the sampling data. Six sampling events were completed in 2021 on these wells (**Table 1**).

Table 1. Dates of Groundwater Samples Collected for each Well in 2020 and the Required Monitoring Programs for the Erickson Impoundments (§257.90(e)(3))

Monitoring Well I.D.	Well Location	Dates Monitored	CCR Rule Monitoring Purpose
MW-1	Background/Upgradient	January 27, 2021	Second Assessment Monitoring
		May 4, 2021 August 3, 2021	Semi-annual Assessment Monitoring
MW-2	Downgradient	January 27, 2021	Second Assessment Monitoring
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-3	Cross-Gradient	May 4, 2021 August 3, 2021	Assessment Monitoring
MW-4	Background/Upgradient	January 27, 2021	Second Assessment Monitoring
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-5	Downgradient	January 27, 2021	Second Assessment Monitoring
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-6	Downgradient	January 27, 2021	Second Assessment Monitoring
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-7	Downgradient	June 15, 2021 July 20, 2021 August 24, 2021 September 28, 2021 November 2, 2021 December 7, 2021	Release Characterization Assessment Monitoring
MW-8	Downgradient	June 15, 2021 July 20, 2021 August 24, 2021 September 28, 2021 November 2, 2021 December 7, 2021	Release Characterization Assessment Monitoring
MW-9	Downgradient	June 15, 2021 July 20, 2021 August 24, 2021 September 28, 2021 November 2, 2021 December 7, 2021	Release Characterization Assessment Monitoring
MW-10	Downgradient	June 15, 2021 July 20, 2021 August 24, 2021 September 28, 2021 November 2, 2021 December 7, 2021	Release Characterization Assessment Monitoring

2.2 Water Levels and Sample Collection

Water levels were collected in each well following the Groundwater Level Monitoring Standard Operating Procedure (SOP) (HDR, 2019a). Water levels were measured before purging of the wells began.

Wells were purged with a peristaltic pump until field parameters (pH, turbidity, conductivity, dissolved oxygen, temperature, and oxidation reduction potential) stabilized. The results of field measurements were recorded on a field data form, which is maintained as part of the field records. After field parameters stabilized, samples were collected and tested for the parameters listed in **Table 2** and **Appendix B**. For quality control, one field duplicate sample was collected during each sample event. Water samples were delivered under Chain of Custody to Merit Laboratories in East Lansing, Michigan.

2.3 Analytical Testing

Groundwater samples for each type of monitoring were analyzed for the COIs shown in **Appendix A and listed in** Error! Reference source not found.. Background monitoring analyses included the parameters in Appendices III and IV of CCR Rule Part 257, plus TSS. Initial assessment monitoring, and subsequent annual assessment monitoring samples are analyzed for all Appendix IV COIs to determine what COIs are detected. The semi-annual assessment monitoring samples are analyzed for Appendix III and detected Appendix IV COIs. Additional metals analyses in the laboratory reports are collected for the State monitoring program (copper, iron, nickel, silver, vanadium, and zinc). The laboratory analyzed matrix spike/matrix spike duplicates at a rate of 5 percent, per laboratory quality control procedures.

Table 2. Constituents of Interest

Appendix III Constituents	**Appendix IV Constituents**
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
Total Dissolved Solids (TDS)	Cobalt
Additional Parameters	Fluoride
Total Suspended Solids (TSS)	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
	Thallium
	Radium 226 and 228 combined

2.4 Data Validation and Data Management

Data validation and data management tasks were performed per the Data Management and Statistical Procedures Plan for Compliance with the Coal Combustion Residuals Rule (HDR, 2020a). Data validation was conducted to eliminate data that did not meet validation criteria and designate a data qualifier for data quality limitation discovered.

All samples and quality control (QC) were reviewed and evaluated, and no samples were rejected. Most QC analyses were within reportable limits; however, when QC was outside limit controls, samples were reported as estimated. Relative percent difference (RPD) failures for field duplicate analyses were less than the 20 percent limit criteria. Laboratory Control Sample (LCS)/LCS duplicates and Matrix Spike/Duplicate (MS/MSD) duplicates %RPD recoveries all were within control limits. Data analyses required minimal qualifications, and all data were usable, even when qualified.

3.0 Monitoring Results

3.1 Water Levels and Groundwater Flow Direction

The water levels are provided in **Table 3**. Potentiometric surface maps were developed for the January and August 2021 water level measurement dates. The maps display the groundwater elevations at the wells and the groundwater contours and are provided in **Appendix A**. Groundwater beneath the area of the impoundments is between 865 to 877 feet amsl. Groundwater elevation fluctuated between 0.1 and 2.14 feet over the year.

The water levels and contour maps confirm that the groundwater flow direction under the impoundments is to the east-northeast and is consistent year-round. The potentiometric surface maps indicate that monitoring wells MW-1 and MW-4 are located upgradient of the Forebay, Retention Pond, and CWP multi-unit and are appropriate to sample groundwater that represents background water quality.

Table 3. Groundwater Elevations Measured in 2021

Well ID		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
TOC Elevation (ft amsl)		891.53	885.8	884.81	893.07	885.19	885.2	870.74	873.74	872.6	875.65
Groundwater Elevation (ft amsl)	1/13/2021	877.08	866.15	870.95	875.77	867.36	865.35	--	--	--	--
	1/27/2021	876.98	866.45		876.01	867.64	865.30	--	--	--	--
	2/17/2021	876.79	865.77	870.53	875.45	865.39	865.01	--	--	--	--
	3/15/2021	877.15	866.90	871.82	876.89	866.91	866.05	--	--	--	--
	5/14/2021	877.51	867.11	872.38	877.53	868.19	866.33	--	--	--	--
	6/15/2021	--	--	--	--	--	--	863.88	864.50	864.09	865.05
	7/20/2021	--	--	--	--	--	--	864.82	865.52	864.84	866.44
	8/3/2021	876.58	866.11	871.68	876.29	867.64	865.37	--	--	--	--
	8/16/2021	877.10	866.58	872.05	876.98	866.84	866.35	865.09	865.79	865.39	867.37
	8/24/2021	--	--	--	--	--	--	864.61	865.24	864.73	866.25
	9/17/2021	875.60	865.12	870.36	875.49	867.07	864.48	864.02	864.52	864.10	865.08
	9/28/2021	--	--	--	--	--	--	864.40	864.86	864.51	865.15
	11/2/2021	--	--	--	--	--	--	865.56	866.26	865.90	867.55
	12/7/2021	--	--	--	--	--	--	865.36	865.83	865.42	866.22
	12/14/2021	877.37	866.94	872.50	877.46	868.56	866.25	865.51	866.06	865.68	866.72

Note: "- -" denotes no measurement was taken.

3.2 Water Quality

3.2.1 Impoundments

A table summary of the analytical data is provided in **Appendix C** and laboratory reports are provided in **Appendix D**. As stipulated in the CCR Rule, eight rounds of background groundwater sampling were completed between April and October 2020 for monitoring wells MW-1, MW-2, MW-4, MW-5 and MW-6. The water quality collected from the monitoring wells located upgradient of the CCR unit was used to develop BTVs for each COI. The *Background Water Quality Statistical Certification* (HDR 2021) documents the background sampling and describes the data evaluation performed to select the appropriate statistical method in the background data. The first detection monitoring event was conducted on October 19, 2020 and SSIs were observed as documented in the November 19, 2020 BWL memorandum, *Determination of Statistically Significant Increases over Background per §257.93(h)(2)* (HDR, 2020b).

The first assessment monitoring event was conducted on November 6, 2020. In accordance with CCR Rule §257.95(h), GPS were established for each Appendix IV COI that was detected. The only detected GPS COIs were arsenic, barium, lithium, molybdenum, and radium-226 and 228 combined. For each detected COI, Error! Reference source not found. lists the EPA established MCL from 40 CFR §141.62 and §141.66, the assessment monitoring BTV (upper tolerance limit (UTL)) for the Erickson impoundments, and the site-specific GPS.

Table 4. Groundwater Protection Standards for Detected Appendix IV COIs §257.95(d)(3)

Constituent	Unit	MCL	BTV (UTL)	GPS^
Arsenic	mg/l	0.0100	0.0112	0.0112
Barium	mg/l	2.00	0.187	2.00
Lithium	mg/l	0.0400*	0.0390	0.0400
Molybdenum	mg/l	0.100*	0.00500	0.100
Radium-226-228	pci/l	5.0*	4.31	5.0

*EPA adopted health-based value in place of MCL
^Maximum of MCL and UTL

In accordance with CCR Rule §257.95(e), downgradient well concentrations from the November 2020 assessment monitoring event were compared against background values, and some concentrations were found to be above background values. In accordance with CCR Rule §257.95(f), detected Appendix IV COI concentrations in downgradient wells were compared against GPS and were found to exceed GPS. Therefore, in accordance with CCR Rule §257.95(g), downgradient well concentrations were statistically evaluated to determine "if one or more constituents in Appendix IV to this part are detected at statistically significant levels (SSL) above the groundwater protection standard." To determine if an exceedance of a GPS value was statistically significant, the 95% lower confidence limit (95LCL) was calculated for each of the downgradient wells (MW-2, MW-5, and MW-6) for each of the detected Appendix IV COIs. The data set used to calculate the lower confidence limit (LCL) included Appendix IV results from samples collected at these wells since the establishment of the groundwater monitoring system. With the exception of MW-7, MW-8, MW-9, and MW-10, the remaining wells had at least 10 sample events that were used to calculate the LCL after this November 2020 sample event. As described in *Groundwater Protection Standards and Determination of SSLs per §257.95(g)*, downgradient wells MW-2, MW-5, and MW-6 showed SSLs of lithium that exceeded the GPS after the November 2020 sample event. This finding triggered the initiation of assessment of corrective measures and BWL completed an ACM in accordance with §257.96 on November 5, 2021 (HDR, 2021a).

Results of the assessment monitoring sampling events in January, May and August 2021 show exceedances of lithium over GPS at monitoring wells MW-2, MW-5, and MW-6. Exceedances of lithium at each well are consistent with 2020 sampling events. Therefore, in accordance with CCR Rule §257.95(g), downgradient well concentrations were statistically evaluated to determine if one or more constituents were detected at SSLs above the GPS for each assessment monitoring event. **Table 5** contains the statistical evaluation for comparison against GPS, with LCL values from each 2021 sample event that exceeded GPS values. Downgradient wells MW-2, MW-5, and MW-6 had SSLs of lithium that exceed the GPS.

Table 5. Statistical GPS Exceedances for detected Appendix IV Constituents for Erickson Surface Impoundment Wells

Appendix IV Constituent	Sample Event	January	May	August
	Well ID	Lithium 0.04 mg/l		
95LCL	MW-2[1]	0.0558	0.0564	0.0565
	MW-5[1]	0.0596	0.0608	0.0620
	MW-6[1]	0.0424	0.0430	0.0433

[1]95% Adjusted Gamma LCL

The monitoring wells installed in June 2021 were sampled on a five-week frequency after installation. At the time of this annual report, the last sample date with a full laboratory report and data validation was from September 2021; and therefore, LCLs were calculated for the new perimeter monitoring wells after the September 2021 sample event. Using this data these wells had four sample events completed for the LCL calculation. Typically, statistical calculations should be completed after eight sample events; therefore, this LCL calculation after four sample events is provided as an early evaluation of conditions at the new perimeter wells. Downgradient well MW-7 showed SSLs of lithium (95LCL 0.089 mg/l) that exceed the GPS (0.04 mg/l) and molybdenum (95LCL 0.259 mg/l) that exceed the GPS (0.10 mg/l) after the four sample events (through September 2021).

Water quality data collected at MW-1 shows a possible impact from the Clear Water Pond (CWP). The possible impact is observed when comparing historical sampling data from MW-1 to background well MW-4. Sample results show MW-1 is consistently higher in concentrations of iron, lithium, sulfate, radium, boron, TDS, and TSS. A similar trend is observed at MW-3, recent sampling data shows elevated concentrations of boron, calcium, lithium, molybdenum, sulfate, and TDS, which may be impacted by the Forebay. MW-3 concentrations of lithium and molybdenum are exceeding the respective GPS values. Therefore, additional wells will be installed in February 2022 northwest of MW-3 and west of MW-1 to provide water quality data unimpacted by nearby BWL facilities.

In 2022, BWL will continue five-week frequency sampling at MW-7, MW-8, MW-9, and MW-10 through February 2022, continue groundwater monitoring in accordance with the assessment monitoring program and consistent with §257.93(e). BWL is planning on installing additional wells at Erickson Station in February 2022 to further delineate the plume horizontally and vertically. A well will be installed northeast of MW-5 near the BWL property boundary to assess the northern-most plume extents. A well will also be installed adjacent to MW-7 and screened in the bedrock to evaluate the vertical connectivity between the glacial aquifer and bedrock aquifer.

4.0 Remedy Selection Progress Update

The sections below provide the semi-annual progress report describing the progress made towards remedy selection and design for the landfill and ash impoundments in accordance with §257.97(a). BWL completed the Assessment of Corrective Measures in November 2021 and determined it would be appropriate to install additional wells at the site and based on the well locations with SSLs, it was determined that groundwater flow and transport modeling would be appropriate to aid in the selection of a remedy for the site.

The primary groundwater and contaminant transport modeling objectives are to simulate the rate of movement, then potential plume delineation, and finally the potential offsite migration of COCs within the local groundwater system. In addition, predictive model runs will simulate movement of COCs over a pre-determined time period and determine if offsite migration is likely or unlikely. Simulation of source control alternatives and treatment alternatives will be performed.

A preliminary description of the model is included within the *Conceptual Site Model and Assessment of Corrective Measures* (HDR, 2021a). Currently the groundwater flow model is calibrated and is consistent with observed groundwater elevations. However, the groundwater flow model will be recalibrated, if necessary, following the installation of the proposed monitoring wells in February 2022.

Contaminant transport modeling is in development for boron, lithium, and molybdenum. Both boron and lithium models have been calibrated using the most recent assessment monitoring event (August 2021) data. Following the expansion of the monitoring well network in February 2022 the predictive scenario modeling will commence, ensuring all the available site-specific data is included.

Water quality sampling and preliminary model simulations do not indicate that concentrations of COCs have moved offsite at the eastern property boundary. This potential for offsite transport was confirmed by COC concentrations at MW-7; however, COCs did not have concentrations above the GPS at MW-8, MW-9, or MW-10. The preliminary boron model indicates that the GPS concentration isopach did not reach the project boundary. The potential for COC mass flux at the downgradient property boundary will be quantified after the model is updated after the installation of the proposed monitoring wells in February 2022.

In 2022, BWL is planning on sampling the surface water in the wetland along the eastern property boundary edge during seasonal inundation and investigating the ability to sample inactive BWL drinking water wells located near the Grand River.

5.0 Summary

The following observations are based on CCR Rule compliance groundwater monitoring program development during 2021:

- Four new monitoring wells were installed in June 2021 (MW-7, MW-8, MW-9, and MW-10). The new monitoring wells serve as downgradient perimeter monitoring wells as close to the BWL property boundary as possible and delineate the extent of the GPS exceedances.
- Groundwater flow is consistently east-northeast under the impoundments.
- Assessment monitoring was completed in January, May, and August 2021.
- Assessment monitoring data was statistically evaluated, and SSLs above the GPS were observed at MW-2, MW-5, and MW-6 for lithium.
- SSLs of lithium and molybdenum over GPS were observed at MW-7 after four sampling events.
- Model calibration is complete for boron and lithium transport models and recalibration will be carried out, if necessary, after new are installed and sampled in February 2022.
- The preliminary boron model indicates that the GPS concentration isopach did not reach the project boundary; therefore the model indicates that all GPS exceedances remain on the BWL property.
- Erickson Station impoundment monitoring status at the end of 2021 is in assessment monitoring and evaluation of potential remedies. BWL will continue to evaluate potential remedies in 2022 through additional plume delineation and groundwater flow and transport modeling.

Four new wells have been proposed and will be installed in February 2022. A well to potentially replace MW-1 as the background monitoring well for the CWP. A well to act as an upgradient well for the Forebay, and MW-3 may potentially transition to a downgradient well. A well will be installed northeast of MW-5 near the BWL property boundary to assess the northern-most plume extents. A well will be installed adjacent to MW-7 and screened in the bedrock to evaluate the vertical connectivity between the glacial aquifer and bedrock aquifer. In 2022 BWL is planning on sampling the surface water in the wetland along the eastern property boundary edge during seasonal inundation and is also investigating the ability to sample inactive BWL drinking water wells located near the Grand River.

6.0 References

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HDR, 2019a. Groundwater Level Monitoring Standard Operating Procedure (SOP). November 18, 2019.

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HDR, 2020b. Determination of Statistically Significant Increases over Background per §257.93(h)(2). November 19, 2020.

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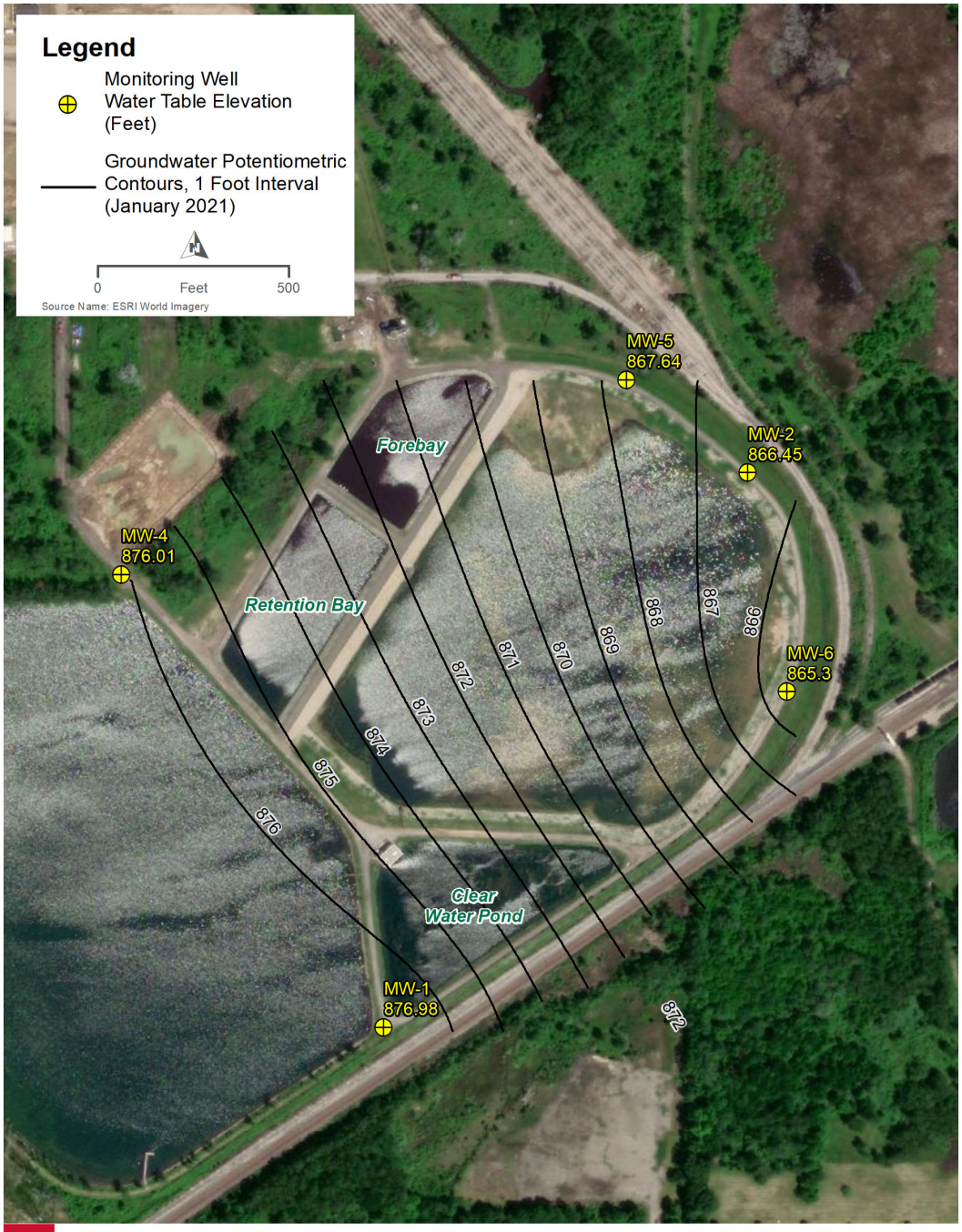
Appendix A

Potentiometric Surface Maps



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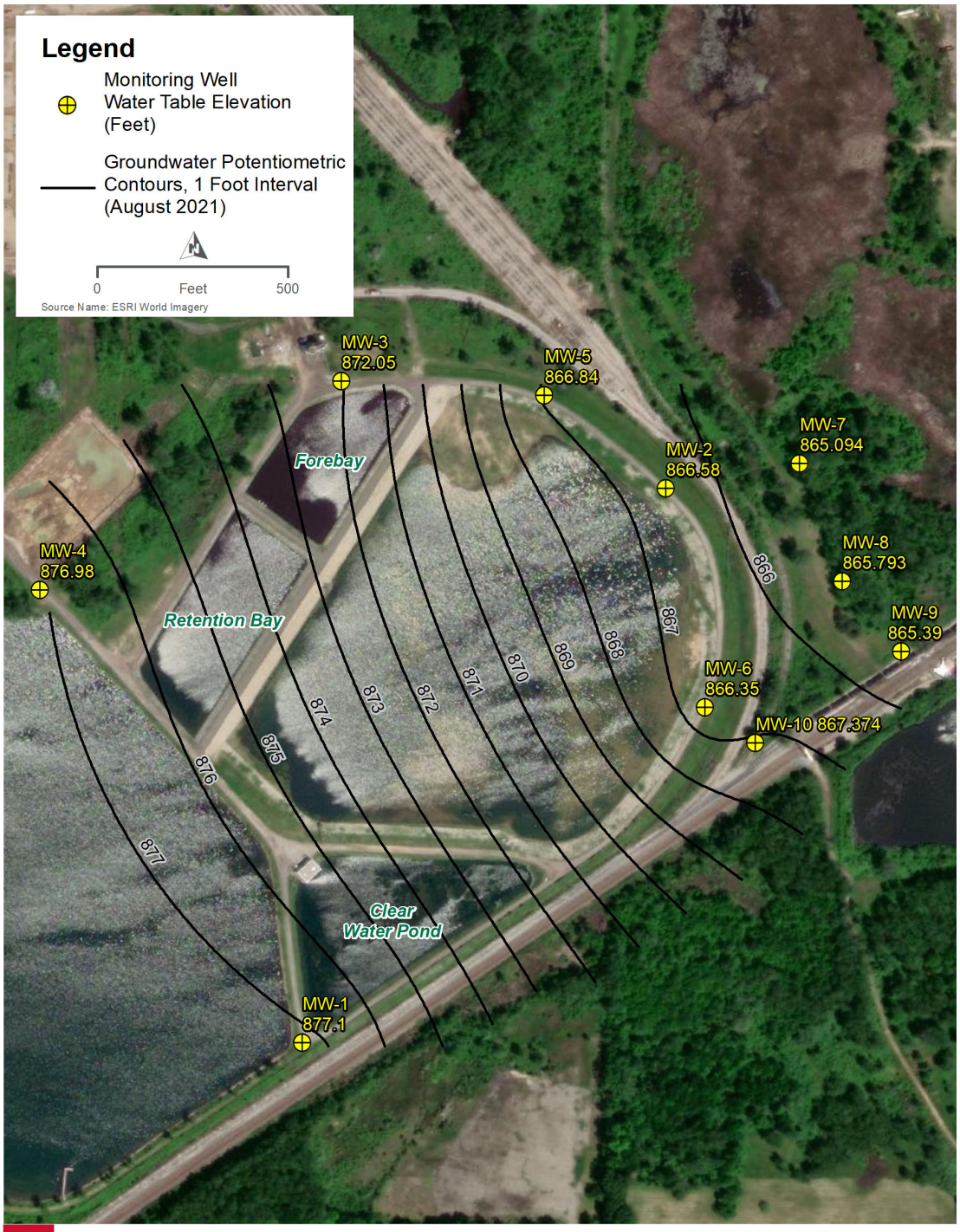

ERICKSON POWER STATION
EATON COUNTY, MICHIGAN

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Appendix B

Monitoring types to comply with specific CCR Rule requirements

Monitoring types to comply with specific CCR Rule requirements			
Type of Monitoring	**Description**	**CCR Rule Reference**	**Constituents Analyzed**
Background Monitoring	Development of background water quality conditions for Appendix III and Appendix IV COIs	§257.94(b)	Appendix III and IV and TSS
Detection Monitoring	Semi-annual detection monitoring for Appendix III COIs	§257.94(c)	Appendix III
Assessment Monitoring	Detailed types below.	§257.95	Detailed types below.
➢ Annual Assessment	Annual assessment monitoring for Appendix III and all Appendix IV COIs (determined detected COIs)	§257.95(b)	Appendix III and all Appendix IV plus TSS
➢ Semi-Annual Assessment	Semi-annual assessment monitoring for Appendix III and detected Appendix IV COIs	§257.95(d)	Appendix III and detected Appendix IV plus TSS
➢ Release Characterization Assessment	Occurs after detection of SSL above the GPS for the purpose of characterizing the nature and extent of the release.	§257.95(g)(1)(iv)	Appendix III and detected Appendix IV plus TSS
Closure Confirmation Monitoring	Occurs after the facility has been closed (e.g. all CCR waste removed from the impoundment) in compliance with CCR Rule for certification of Clean Closure.	§257.102	Appendix IV

Appendix C

Lab Results Summary Tables

			Sample Location:	MW-1												
			Sample Type:	Background												
			Sample Date:	4/28/2020	5/26/2020	6/23/2020	7/21/2020	8/18/2020	9/15/2020	9/28/2020	10/12/2020	10/19/2020	10/19/2020	11/6/2020	1/27/2021	5/4/2021	8/3/2021
Constituent	Unit	CCR Rule GPS		Background Monitoring										Initial A.M.	Assessment Monitoring		
Field Parameters													Field Dup				
pH	su	-		6.81	6.62	6.75	6.85	6.89	6.90	6.77	6.78	7.15	7.15	6.87	6.82	6.7	6.73
Conductivity	mS/cm	-		1.175	1.199	1.218	1.209	1.220	1.215	1.177	1.185	1.210	1.210	1.205	1.240	1.2	1185
Turbidity	NTU	-		28.20	40.21	17.10	32.30	21.45	15.61	7.32	7.05	8.64	8.64	8.02	9.95	8.5	7.95
Dissolved Oxygen	mg/L	-		0.00	0.01	0.08	0.05	0.52	0.01	0.05	0.30	0.09	0.09	0.21	0.09	0.1	0.08
Temperature	°C	-		11.3	15.2	13.5	16.5	15.6	15.5	13.8	15.1	13.9	13.9	15.9	9.8	12	15.7
Oxidation Reduction Potential	mV	-		-43.2	-28.5	-87.2	-53.0	-34.7	-109.8	-62.7	-59.4	-79.2	-79.2	-78.8	-27.5	-20.1	-63.4
Appendix III																	
Boron	mg/L	-		0.48	0.27	0.39	0.38	0.41	0.44	0.45	0.37	0.41	0.39	-	0.21	0.19	0.22
Calcium	mg/L	-		162	180	165	156	161	170	153	167	156	150	-	173	156	153
Chloride	mg/L	-		74	52	70	64	65	59	61	59	52	53	-	44	48	46
Fluoride	mg/L	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0
Sulfate	mg/L	-		38	69	59	75	75	77	80	81	84	85	-	78	65	57
Total Dissolved Solids	mg/L	-		728	794	774	782	776	768	796	774	806	784	-	776	760	748
pH, Field	su	-		6.81	6.62	6.75	6.85	6.89	6.90	6.77	6.78	7.15	7.15	-	6.82	6.7	6.73
Appendix IV																	
Antimony	mg/L	-		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112		0.004	0.005	0.007	0.004	0.006	0.006	0.006	0.006	0.005	0.006	0.007	0.005	0.005	0.005
Barium	mg/L	2.000		0.149	0.150	0.168	0.128	0.152	0.148	0.145	0.129	0.136	0.135	0.133	0.121	0.113	0.109
Beryllium	mg/L	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	-		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04		0.036	0.023	0.032	0.033	0.034	0.039	**0.041**	0.037	0.036	0.036	0.034	0.019	0.015	0.016
Mercury	mg/L	-		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-		1.1	0.34	0.518	0.299	0.4	0.618	-0.0627	0.717	0.812	0.600	0.533	0.504	0.56	0.301
Radium-228	pCi/L	-		0.518	0.457	-0.166	0.254	1.47	0.217	-0.778	0.031	0.00457	-0.262	-0.0288	0.85	3.47	0.0172
Radium-226/228	pCi/L	5		1.61	0.796	0.518	0.553	1.87	0.889	0	0.748	0.816	0.600	0.533	1.35	4.03	0.318
Selenium	mg/L	-		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-		31	45	43	37	48	55	19	20	31	32	19	14	14	11

BOLD values indicate GPS exceedance

		Sample Location:	MW-2												
		Sample Type:	Downgradient												
		Sample Date:	4/28/2020	5/26/2020	6/23/2020	7/21/2020	8/18/2020	9/15/2020	9/28/2020	10/12/2020	10/19/2020	11/6/2020	1/27/2021	5/4/2021	8/3/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring									Initial A.M.	Assessment Monitoring		
Field Parameters															
pH	su	-	6.77	6.54	6.69	6.75	6.80	6.83	6.70	6.72	7.08	6.83	6.76	6.7	6.65
Conductivity	mS/cm	-	1.602	1.556	1.699	1.744	1.762	1.794	1.761	1.762	1.798	1.792	1.734	1.7	1655
Turbidity	NTU	-	72.31	8.27	8.95	9.42	5.95	4.15	7.11	9.56	6.28	11.27	10.15	10	9.62
Dissolved Oxygen	mg/L	-	0.02	0.02	0.07	0.19	0.15	0.12	0.03	0.34	0.03	0.19	0.08	0.21	0.02
Temperature	°C	-	11.6	14.2	12.9	15.0	13.9	13.7	12.7	14.5	12.3	14.3	9.1	12	14.3
Oxidation Reduction Potential	mV	-	-42.5	36.0	-40.2	32.5	38.2	-75.8	56.1	35.3	22.1	-29.0	55.9	181.8	94.5
Appendix III															
Boron	mg/L	-	3.56	3.38	4.05	4.61	5.19	5.97	5.94	5.97	5.97	-	5.8	5.04	6.17
Calcium	mg/L	-	251	256	268	271	272	270	265	270	270	-	260	254	226
Chloride	mg/L	-	67	68	75	81	85	88	84	88	88	-	94	77	79
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0
Sulfate	mg/L	-	386	386	484	549	580	560	586	560	560	-	506	505	504
Total Dissolved Solids	mg/L	-	1170	1180	1300	1390	1430	1390	1420	1390	1390	-	1320	1250	1300
pH, Field	su	-	6.77	6.54	6.69	6.75	38.2	-75.8	56.1	6.72	7.08	-	6.76	6.70	6.65
Appendix IV															
Antimony	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	2.000	0.039	0.043	0.045	0.036	0.045	0.039	0.041	0.041	0.041	0.042	0.041	0.041	0.039
Beryllium	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	**0.055**	**0.047**	**0.055**	**0.053**	**0.057**	**0.066**	**0.066**	**0.065**	**0.070**	**0.063**	**0.067**	**0.061**	**0.058**
Mercury	mg/L	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	0.010	0.008	0.010	0.007	0.011	0.011	0.012	0.012	0.012	0.012	0.01	0.009	0.012
Radium-226	pCi/L	-	0.813	0.0551	0.754	0.329	0.171	0.183	0.263	0.151	0.405	0.539	0.296	0.366	0.17
Radium-228	pCi/L	-	1.05	0.0833	-0.139	0.0326	0.573	-0.0154	0.0604	1.3	0.0896	0.874	0.713	0.15	1.02
Radium-226/228	pCi/L	5	1.86	0.138	0.754	0.362	0.745	0.183	0.323	1.45	0.495	1.41	1.01	0.515	1.19
Selenium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	<3	1	<3	<3	14	<3	2	6	3	10	10	12	10

BOLD values indicate GPS exceedance

		Sample Location:	MW-3	
		Sample Type:	Upgradient	
		Sample Date:	5/4/2021	8/3/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring	
Field Parameters				
pH	su	-	7.20	7.15
Conductivity	mS/cm	-	1.800	1.796
Turbidity	NTU	-	2.10	8.01
Dissolved Oxygen	mg/L	-	0.10	0.03
Temperature	°C	-	12.0	14.1
Oxidation Reduction Potential	mV	-	-37.5	-65.2
Appendix III				
Boron	mg/L	-	5.41	6.16
Calcium	mg/L	-	243	223
Chloride	mg/L	-	89	92
Fluoride	mg/L	-	<1.0	<1.0
Sulfate	mg/L	-	698	727
Total Dissolved Solids	mg/L	-	1490	1500
pH, Field	su	-	7.20	7.15
Appendix IV				
Antimony	mg/L	-	<0.005	<0.005
Arsenic	mg/L	0.0112	0.003	0.003
Barium	mg/L	2.000	0.021	0.021
Beryllium	mg/L	-	<0.001	<0.001
Cadmium	mg/L	-	<0.0005	<0.0005
Chromium	mg/L	-	<0.005	<0.005
Cobalt	mg/L	-	<0.005	<0.005
Fluoride	mg/L	-	<1.0	<1.0
Lead	mg/L	-	<0.003	<0.003
Lithium	mg/L	0.04	**0.077**	**0.086**
Mercury	mg/L	-	<0.0002	<0.0002
Molybdenum	mg/L	0.1	**0.162**	**0.153**
Radium-226	pCi/L	-	0.437	0.152
Radium-228	pCi/L	-	0.76	0.963
Radium-226/228	pCi/L	5	1.2	1.11
Selenium	mg/L	-	<0.005	<0.005
Thallium	mg/L	-	<0.002	<0.002
Total Suspended Solids	mg/L	-	3	1

BOLD values indicate GPS exceedance

		Sample Location:	MW-4																									
		Sample Type:	Background																									
		Sample Date:	4/28/2020		5/26/2020		6/23/2020		7/21/2020		8/18/2020		9/15/2020		9/28/2020		10/12/2020		10/19/2020	11/6/2020		1/27/2021		5/4/2021		8/3/2021	
Constituent	Unit	CCR Rule GPS	Background Monitoring																	Initial A.M.		Assessment Monitoring					
Field Parameters				Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup			Field Dup		Field Dup		Field Dup		Field Dup
pH	su	-	7.18	7.18	7.13	7.13	7.11	7.11	7.23	7.23	7.24	7.24	7.28	7.28	7.14	7.14	7.13	7.13	7.87	7.22	7.22	7.14	7.14	7.10	7.10	7.03	7.03
Conductivity	mS/cm	-	0.902	0.902	0.894	0.894	0.911	0.911	0.890	0.890	0.880	0.880	0.888	0.888	0.859	0.859	0.866	0.866	0.875	0.876	0.876	0.900	0.900	0.910	0.910	0.884	0.884
Turbidity	NTU	-	2.57	2.57	0.26	0.26	3.01	3.01	1.70	1.70	1.56	1.56	1.64	1.64	1.08	1.08	1.39	1.39	1.25	1.21	1.21	1.57	1.57	2.00	2.00	1.84	1.84
Dissolved Oxygen	mg/L	-	0.31	0.31	0.29	0.29	0.02	0.02	0.03	0.03	0.01	0.01	0.02	0.02	0.02	0.02	0.35	0.35	0.04	0.18	0.18	0.13	0.13	0.19	0.19	0.03	0.03
Temperature	°C	-	10.2	10.2	14.1	14.1	13.5	13.5	14.7	14.7	14.2	14.2	13.7	13.7	13.4	13.4	14.0	14.0	12.9	14.4	14.4	9.7	9.7	13.0	13.0	14.4	14.4
Oxidation Reduction Potential	mV	-	-76.7	-76.7	-45.2	-45.2	-174.8	-174.8	-68.4	-68.4	-75.0	-75.0	-153.2	-153.2	-77.3	-77.3	-63.8	-63.8	-78.1	-119.1	-119.1	-21.9	-21.9	-22.5	-22.5	-66.4	-66.4
Appendix III																											
Boron	mg/L	-	0.05	0.05	0.06	0.06	0.06	0.05	0.06	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.06	0.05	0.06	-	-	0.05	0.05	0.05	0.05	0.08	0.07
Calcium	mg/L	-	113	111	115	114	108	108	105	102	111	107	108	110	102	105	111	110	99.7	-	-	112	109	102	107	98.4	94.6
Chloride	mg/L	-	70	70	72	72	72	73	72	72	70	71	68	70	69	70	71	71	68	-	-	70	70	72	75	68	68
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	-	59	60	57	56	57	57	56	56	58	59	58	58	58	58	60	59	57	-	-	57	57	56	58	52	53
Total Dissolved Solids	mg/L	-	548	546	566	562	558	582	540	534	582	552	572	542	538	544	538	534	554	-	-	522	514	532	526	568	570
pH, Field	su	-	7.18	7.18	7.13	7.13	7.11	7.11	7.23	7.23	7.24	7.24	7.28	7.28	7.14	7.14	7.13	7.13	7.87	-	-	7.14	7.14	7.1	7.1	7.03	7.03
Appendix IV																											
Antimony	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	0.006	0.006	0.006	0.007	0.007	0.007	0.007	0.007	0.008	0.007	0.009	0.007	0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.007	0.007	0.006	0.007	0.008	0.008
Barium	mg/L	2.000	0.157	0.155	0.165	0.168	0.165	0.170	0.146	0.147	0.166	0.167	0.163	0.163	0.163	0.168	0.151	0.155	0.160	0.16	0.159	0.157	0.153	0.156	0.156	0.155	0.159
Beryllium	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	<0.010	<0.010	0.009	0.009	0.008	0.008	0.009	0.008	<0.010	<0.010	0.010	0.010	0.010	0.011	0.010	<0.010	0.010	0.011	0.011	0.012	0.01	<0.010	0.011	0.01	0.01
Mercury	mg/L	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	<0.005	<0.005	<0.005	0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005
Radium-226	pCi/L	-	0.839	0.953	0.599	1.08	0.368	0.223	0.339	0.811	0.527	0.3	0.583	0.773	0.797	0.759	0.35	0.709	0.357	0.742	3.30	0.524	0.297	2.12	0.626	0.232	0.532
Radium-228	pCi/L	-	1.08	1.38	-0.093	0.28	-0.141	0.302	0.863	0.721	2.46	0.253	0.113	-0.641	0.839	1.47	1.65	1.38	0.232	0.0791	0.921	-0.957	0.956	5	-0.91	-0.362	1.81
Radium-226/228	pCi/L	5	1.92	2.33	0.599	1.36	0.368	0.524	1.2	1.53	2.99	0.552	0.696	0.773	1.64	2.23	2.00	2.09	0.589	0.821	4.22	0.524	1.25	2.89	0.626	0.232	2.34
Selenium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	<3	<3	1	1	<3	<3	<3	<3	<3	<3	<3	<3	2	2	<3	1	3	1	1	1	<3	1	<3	1	1

BOLD values indicate GPS exceedance

		Sample Location:	MW-5												
		Sample Type:	Downgradient												
		Sample Date:	4/28/2020	5/26/2020	6/23/2020	7/21/2020	8/18/2020	9/15/2020	9/28/2020	10/12/2020	10/19/2020	11/6/2020	1/27/2021	5/4/2021	8/3/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring									Initial A.M.	Assessment Monitoring		
Field Parameters															
pH	su	-	7.27	7.24	7.31	7.34	7.30	7.17	6.71	7.34	7.45	7.16	7.35	6.40	7.22
Conductivity	mS/cm	-	1.576	1.882	1.970	1.869	1.750	1.893	1.945	2.493	1.425	2.234	1.295	1.600	1.772
Turbidity	NTU	-	179.57	69.71	17.91	15.10	20.25	19.02	15.75	12.35	9.58	18.49	15.25	21.00	9.52
Dissolved Oxygen	mg/L	-	0.55	0.65	2.61	3.85	2.50	0.64	1.27	3.49	4.25	1.02	2.34	2.45	2.45
Temperature	°C	-	11.6	13.9	15.2	17.5	12.7	12.3	12.5	15.5	11.6	12.5	8.6	13.0	13.3
Oxidation Reduction Potential	mV	-	-33.0	28.7	-34.8	58.4	69.5	-24.8	180.1	-31.2	130.2	17.5	191.2	248.4	132.6
Appendix III															
Boron	mg/L	-	4.99	5.19	4.59	4.57	4.48	5.00	5.09	5.00	5.75	-	4.61	3.66	4.82
Calcium	mg/L	-	245	320	289	251	266	266	283	372	319	-	245	221	229
Chloride	mg/L	-	68	82	75	80	76	77	78	81	83	-	66	73	66
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0
Sulfate	mg/L	-	591	930	931	877	714	791	873	1,080	1,170	-	578	581	700
Total Dissolved Solids	mg/L	-	1280	1770	1720	1640	1520	1540	1660	1960	2020	-	1220	1230	1390
pH, Field	su	-	7.27	7.24	7.31	7.34	7.30	7.17	6.71	7.34	7.45	-	7.35	6.4	7.22
Appendix IV															
Antimony	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	0.005	0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002
Barium	mg/L	2.000	0.064	0.056	0.049	0.041	0.056	0.043	0.043	0.048	0.042	0.033	0.039	0.038	0.04
Beryllium	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	-	0.005	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	**0.091**	**0.051**	**0.061**	**0.074**	**0.085**	**0.091**	**0.070**	**0.054**	**0.046**	**0.057**	**0.08**	**0.073**	**0.078**
Mercury	mg/L	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	0.096	0.051	0.050	0.052	0.067	0.053	0.044	0.038	0.035	0.032	0.054	0.05	0.039
Radium-226	pCi/L	-	1.1	-0.0419	0.379	-0.0445	0.415	0.458	0.533	0.461	0.537	0.343	0.787	0.349	0.374
Radium-228	pCi/L	-	0.187	-0.481	-0.299	0.46	1.06	-0.00462	0.225	0.176	-0.866	1.36	3.2	0.797	0.271
Radium-226/228	pCi/L	5	1.29	0	0.379	0.46	1.48	0.458	0.758	0.637	0.537	1.70	3.99	1.08	0.644
Selenium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	161	21	23	37	20	61	6	14	7	4	7	8	4

BOLD values indicate GPS exceedance

		Sample Location:	MW-6												
		Sample Type:	Downgradient												
		Sample Date:	4/28/2020	5/26/2020	6/23/2020	7/21/2020	8/18/2020	9/15/2020	9/28/2020	10/12/2020	10/19/2020	11/6/2020	1/27/2021	5/4/2021	8/3/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring									Initial A.M.	Assessment Monitoring		
Field Parameters															
pH	su	-	6.64	6.35	6.68	6.76	6.80	6.85	6.69	6.71	7.11	6.76	6.72	7.0	6.5
Conductivity	mS/cm	-	0.954	0.902	1.044	1.075	1.130	1.251	1.149	1.205	1.275	1.169	1.178	1.000	1.022
Turbidity	NTU	-	16.71	17.80	33.60	6.61	8.99	6.95	5.42	8.45	8.35	9.69	1.19	8.00	8.74
Dissolved Oxygen	mg/L	-	0.05	0.01	0.09	0.09	0.05	0.04	0.02	0.24	0.04	0.18	0.12	0.10	0.07
Temperature	°C	-	10.5	14.2	11.7	13.4	13.0	13.6	12.6	14.3	12.8	15.2	11.0	12.0	13.2
Oxidation Reduction Potential	mV	-	-26.9	102.4	-45.9	139.7	91.1	-66.5	59.5	88.9	91.2	12.0	122.9	70.8	168.5
Appendix III															
Boron	mg/L	-	0.56	0.49	0.65	0.75	0.86	1.05	0.97	0.99	1.09	-	0.91	0.64	0.76
Calcium	mg/L	-	142	143	154	161	170	192	175	189	173	-	191	149	146
Chloride	mg/L	-	26	24	29	33	37	43	39	41	42	-	38	27	27
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0
Sulfate	mg/L	-	135	123	154	183	222	264	214	242	263	-	198	133	139
Total Dissolved Solids	mg/L	-	642	598	706	738	820	880	822	868	898	-	798	658	692
pH, Field	su	-	6.64	6.35	6.68	6.76	6.80	6.85	6.69	6.71	7.11	-	6.72	7.0	6.5
Appendix IV															
Antimony	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	2.000	0.042	0.050	0.042	0.044	0.053	0.054	0.055	0.054	0.057	0.052	0.052	0.044	0.043
Beryllium	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	0.037	0.038	0.037	**0.041**	**0.044**	**0.055**	**0.053**	**0.052**	**0.059**	**0.058**	**0.048**	**0.048**	**0.047**
Mercury	mg/L	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	0.021	0.021	0.026	0.025	0.030	0.031	0.028	0.029	0.034	0.028	0.024	0.024	0.029
Radium-226	pCi/L	-	0.212	0.265	0.568	1.06	0.34	1.01	0.175	0.31	0.464	0.393	0.263	0.32	0.116
Radium-228	pCi/L	-	0.384	0.357	0.771	-0.0421	1.22	0.641	0.27	0.237	1.14	0.426	1.72	1.13	1.3
Radium-226/228	pCi/L	5	0.596	0.622	1.34	1.06	1.56	1.65	0.445	0.547	1.61	0.819	1.98	1.45	1.42
Selenium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	<3	6	<3	<3	<3	<3	<3	<3	1	<3	<3	<3	2

BOLD values indicate GPS exceedance

		Sample Location:	MW-7					
		Sample Type:	Downgradient					
		Sample Date:	6/15/2021	7/20/2021	8/24/2021	9/28/2021	11/2/2021	12/7/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring					
Field Parameters								
pH	su	-	8.18	7.40	7.40	7.47	7.37	7.47
Conductivity	mS/cm	-	0.879	0.900	0.916	0.925	0.462	0.972
Turbidity	NTU	-	1.71	5.00	5.37	16.01	5.18	2.2
Dissolved Oxygen	mg/L	-	0.03	<0.1	0.01	0.02	0	0.02
Temperature	°C	-	12.9	14.0	17.0	14.3	13	11
Oxidation Reduction Potential	mV	-	-142.1	-117.2	-139.5	-128.3	-146.5	-157.1
Appendix III								
Boron	mg/L	-	1.88	1.78	1.89	1.81	2.12	2.19
Calcium	mg/L	-	110	111	112	108	122	126
Chloride	mg/L	-	73	74	74	75	73	72.2
Fluoride	mg/L	-	< 1.0	<1.0	<1.0	<1.0	<1.0	0.338
Sulfate	mg/L	-	189	181	184	191	212	203
Total Dissolved Solids	mg/L	-	586	574	592	588	622	634
pH, Field	su	-	8.18	7.40	7.40	7.47	7.37	7.47
Appendix IV								
Antimony	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	0.006	0.006	0.007	0.006	0.005	0.006
Barium	mg/L	2.000	0.056	0.06	0.052	0.051	0.054	0.056
Beryllium	mg/L	-	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	< 1.0	<1.0	<1.0	<1.0	<1.0	0.338
Lead	mg/L	-	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	**0.089**	**0.096**	**0.093**	**0.097**	**0.100**	**0.100**
Mercury	mg/L	-	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	**0.259**	**0.26**	**0.292**	**0.276**	**0.276**	**0.293**
Radium-226	pCi/L	-	0.253	1.4	0.766	0.829	0.666	2.64
Radium-228	pCi/L	-	1.85	3.42	0.535	2.49	0.115	0.179
Radium-226/228	pCi/L	5	2.11	4.82	1.3	3.32	0.781	2.82
Selenium	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	< 3	<3	<3	<3	<3	<3

BOLD values indicate GPS exceedance

		Sample Location:	MW-8					
		Sample Type:	Downgradient					
		Sample Date:	6/15/2021	7/20/2021	8/24/2021	9/28/2021	11/2/2021	12/7/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring					
Field Parameters								
pH	su	-	7.78	7.00	6.99	7.24	7.03	7.12
Conductivity	mS/cm	-	0.620	0.640	0.620	0.721	0.656	0.653
Turbidity	NTU	-	2.24	7.00	7.18	6.53	5.25	2.95
Dissolved Oxygen	mg/L	-	2.29	1.00	1.66	0.04	7.83	1.76
Temperature	°C	-	10.7	14.0	16.4	14.3	14	11.2
Oxidation Reduction Potential	mV	-	72.1	280.5	325.9	112.7	228.5	122
Appendix III								
Boron	mg/L	-	0.11	0.1	0.08	0.21	0.08	0.05
Calcium	mg/L	-	91.2	94.6	89.8	86.5	93.0	98.5
Chloride	mg/L	-	11	17	10	59	8	4.45
Fluoride	mg/L	-	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0587
Sulfate	mg/L	-	25	35	17	48	16	13.8
Total Dissolved Solids	mg/L	-	392	384	362	414	368	370
pH, Field	su	-	7.78	7.00	6.99	7.24	7.03	7.12
Appendix IV								
Antimony	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	2.000	0.028	0.021	0.022	0.026	0.021	0.021
Beryllium	mg/L	-	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0587
Lead	mg/L	-	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	< 0.010	<0.005	<0.005	0.013	0.009	0.006
Mercury	mg/L	-	< 0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	< 0.011	0.006	<0.005	0.013	<0.005	<0.005
Radium-226	pCi/L	-	0.287	0.389	0.437	0.228	0.228	1.70
Radium-228	pCi/L	-	0.396	-0.103	0.114	0.469	1.71	0.583
Radium-226/228	pCi/L	5	0.683	0.389	0.551	0.697	1.93	2.28
Selenium	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	< 3	<3	<3	<3	<3	2

BOLD values indicate GPS exceedance

Sample Location:			MW-9												
Sample Type:			Downgradient												
Sample Date:			6/15/2021	6/15/2021	7/20/2021	7/20/2021	8/24/2021	8/24/2021	9/28/2021	9/28/2021	11/2/2021	11/2/2021	12/7/2021	12/7/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring												
Field Parameters				Field Dupe		Field Dupe		Field Dupe		Field Dupe		Field Dupe		Field Dupe
pH	su	-	7.74	7.74	7.20	7.20	7.21	7.21	7.28	7.28	7.14	7.14	7.27	7.27
Conductivity	mS/cm	-	0.393	0.393	0.42	0.42	0.44	0.44	0.444	0.444	0.471	0.471	0.459	0.459
Turbidity	NTU	-	1.60	1.60	6.7	6.7	6.15	6.15	5.25	5.25	5.61	5.61	2.21	2.21
Dissolved Oxygen	mg/L	-	5.48	5.48	5.35	5.35	4.52	4.52	4.5	4.5	4.89	4.89	5.42	5.42
Temperature	°C	-	12.9	12.9	17	17	19	19	17.1	17.1	13.8	13.8	9.5	9.5
Oxidation Reduction Potential	mV	-	164.1	164.1	310.7	310.7	329.2	329.2	171.8	171.8	238.1	238.1	135.9	135.9
Appendix III														
Boron	mg/L	-	< 0.40	< 0.40	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Calcium	mg/L	-	62.1	64.2	66.3	67.5	69.2	68.8	71.0	71.5	78.0	80.7	76.6	75.8
Chloride	mg/L	-	< 5	< 5	<5	<5	<5	<5	<5	<5	<5	<5	1.11	1.07
Fluoride	mg/L	-	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.033	0.033
Sulfate	mg/L	-	< 5	< 5	<5	<5	<5	<5	<5	<5	<5	<5	3.58	3.52
Total Dissolved Solids	mg/L	-	232	240	242	232	242	256	246	244	252	268	244	246
pH, Field	su	-	7.74	7.74	7.20	7.20	7.21	7.21	7.28	7.28	7.14	7.14	7.27	7.27
Appendix IV														
Antimony	mg/L	-	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	2.000	0.015	0.015	0.013	0.014	0.015	0.014	0.014	0.015	0.015	0.016	0.014	0.015
Beryllium	mg/L	-	< 0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.033	0.033
Lead	mg/L	-	< 0.003	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury	mg/L	-	< 0.0002	< 0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	0.625	-	0.189	0.166	0.266	0.421	0.797	0.368	0.177	0.534	1.67	1.69
Radium-228	pCi/L	-	0.218	0.214	0.286	-0.125	-0.359	1.65	0.453	0.846	-0.0915	0.483	0.666	0.826
Radium-226/228	pCi/L	5	0.844	-	0.475	0.166	0.266	2.07	1.25	1.21	0.177	1.02	2.34	2.51
Selenium	mg/L	-	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	< 0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	< 3	< 3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

BOLD values indicate GPS exceedance

		Sample Location:	MW-10					
		Sample Type:	Downgradient					
		Sample Date:	6/15/2021	7/20/2021	8/24/2021	9/28/2021	11/2/2021	12/7/2021
Constituent	Unit	CCR Rule GPS	Background Monitoring					
Field Parameters								
pH	su	-	7.30	6.60	6.70	6.89	6.57	6.69
Conductivity	mS/cm	-	0.725	0.71	0.741	0.664	0.78	0.753
Turbidity	NTU	-	1.79	2.3	1.95	5.99	1.29	2.09
Dissolved Oxygen	mg/L	-	2.05	3.3	3.2	2.43	2.83	2.89
Temperature	°C	-	12.0	14	15.5	15	14.2	11.6
Oxidation Reduction Potential	mV	-	121.2	240	330.1	164.1	230.9	147.9
Appendix III								
Boron	mg/L	-	0.05	0.05	0.06	0.05	0.07	0.05
Calcium	mg/L	-	132	128	129	113	137	128
Chloride	mg/L	-	< 5	<5	<5	<5	<5	1.03
Fluoride	mg/L	-	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0660
Sulfate	mg/L	-	12	15	14	9	17	14.5
Total Dissolved Solids	mg/L	-	446	410	432	376	436	428
pH, Field	su	-	7.30	6.60	6.70	6.89	6.57	6.69
Appendix IV								
Antimony	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.0112	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	2.000	0.044	0.041	0.047	0.041	0.044	0.043
Beryllium	mg/L	-	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	-	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0660
Lead	mg/L	-	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.04	< 0.010	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury	mg/L	-	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.1	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	0.548	0.262	0.183	0.701	0.381	1.46
Radium-228	pCi/L	-	0.123	-0.994	0.187	-0.076	0.225	0.929
Radium-226/228	pCi/L	5	0.671	0.262	0.371	0.701	0.605	2.39
Selenium	mg/L	-	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	-	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	< 3	<3	<3	<3	<3	<3

BOLD values indicate GPS exceedance

Appendix D

Lab Reports

MERIT LABORATORIES, INC.
2680 EAST LANSING DRIVE EAST LANSING • MICHIGAN • 48823
PHONE: 517-332-0167 FAX: 517-332-6333
FULL SERVICE ANALYTICAL TESTING FIELD SERVICES • CONSULTING • TRAINING

BOARD OF WATER & LIGHT

ERICKSON AM EPA ASSESSMENT 2

SDG Batch:

21073

Pages 1 - 217

MERIT LABORATORIES, INC.
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PHONE: 517-332-0167 FAX: 517-332-6333
FULL SERVICE ANALYTICAL TESTING FIELD SERVICES • CONSULTING • TRAINING

BOARD OF WATER & LIGHT

PROJECT:
ERICKSON AM EPA ASSESSMENT 2

SDG Batch:
21073.01

Prepared by:
Merit Laboratories, Inc.

March 1, 2021

Laboratory Name: Merit Laboratories, Inc.
City / State: East Lansing, MI
Sample Delivery Group: S21073.01 - .07

	References		Pages		Checklist	
Deliverable	**Form**	**CLP**	**From**	**To**	**Lab**	**Audit**
1. **Inventory Sheet** (not numbered)	This	DC-2			☑	☐
2. **SDG Case Narrative**			1	2	☑	☐
3. **Analytical Summary Report**			3	34	☑	☐
4. **ICP/MS Metals Data**			35	135		
Sequence / Injection Log		F.0			☑	☐
Data Sheet		F. I			☑	☐
Initial Calibration and Calibration Verification		F. IIA			☑	☐
CRDL Standards		F. IIB			☐	☐
Blanks		F. III			☑	☐
Interference Check Sample		F. IVB			☑	☐
Spike Sample Recovery		F. VA			☑	☐
Post-Digest Spike Sample Recovery		F. VB			☑	☐
Duplicates		F. VI			☐	☐
Laboratory Control Sample		F. VII			☑	☐
Serial Dilutions		F. VIII			☑	☐
Analysis Run Log		F. XIII			☑	☐
ICP/MS Tune		F. XIV			☑	☐
Internal Standard Relative Intensity Summary		F. XV			☑	☐
Instrument Detection Limits (IDL) & MDLs		F. IX			☑	☐
Linear Ranges		F. XI			☑	☐
ICP/MS Raw Data					☑	☐
Preparation / Digestion Log		F. XII			☑	☐
5. **Mercury Data**			136	154		
Sequence / Injection Log		F.0			☑	☐
Data Sheet		F. I			☑	☐
Initial Calibration and Calibration Verification		F. IIA			☑	☐
CRDL Standards		F. IIB			☐	☐
Blanks		F. III			☑	☐
Spike Sample Recovery		F. VA			☑	☐
Post-Digest Spike Sample Recovery		F. VB			☑	☐
Duplicates		F. VI			☐	☐
Laboratory Control Sample		F. VII			☑	☐
Analysis Run Log		F. XIII			☑	☐
Mercury Cold Vapor Raw Data					☑	☐
Preparation / Digestion Log					☑	☐
6. **Ion Chromatography Data**			155	210		
Bench Sheet - sample and QC sample evaluation					☑	☐
Calibration Curve - data and evaluation					☑	☐
7. **Total Suspended Solids Data**			211	211		
Bench Sheet - sample and QC sample evaluation					☑	☐

Deliverable	References Form	References CLP	Pages From	Pages To	Checklist Lab	Checklist Audit
8. **Total Dissolved Solids Data**			212	212		
Bench Sheet - sample and QC sample evaluation					☑	☐
9. **Shipping / Receiving Documents**			213	217		
Chain-of-Custody					☑	☐
Sample log-in sheet					☑	
Sample Receipt					☑	☐
10. **Subcontracted Analysis Report**						
GEL Laboratories – Radiological Analysis (Total Pages 50)					☑	☐

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CASE NARRATIVE
CLIENT: BOARD OF WATER & LIGHT
PROJECT: ERICKSON AM EPA ASSESSMENT 2
Merit IDs: S21073.01-S21073.07

Field Sampling: Marc Wahrer performed the fieldwork.

Analytical Bottles: All bottles were sent with the appropriate preservation in it. Please see the bottle list attached.

Sample Receiving: All samples were received by the laboratory (01/28/2021). Dates and signatures can be found on the Chain of Custody Records. The sample receipts specify the actual tags and bottles received and logged into the laboratory "vlims" system.

ANALYSES

Metals: All metal analyses were performed according to Method 200.8. The metal digestion was performed according to Method 3015A. The QC requirements were followed for this specific project and method-specified criteria were met. *Outliers*: None

Notes: Dilution test not applicable if measured concentration is less than 100 times MDL.

Mercury: All mercury QC requirements were met according to the specifications in Method 245.1. *Outliers*: None

Fluoride: All fluoride QC requirements were met according to the specifications in Method 300.0. *Outliers:* None

Chloride: All chloride QC requirements were met according to the specifications in Method 300.0. *Outliers*: None

Sulfate: All Sulfate QC requirements were met according to the specifications in Method 300.0. *Outliers:* None

Total Suspended Solids: All total suspended solids QC requirements were met according to the specifications in Method 2540 D.

Outliers:
Run Batch TSS210128

- The DUP (non-client sample) had high RPD for TSS.

Total Dissolved Solids: All total suspended solids QC requirements were met according to the specifications in Method 2540 C. *Outliers*: None

Radium 226 & 228: All radiological analysis were subcontracted out to GEL Laboratories. GEL Laboratories analytical report is included.

Data Reporting: The analytical reports are reflective of what is on a given Chain-of-Custody record (COC). Merit's IDs were assigned to the samples as they were delivered and accepted by our log-in staff.

"I certify that this data package is in compliance with the terms and conditions of the program, and project, and contractual requirements both technically and for completeness, for other than the condition detailed above. Release of the data contained in this hardcopy data package and its computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature."

Barbara Ball

Barb Ball
QA Officer

03/01/2021
Date

Analytical Laboratory Report

Final Report

Report ID: S21073.01(03)
Generated on 02/26/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S21073.01-S21073.07
Project: Erickson AM EPA Assessment 2
Collected Date(s): 01/27/2021
Submitted Date/Time: 01/28/2021 12:36
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

All analyses completed
All metals results are reported as total.

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (7 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S21073.01	MW-1 L101070-01	Groundwater	01/27/21 12:26
S21073.02	MW-2 L101070-02	Groundwater	01/27/21 15:56
S21073.03	MW-4 L101070-03	Groundwater	01/27/21 10:21
S21073.04	MW-5 L101070-04	Groundwater	01/27/21 16:36
S21073.05	MW-6 L101070-05	Groundwater	01/27/21 14:21
S21073.06	MW-4 Duplicate L101070-06	Groundwater	01/27/21 10:21
S21073.07	Field Blank L101070-07	Water	01/27/21 07:30

Lab Sample ID: S21073.01
Sample Tag: MW-1 L101070-01
Collected Date/Time: 01/27/2021 12:26
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.4	IR
2	1L Plastic	None	Yes	2.4	IR
1	125ml Plastic	HNO3	Yes	2.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/29/21 10:15	JRH	
Metal Digestion	Completed	SW3015A	01/29/21 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 01/29/21 13:35, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 01/29/21 08:26, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	44	10	0.13	mg/L	10	16887-00-6	
Sulfate	78	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 01/28/21 17:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	776	20	2	mg/L	2		

Method: SM2540D, Run Date: 01/28/21 15:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	14	3	1	mg/L	2.00		

Metals

Method: E200.8, Run Date: 01/29/21 12:36, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	173	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 01/29/21 11:32, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.005	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.121	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.21	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.019	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S21073.01 (continued)

Sample Tag: MW-1 L101070-01

Method: E200.8, Run Date: 01/29/21 11:32, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	

Method: E245.1, Run Date: 01/29/21 13:02, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/26/21 16:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S21073.02
Sample Tag: MW-2 L101070-02
Collected Date/Time: 01/27/2021 15:56
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.4	IR
2	1L Plastic	None	Yes	2.4	IR
1	125ml Plastic	HNO3	Yes	2.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/29/21 10:15	JRH	
Metal Digestion	Completed	SW3015A	01/29/21 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 01/29/21 08:36, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	94	10	0.13	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 01/29/21 13:45, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 01/29/21 10:07, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	506	50	5.2	mg/L	50	14808-79-8	

Method: SM2540C, Run Date: 01/28/21 17:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,320	20	2	mg/L	2		

Method: SM2540D, Run Date: 01/28/21 15:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	10	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 01/29/21 12:37, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	260	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 01/29/21 11:35, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.041	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	5.80	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	

Lab Sample ID: S21073.02 (continued)

Sample Tag: MW-2 L101070-02

Method: E200.8, Run Date: 01/29/21 11:35, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lithium*	0.067	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.010	0.005	0.000217	mg/L	5	7439-98-7	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	

Method: E245.1, Run Date: 01/29/21 13:04, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/26/21 16:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S21073.03
Sample Tag: MW-4 L101070-03
Collected Date/Time: 01/27/2021 10:21
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.4	IR
2	1L Plastic	None	Yes	2.4	IR
1	125ml Plastic	HNO3	Yes	2.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/29/21 10:15	JRH	
Metal Digestion	Completed	SW3015A	01/29/21 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 01/29/21 13:55, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 01/29/21 08:46, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	70	10	0.13	mg/L	10	16887-00-6	
Sulfate	57	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 01/28/21 17:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	522	20	2	mg/L	2		

Method: SM2540D, Run Date: 01/28/21 15:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	1	3	1	mg/L	1.00		b

Metals

Method: E200.8, Run Date: 01/29/21 12:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	112	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 01/29/21 11:39, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.007	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.157	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.012	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S21073.03 (continued)

Sample Tag: MW-4 L101070-03

Method: E200.8, Run Date: 01/29/21 11:39, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	

Method: E245.1, Run Date: 01/29/21 13:06, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/26/21 16:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S21073.04
Sample Tag: MW-5 L101070-04
Collected Date/Time: 01/27/2021 16:36
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.4	IR
2	1L Plastic	None	Yes	2.4	IR
1	125ml Plastic	HNO3	Yes	2.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/29/21 10:15	JRH	
Metal Digestion	Completed	SW3015A	01/29/21 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 01/29/21 08:56, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	66	10	0.13	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 01/29/21 14:05, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 01/29/21 10:17, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	578	50	5.2	mg/L	50	14808-79-8	

Method: SM2540C, Run Date: 01/28/21 17:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,220	20	2	mg/L	2		

Method: SM2540D, Run Date: 01/28/21 15:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	7	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 01/29/21 12:44, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	245	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 01/29/21 11:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.039	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	4.61	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	

Lab Sample ID: S21073.04 (continued)

Sample Tag: MW-5 L101070-04

Method: E200.8, Run Date: 01/29/21 11:42, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lithium*	0.080	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.054	0.005	0.000217	mg/L	5	7439-98-7	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	

Method: E245.1, Run Date: 01/29/21 13:07, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/26/21 16:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S21073.05
Sample Tag: MW-6 L101070-05
Collected Date/Time: 01/27/2021 14:21
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.4	IR
2	1L Plastic	None	Yes	2.4	IR
1	125ml Plastic	HNO3	Yes	2.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/29/21 10:15	JRH	
Metal Digestion	Completed	SW3015A	01/29/21 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 01/29/21 14:15, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 01/29/21 09:07, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	38	20	0.26	mg/L	20	16887-00-6	
Sulfate	198	20	2.1	mg/L	20	14808-79-8	

Method: SM2540C, Run Date: 01/28/21 17:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	798	20	2	mg/L	2		

Method: SM2540D, Run Date: 01/28/21 15:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 01/29/21 12:45, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	191	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 01/29/21 11:46, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.052	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.91	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.048	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.024	0.005	0.000217	mg/L	5	7439-98-7	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S21073.05 (continued)

Sample Tag: MW-6 L101070-05

Method: E200.8, Run Date: 01/29/21 11:46, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	

Method: E245.1, Run Date: 01/29/21 13:09, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/26/21 16:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S21073.06
Sample Tag: MW-4 Duplicate L101070-06
Collected Date/Time: 01/27/2021 10:21
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.4	IR
2	1L Plastic	None	Yes	2.4	IR
1	125ml Plastic	HNO3	Yes	2.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/29/21 10:15	JRH	
Metal Digestion	Completed	SW3015A	01/29/21 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 01/29/21 14:25, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 01/29/21 09:17, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	70	10	0.13	mg/L	10	16887-00-6	
Sulfate	57	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 01/28/21 17:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	514	20	2	mg/L	2		

Method: SM2540D, Run Date: 01/28/21 15:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 01/29/21 12:47, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	109	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 01/29/21 11:49, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.007	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.153	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.010	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S21073.06 (continued)

Sample Tag: MW-4 Duplicate L101070-06

Method: E200.8, Run Date: 01/29/21 11:49, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	

Method: E245.1, Run Date: 01/29/21 13:11, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/26/21 16:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S21073.07
Sample Tag: Field Blank L101070-07
Collected Date/Time: 01/27/2021 07:30
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.4	IR
2	1L Plastic	None	Yes	2.4	IR
1	125ml Plastic	HNO3	Yes	2.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/29/21 10:15	JRH	
Metal Digestion	Completed	SW3015A	01/29/21 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 01/29/21 14:35, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	

Method: E300.0, Run Date: 01/29/21 09:27, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 01/28/21 17:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		

Method: SM2540D, Run Date: 01/28/21 15:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 01/29/21 12:29, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 01/29/21 11:29, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.010	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S21073.07 (continued)

Sample Tag: Field Blank L101070-07

Method: E200.8, Run Date: 01/29/21 11:29, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	

Method: E245.1, Run Date: 01/29/21 13:16, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/26/21 16:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Quality Control Cover Page

Report ID: S21073.01(03)
Report Date: 02/26/2021
Project: Erickson AM EPA Assessment 2
Lab Sample ID(s): S21073.01-S21073.07

Report to:

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Sample ID	Sample Tag	Collected	Matrix	Analysis Departments
S21073.01	MW-1 L101070-01	01/27/2021 12:26	Groundwater	Inorganics, Metals
S21073.02	MW-2 L101070-02	01/27/2021 15:56	Groundwater	Inorganics, Metals
S21073.03	MW-4 L101070-03	01/27/2021 10:21	Groundwater	Inorganics, Metals
S21073.04	MW-5 L101070-04	01/27/2021 16:36	Groundwater	Inorganics, Metals
S21073.05	MW-6 L101070-05	01/27/2021 14:21	Groundwater	Inorganics, Metals
S21073.06	MW-4 Duplicate L101070-06	01/27/2021 10:21	Groundwater	Inorganics, Metals
S21073.07	Field Blank L101070-07	01/27/2021 07:30	Water	Inorganics, Metals

I certify that this data package is in compliance with the terms and conditions of the program, and project, and contractual requirements both technically and for completeness. Release of the data contained in this hardcopy data package and its computer-readable data submitted has been authorized by the Quality Assurance Manager and his/her designee, as verified by the following signature.

Barbara Ball
Quality Assurance Manager

Quality Control Report

Report ID: QC-S21073-01
Generated on 03/01/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:

Report Produced by

Merit Laboratories
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Report Summary

Lab Sample ID(s): S21073.01-S21073.07
Project: Erickson AM EPA Assessment 2
Submitted Date/Time: 01/28/2021 12:36
Sampled by: Marc Wahrer
P.O. #:

QC Report Sections

Report Flag Descriptions

*: QC result is outside of indicated control limits
W: Surrogate result not applicable due to sample dilution

I certify that this data package is in compliance with the terms and conditions of the program, and project, and contractual requirements both technically and for completeness. Release of the data contained in this hardcopy data package and its computer-readable data submitted has been authorized by the Quality Assurance Manager and his/her designee, as verified by the following signature.

Barbara Ball
Quality Assurance Manager

Lab Sample ID: S21073.01

Sample Tag: MW-1 L101070-01

Collected Date/Time: 01/27/2021 12:26

Matrix: Groundwater

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Chloride	E300.0	01/29/21 08:26	CL210129-W1-A	CL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Fluoride (Undistilled)	E300.0	01/29/21 13:35	FL210129-W1-A	FL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Sulfate	E300.0	01/29/21 08:26	SFT210129-W1-A	SFT210129-W1-A	No	BLK/LCS/MS/MSD/DU
Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128	TDS210128	No	BLK/LCS/DUP
Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128	TSS210128	No	BLK/LCS/DUP
Metals						
Antimony	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Arsenic	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Barium	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Beryllium	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Boron	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cadmium	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Calcium	E200.8	01/29/21 12:36	MT4-21-0129B	MTD-012921-3	No	BLK/LCS/MS/MSD
Chromium	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cobalt	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lead	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lithium	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Mercury	E245.1	01/29/21 13:02	HG2-HG3-21-0129A	HGD-012921-1	No	BLK/LCS/MS/MSD
Molybdenum	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Selenium	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Thallium	E200.8	01/29/21 11:32	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD

Lab Sample ID: S21073.02

Sample Tag: MW-2 L101070-02

Collected Date/Time: 01/27/2021 15:56

Matrix: Groundwater

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Chloride	E300.0	01/29/21 08:36	CL210129-W1-A	CL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Fluoride (Undistilled)	E300.0	01/29/21 13:45	FL210129-W1-A	FL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Sulfate	E300.0	01/29/21 10:07	SFT210129-W1-A	SFT210129-W1-A	No	BLK/LCS/MS/MSD/DU
Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128	TDS210128	No	BLK/LCS/DUP
Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128	TSS210128	No	BLK/LCS/DUP
Metals						
Antimony	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Arsenic	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Barium	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Beryllium	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Boron	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cadmium	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Calcium	E200.8	01/29/21 12:37	MT4-21-0129B	MTD-012921-3	No	BLK/LCS/MS/MSD
Chromium	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cobalt	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lead	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lithium	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Mercury	E245.1	01/29/21 13:04	HG2-HG3-21-0129A	HGD-012921-1	No	BLK/LCS/MS/MSD
Molybdenum	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Selenium	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Thallium	E200.8	01/29/21 11:35	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD

Lab Sample ID: S21073.03

Sample Tag: MW-4 L101070-03

Collected Date/Time: 01/27/2021 10:21

Matrix: Groundwater

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Chloride	E300.0	01/29/21 08:46	CL210129-W1-A	CL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Fluoride (Undistilled)	E300.0	01/29/21 13:55	FL210129-W1-A	FL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Sulfate	E300.0	01/29/21 08:46	SFT210129-W1-A	SFT210129-W1-A	No	BLK/LCS/MS/MSD/DU
Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128	TDS210128	No	BLK/LCS/DUP
Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128	TSS210128	No	BLK/LCS/DUP
Metals						
Antimony	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Arsenic	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Barium	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Beryllium	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Boron	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cadmium	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Calcium	E200.8	01/29/21 12:42	MT4-21-0129B	MTD-012921-3	No	BLK/LCS/MS/MSD
Chromium	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cobalt	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lead	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lithium	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Mercury	E245.1	01/29/21 13:06	HG2-HG3-21-0129A	HGD-012921-1	No	BLK/LCS/MS/MSD
Molybdenum	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Selenium	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Thallium	E200.8	01/29/21 11:39	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD

Lab Sample ID: S21073.04

Sample Tag: MW-5 L101070-04

Collected Date/Time: 01/27/2021 16:36

Matrix: Groundwater

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Chloride	E300.0	01/29/21 08:56	CL210129-W1-A	CL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Fluoride (Undistilled)	E300.0	01/29/21 14:05	FL210129-W1-A	FL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Sulfate	E300.0	01/29/21 10:17	SFT210129-W1-A	SFT210129-W1-A	No	BLK/LCS/MS/MSD/DU
Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128	TDS210128	No	BLK/LCS/DUP
Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128	TSS210128	No	BLK/LCS/DUP
Metals						
Antimony	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Arsenic	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Barium	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Beryllium	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Boron	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cadmium	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Calcium	E200.8	01/29/21 12:44	MT4-21-0129B	MTD-012921-3	No	BLK/LCS/MS/MSD
Chromium	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cobalt	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lead	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lithium	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Mercury	E245.1	01/29/21 13:07	HG2-HG3-21-0129A	HGD-012921-1	No	BLK/LCS/MS/MSD
Molybdenum	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Selenium	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Thallium	E200.8	01/29/21 11:42	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD

Lab Sample ID: S21073.05

Sample Tag: MW-6 L101070-05

Collected Date/Time: 01/27/2021 14:21

Matrix: Groundwater

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Chloride	E300.0	01/29/21 09:07	CL210129-W1-A	CL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Fluoride (Undistilled)	E300.0	01/29/21 14:15	FL210129-W1-A	FL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Sulfate	E300.0	01/29/21 09:07	SFT210129-W1-A	SFT210129-W1-A	No	BLK/LCS/MS/MSD/DU
Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128	TDS210128	No	BLK/LCS/DUP
Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128	TSS210128	No	BLK/LCS/DUP
Metals						
Antimony	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Arsenic	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Barium	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Beryllium	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Boron	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cadmium	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Calcium	E200.8	01/29/21 12:45	MT4-21-0129B	MTD-012921-3	No	BLK/LCS/MS/MSD
Chromium	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cobalt	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lead	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lithium	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Mercury	E245.1	01/29/21 13:09	HG2-HG3-21-0129A	HGD-012921-1	No	BLK/LCS/MS/MSD
Molybdenum	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Selenium	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Thallium	E200.8	01/29/21 11:46	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD

Lab Sample ID: S21073.06

Sample Tag: MW-4 Duplicate L101070-06

Collected Date/Time: 01/27/2021 10:21

Matrix: Groundwater

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Chloride	E300.0	01/29/21 09:17	CL210129-W1-A	CL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Fluoride (Undistilled)	E300.0	01/29/21 14:25	FL210129-W1-A	FL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Sulfate	E300.0	01/29/21 09:17	SFT210129-W1-A	SFT210129-W1-A	No	BLK/LCS/MS/MSD/DU
Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128	TDS210128	No	BLK/LCS/DUP
Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128	TSS210128	No	BLK/LCS/DUP
Metals						
Antimony	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Arsenic	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Barium	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Beryllium	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Boron	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cadmium	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Calcium	E200.8	01/29/21 12:47	MT4-21-0129B	MTD-012921-3	No	BLK/LCS/MS/MSD
Chromium	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cobalt	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lead	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lithium	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Mercury	E245.1	01/29/21 13:11	HG2-HG3-21-0129A	HGD-012921-1	No	BLK/LCS/MS/MSD
Molybdenum	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Selenium	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Thallium	E200.8	01/29/21 11:49	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD

Lab Sample ID: S21073.07

Sample Tag: Field Blank L101070-07

Collected Date/Time: 01/27/2021 07:30

Matrix: Water

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Chloride	E300.0	01/29/21 09:27	CL210129-W1-A	CL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Fluoride (Undistilled)	E300.0	01/29/21 14:35	FL210129-W1-A	FL210129-W1-A	No	BLK/LCS/MS/MSD/DU
Sulfate	E300.0	01/29/21 09:27	SFT210129-W1-A	SFT210129-W1-A	No	BLK/LCS/MS/MSD/DU
Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128	TDS210128	No	BLK/LCS/DUP
Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128	TSS210128	No	BLK/LCS/DUP
Metals						
Antimony	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Arsenic	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Barium	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Beryllium	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Boron	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cadmium	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Calcium	E200.8	01/29/21 12:29	MT4-21-0129B	MTD-012921-3	No	BLK/LCS/MS/MSD
Chromium	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Cobalt	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lead	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Lithium	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Mercury	E245.1	01/29/21 13:16	HG2-HG3-21-0129A	HGD-012921-1	No	BLK/LCS/MS/MSD
Molybdenum	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Selenium	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD
Thallium	E200.8	01/29/21 11:29	MT4-21-0129A	MTD-012921-3	No	BLK/LCS/MS/MSD

Inorganics, Prep Batch ID: CL210129-W1-A

Surrogates: No, QC Types: BLK/LCS/MS/MSD/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.01	Chloride	E300.0	01/29/21 08:26	CL210129-W1-A
S21073.02	Chloride	E300.0	01/29/21 08:36	CL210129-W1-A
S21073.03	Chloride	E300.0	01/29/21 08:46	CL210129-W1-A
S21073.04	Chloride	E300.0	01/29/21 08:56	CL210129-W1-A
S21073.05	Chloride	E300.0	01/29/21 09:07	CL210129-W1-A
S21073.06	Chloride	E300.0	01/29/21 09:17	CL210129-W1-A
S21073.07	Chloride	E300.0	01/29/21 09:27	CL210129-W1-A

Inorganics, Prep Batch ID: FL210129-W1-A

Surrogates: No, QC Types: BLK/LCS/MS/MSD/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.01	Fluoride (Undistilled)	E300.0	01/29/21 13:35	FL210129-W1-A
S21073.02	Fluoride (Undistilled)	E300.0	01/29/21 13:45	FL210129-W1-A
S21073.03	Fluoride (Undistilled)	E300.0	01/29/21 13:55	FL210129-W1-A
S21073.04	Fluoride (Undistilled)	E300.0	01/29/21 14:05	FL210129-W1-A
S21073.05	Fluoride (Undistilled)	E300.0	01/29/21 14:15	FL210129-W1-A
S21073.06	Fluoride (Undistilled)	E300.0	01/29/21 14:25	FL210129-W1-A
S21073.07	Fluoride (Undistilled)	E300.0	01/29/21 14:35	FL210129-W1-A

Inorganics, Prep Batch ID: SFT210129-W1-A

Surrogates: No, QC Types: BLK/LCS/MS/MSD/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.01	Sulfate	E300.0	01/29/21 08:26	SFT210129-W1-A
S21073.02	Sulfate	E300.0	01/29/21 10:07	SFT210129-W1-A
S21073.03	Sulfate	E300.0	01/29/21 08:46	SFT210129-W1-A
S21073.04	Sulfate	E300.0	01/29/21 10:17	SFT210129-W1-A
S21073.05	Sulfate	E300.0	01/29/21 09:07	SFT210129-W1-A
S21073.06	Sulfate	E300.0	01/29/21 09:17	SFT210129-W1-A
S21073.07	Sulfate	E300.0	01/29/21 09:27	SFT210129-W1-A

Inorganics, Prep Batch ID: TDS210128

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.01	Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128
S21073.02	Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128
S21073.03	Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128
S21073.04	Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128
S21073.05	Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128
S21073.06	Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128
S21073.07	Total Dissolved Solids	SM2540C	01/28/21 17:45	TDS210128

Inorganics, Prep Batch ID: TSS210128

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.01	Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128
S21073.02	Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128
S21073.03	Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128
S21073.04	Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128
S21073.05	Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128
S21073.06	Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128

Inorganics, Prep Batch ID: TSS210128 (continued)

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.07	Total Suspended Solids	SM2540D	01/28/21 15:30	TSS210128

Metals, Prep Batch ID: HGD-012921-1

Surrogates: No, QC Types: BLK/LCS/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.01	Mercury	E245.1	01/29/21 13:02	HG2-HG3-21-0129A
S21073.02	Mercury	E245.1	01/29/21 13:04	HG2-HG3-21-0129A
S21073.03	Mercury	E245.1	01/29/21 13:06	HG2-HG3-21-0129A
S21073.04	Mercury	E245.1	01/29/21 13:07	HG2-HG3-21-0129A
S21073.05	Mercury	E245.1	01/29/21 13:09	HG2-HG3-21-0129A
S21073.06	Mercury	E245.1	01/29/21 13:11	HG2-HG3-21-0129A
S21073.07	Mercury	E245.1	01/29/21 13:16	HG2-HG3-21-0129A

Metals, Prep Batch ID: MTD-012921-3

Surrogates: No, QC Types: BLK/LCS/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.01	Antimony	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Arsenic	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Barium	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Beryllium	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Boron	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Cadmium	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Calcium	E200.8	01/29/21 12:36	MT4-21-0129B
S21073.01	Chromium	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Cobalt	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Lead	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Lithium	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Molybdenum	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Selenium	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.01	Thallium	E200.8	01/29/21 11:32	MT4-21-0129A
S21073.02	Antimony	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Arsenic	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Barium	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Beryllium	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Boron	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Cadmium	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Calcium	E200.8	01/29/21 12:37	MT4-21-0129B
S21073.02	Chromium	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Cobalt	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Lead	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Lithium	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Molybdenum	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Selenium	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.02	Thallium	E200.8	01/29/21 11:35	MT4-21-0129A
S21073.03	Antimony	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Arsenic	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Barium	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Beryllium	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Boron	E200.8	01/29/21 11:39	MT4-21-0129A

Metals, Prep Batch ID: MTD-012921-3 (continued)

Surrogates: No, QC Types: BLK/LCS/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.03	Cadmium	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Calcium	E200.8	01/29/21 12:42	MT4-21-0129B
S21073.03	Chromium	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Cobalt	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Lead	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Lithium	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Molybdenum	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Selenium	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.03	Thallium	E200.8	01/29/21 11:39	MT4-21-0129A
S21073.04	Antimony	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Arsenic	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Barium	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Beryllium	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Boron	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Cadmium	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Calcium	E200.8	01/29/21 12:44	MT4-21-0129B
S21073.04	Chromium	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Cobalt	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Lead	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Lithium	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Molybdenum	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Selenium	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.04	Thallium	E200.8	01/29/21 11:42	MT4-21-0129A
S21073.05	Antimony	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Arsenic	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Barium	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Beryllium	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Boron	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Cadmium	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Calcium	E200.8	01/29/21 12:45	MT4-21-0129B
S21073.05	Chromium	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Cobalt	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Lead	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Lithium	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Molybdenum	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Selenium	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.05	Thallium	E200.8	01/29/21 11:46	MT4-21-0129A
S21073.06	Antimony	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Arsenic	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Barium	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Beryllium	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Boron	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Cadmium	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Calcium	E200.8	01/29/21 12:47	MT4-21-0129B
S21073.06	Chromium	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Cobalt	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Lead	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Lithium	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Molybdenum	E200.8	01/29/21 11:49	MT4-21-0129A

Metals, Prep Batch ID: MTD-012921-3 (continued)

Surrogates: No, QC Types: BLK/LCS/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S21073.06	Selenium	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.06	Thallium	E200.8	01/29/21 11:49	MT4-21-0129A
S21073.07	Antimony	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Arsenic	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Barium	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Beryllium	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Boron	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Cadmium	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Calcium	E200.8	01/29/21 12:29	MT4-21-0129B
S21073.07	Chromium	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Cobalt	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Lead	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Lithium	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Molybdenum	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Selenium	E200.8	01/29/21 11:29	MT4-21-0129A
S21073.07	Thallium	E200.8	01/29/21 11:29	MT4-21-0129A

Form 0: Sequence Log

Data Set ID: MT4-21-0129A
Analysis Date: 01/29/21

Instrument ID: PE NEXION
Analyst: CCM

Filename	*Run Time*	*Sample ID*	*Matrix*	*QC Type*
001	10:54:20 Fri 29-Jan-21	Blank	Liquid	
002	10:55:43 Fri 29-Jan-21	Std-0.0	Liquid	
003	10:57:06 Fri 29-Jan-21	Std-0.0001	Liquid	
004	10:58:29 Fri 29-Jan-21	Std-0.0005	Liquid	
005	10:59:52 Fri 29-Jan-21	Std-0.005	Liquid	
006	11:01:14 Fri 29-Jan-21	Std-0.02	Liquid	
007	11:02:37 Fri 29-Jan-21	Std-0.05	Liquid	
008	11:03:58 Fri 29-Jan-21	Std-0.2	Liquid	
009	11:05:19 Fri 29-Jan-21	ICV-0.1	Liquid	ICV
010	11:06:42 Fri 29-Jan-21	CCV-0.1	Liquid	CCV
011	11:08:06 Fri 29-Jan-21	rinse	Liquid	
012	11:09:29 Fri 29-Jan-21	ICB	Liquid	ICB
013	11:10:52 Fri 29-Jan-21	CCB	Liquid	CCB
014	11:13:31 Fri 29-Jan-21	BS-0.0001	Liquid	BS
015	11:15:05 Fri 29-Jan-21	BS-0.0005	Liquid	BS
016	11:16:28 Fri 29-Jan-21	BS-0.001	Liquid	BS
017	11:18:28 Fri 29-Jan-21	BS-0.002	Liquid	BS
018	11:19:59 Fri 29-Jan-21	Solu-AB	Liquid	AB
019	11:21:22 Fri 29-Jan-21	Solu-AA	Liquid	AA
020	11:24:31 Fri 29-Jan-21	012921_3 LCS-0.05	Liquid	LCS
021	11:25:54 Fri 29-Jan-21	Rinse	Liquid	
022	11:27:18 Fri 29-Jan-21	012921_3 LRB	Liquid	LRB
023	11:29:20 Fri 29-Jan-21	21073.07s	Liquid	S
024	11:31:20 Fri 29-Jan-21	21073.01 dil	Liquid	DIL
025	11:32:41 Fri 29-Jan-21	21073.01s	Liquid	S
026	11:34:17 Fri 29-Jan-21	Rinse	Liquid	
027	11:35:38 Fri 29-Jan-21	21073.02s	Liquid	S
028	11:38:27 Fri 29-Jan-21	Rinse	Liquid	
029	11:39:49 Fri 29-Jan-21	21073.03s	Liquid	S
030	11:41:12 Fri 29-Jan-21	Rinse	Liquid	
031	11:42:42 Fri 29-Jan-21	21073.04s	Liquid	S
032	11:45:28 Fri 29-Jan-21	Rinse	Liquid	
033	11:46:50 Fri 29-Jan-21	21073.05s	Liquid	S
034	11:48:14 Fri 29-Jan-21	Rinse	Liquid	
035	11:49:50 Fri 29-Jan-21	21073.06s	Liquid	S
036	11:51:54 Fri 29-Jan-21	21073.06 MS-0.05	Liquid	MS
037	11:53:15 Fri 29-Jan-21	21073.06 MSD-0.05	Liquid	MSD
038	11:54:47 Fri 29-Jan-21	CCV2-0.1	Liquid	CCV
039	11:56:15 Fri 29-Jan-21	Rinse	Liquid	
040	11:57:38 Fri 29-Jan-21	CCB2	Liquid	CCB

Form 0: Sequence Log

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Filename	*Run Time*	*Sample ID*	*Matrix*	*QC Type*
001	12:15:53 Fri 29-Jan-21	Blank	Liquid	
002	12:16:42 Fri 29-Jan-21	Std-0.0	Liquid	
003	12:17:30 Fri 29-Jan-21	Std-0.20	Liquid	
004	12:18:19 Fri 29-Jan-21	Std-0.50	Liquid	
005	12:19:08 Fri 29-Jan-21	Std-1.0	Liquid	
006	12:19:56 Fri 29-Jan-21	Std-2.0	Liquid	
007	12:20:45 Fri 29-Jan-21	Std-5.0	Liquid	
008	12:21:34 Fri 29-Jan-21	ICV-2.0	Liquid	ICV
009	12:22:59 Fri 29-Jan-21	CCV-2.0	Liquid	CCV
010	12:23:48 Fri 29-Jan-21	ICB	Liquid	ICB
011	12:24:37 Fri 29-Jan-21	CCB	Liquid	CCB
012	12:25:25 Fri 29-Jan-21	BS-0.1	Liquid	BS
013	12:26:27 Fri 29-Jan-21	012921_3 LCS-1.0	Liquid	LCS
014	12:27:16 Fri 29-Jan-21	012921_3 LRB	Liquid	LRB
015	12:29:02 Fri 29-Jan-21	21073.07s	Liquid	S
016	12:30:04 Fri 29-Jan-21	RINSE	Liquid	
017	12:30:50 Fri 29-Jan-21	21040.01s	Liquid	S
018	12:31:39 Fri 29-Jan-21	RINSE	Liquid	
019	12:32:25 Fri 29-Jan-21	21042.01s	Liquid	S
020	12:33:13 Fri 29-Jan-21	RINSE	Liquid	
021	12:34:00 Fri 29-Jan-21	21102.01s	Liquid	S
022	12:34:48 Fri 29-Jan-21	RINSE	Liquid	
023	12:35:34 Fri 29-Jan-21	21073.01 dil	Liquid	DIL
024	12:36:21 Fri 29-Jan-21	21073.01s	Liquid	S
025	12:37:09 Fri 29-Jan-21	RINSE	Liquid	
026	12:37:59 Fri 29-Jan-21	21073.02s	Liquid	S
027	12:38:47 Fri 29-Jan-21	RINSE	Liquid	
028	12:40:52 Fri 29-Jan-21	21073.02 dil	Liquid	DIL
029	12:41:41 Fri 29-Jan-21	RINSE	Liquid	
030	12:42:47 Fri 29-Jan-21	21073.03s	Liquid	S
031	12:43:35 Fri 29-Jan-21	RINSE	Liquid	
032	12:44:22 Fri 29-Jan-21	21073.04s	Liquid	S
033	12:45:11 Fri 29-Jan-21	RINSE	Liquid	
034	12:45:58 Fri 29-Jan-21	21073.05s	Liquid	S
035	12:46:47 Fri 29-Jan-21	RINSE	Liquid	
036	12:47:33 Fri 29-Jan-21	21073.06s	Liquid	S
037	12:48:19 Fri 29-Jan-21	21073.06 MS-2.0	Liquid	MS
038	12:49:51 Fri 29-Jan-21	21073.06 MSD-2.0	Liquid	MSD
039	12:50:46 Fri 29-Jan-21	CCV2-2.0	Liquid	CCV
040	12:51:34 Fri 29-Jan-21	CCB2	Liquid	CCB

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.01
Sample Tag: MW-1 L101070-01
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-47-3	Chromium	Not detected	0.005	0.0000965	mg/L	5	01/29/2021	
7440-42-8	Boron	0.21	0.04	0.00175	mg/L	5	01/29/2021	
7440-38-2	Arsenic	0.005	0.002	0.000255	mg/L	5	01/29/2021	
7782-49-2	Selenium	Not detected	0.005	0.00209	mg/L	5	01/29/2021	
7439-98-7	Molybdenum	Not detected	0.005	0.000217	mg/L	5	01/29/2021	
7440-43-9	Cadmium	Not detected	0.0005	0.000190	mg/L	5	01/29/2021	
7440-36-0	Antimony	Not detected	0.005	0.00255	mg/L	5	01/29/2021	
7440-39-3	Barium	0.121	0.005	0.000162	mg/L	5	01/29/2021	
7440-28-0	Thallium	Not detected	0.002	0.0000855	mg/L	5	01/29/2021	
7439-92-1	Lead	Not detected	0.003	0.000190	mg/L	5	01/29/2021	
7440-41-7	Beryllium	Not detected	0.001	0.000215	mg/L	5	01/29/2021	
7440-48-4	Cobalt	Not detected	0.005	0.000108	mg/L	5	01/29/2021	
7439-93-2	Lithium	0.019	0.010	0.00163	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.01
Sample Tag: MW-1 L101070-01
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-70-2	Calcium	173	0.50	0.0435	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.02
Sample Tag: MW-2 L101070-02
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-47-3	Chromium	Not detected	0.005	0.0000965	mg/L	5	01/29/2021	
7440-42-8	Boron	5.80	0.04	0.00175	mg/L	5	01/29/2021	
7440-38-2	Arsenic	Not detected	0.002	0.000255	mg/L	5	01/29/2021	
7782-49-2	Selenium	Not detected	0.005	0.00209	mg/L	5	01/29/2021	
7439-98-7	Molybdenum	0.010	0.005	0.000217	mg/L	5	01/29/2021	
7440-43-9	Cadmium	Not detected	0.0005	0.000190	mg/L	5	01/29/2021	
7440-36-0	Antimony	Not detected	0.005	0.00255	mg/L	5	01/29/2021	
7440-39-3	Barium	0.041	0.005	0.000162	mg/L	5	01/29/2021	
7440-28-0	Thallium	Not detected	0.002	0.0000855	mg/L	5	01/29/2021	
7439-92-1	Lead	Not detected	0.003	0.000190	mg/L	5	01/29/2021	
7440-41-7	Beryllium	Not detected	0.001	0.000215	mg/L	5	01/29/2021	
7440-48-4	Cobalt	Not detected	0.005	0.000108	mg/L	5	01/29/2021	
7439-93-2	Lithium	0.067	0.010	0.00163	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.02
Sample Tag: MW-2 L101070-02
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-70-2	Calcium	260	0.50	0.0435	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.03
Sample Tag: MW-4 L101070-03
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-47-3	Chromium	Not detected	0.005	0.0000965	mg/L	5	01/29/2021	
7440-42-8	Boron	0.05	0.04	0.00175	mg/L	5	01/29/2021	
7440-38-2	Arsenic	0.007	0.002	0.000255	mg/L	5	01/29/2021	
7782-49-2	Selenium	Not detected	0.005	0.00209	mg/L	5	01/29/2021	
7439-98-7	Molybdenum	Not detected	0.005	0.000217	mg/L	5	01/29/2021	
7440-43-9	Cadmium	Not detected	0.0005	0.000190	mg/L	5	01/29/2021	
7440-36-0	Antimony	Not detected	0.005	0.00255	mg/L	5	01/29/2021	
7440-39-3	Barium	0.157	0.005	0.000162	mg/L	5	01/29/2021	
7440-28-0	Thallium	Not detected	0.002	0.0000855	mg/L	5	01/29/2021	
7439-92-1	Lead	Not detected	0.003	0.000190	mg/L	5	01/29/2021	
7440-41-7	Beryllium	Not detected	0.001	0.000215	mg/L	5	01/29/2021	
7440-48-4	Cobalt	Not detected	0.005	0.000108	mg/L	5	01/29/2021	
7439-93-2	Lithium	0.012	0.010	0.00163	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.03
Sample Tag: MW-4 L101070-03
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-70-2	Calcium	112	0.50	0.0435	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.04
Sample Tag: MW-5 L101070-04
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-47-3	Chromium	Not detected	0.005	0.0000965	mg/L	5	01/29/2021	
7440-42-8	Boron	4.61	0.04	0.00175	mg/L	5	01/29/2021	
7440-38-2	Arsenic	Not detected	0.002	0.000255	mg/L	5	01/29/2021	
7782-49-2	Selenium	Not detected	0.005	0.00209	mg/L	5	01/29/2021	
7439-98-7	Molybdenum	0.054	0.005	0.000217	mg/L	5	01/29/2021	
7440-43-9	Cadmium	Not detected	0.0005	0.000190	mg/L	5	01/29/2021	
7440-36-0	Antimony	Not detected	0.005	0.00255	mg/L	5	01/29/2021	
7440-39-3	Barium	0.039	0.005	0.000162	mg/L	5	01/29/2021	
7440-28-0	Thallium	Not detected	0.002	0.0000855	mg/L	5	01/29/2021	
7439-92-1	Lead	Not detected	0.003	0.000190	mg/L	5	01/29/2021	
7440-41-7	Beryllium	Not detected	0.001	0.000215	mg/L	5	01/29/2021	
7440-48-4	Cobalt	Not detected	0.005	0.000108	mg/L	5	01/29/2021	
7439-93-2	Lithium	0.080	0.010	0.00163	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.04
Sample Tag: MW-5 L101070-04
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-70-2	Calcium	245	0.50	0.0435	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.05
Sample Tag: MW-6 L101070-05
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-47-3	Chromium	Not detected	0.005	0.0000965	mg/L	5	01/29/2021	
7440-42-8	Boron	0.91	0.04	0.00175	mg/L	5	01/29/2021	
7440-38-2	Arsenic	Not detected	0.002	0.000255	mg/L	5	01/29/2021	
7782-49-2	Selenium	Not detected	0.005	0.00209	mg/L	5	01/29/2021	
7439-98-7	Molybdenum	0.024	0.005	0.000217	mg/L	5	01/29/2021	
7440-43-9	Cadmium	Not detected	0.0005	0.000190	mg/L	5	01/29/2021	
7440-36-0	Antimony	Not detected	0.005	0.00255	mg/L	5	01/29/2021	
7440-39-3	Barium	0.052	0.005	0.000162	mg/L	5	01/29/2021	
7440-28-0	Thallium	Not detected	0.002	0.0000855	mg/L	5	01/29/2021	
7439-92-1	Lead	Not detected	0.003	0.000190	mg/L	5	01/29/2021	
7440-41-7	Beryllium	Not detected	0.001	0.000215	mg/L	5	01/29/2021	
7440-48-4	Cobalt	Not detected	0.005	0.000108	mg/L	5	01/29/2021	
7439-93-2	Lithium	0.048	0.010	0.00163	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.05
Sample Tag: MW-6 L101070-05
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-70-2	Calcium	191	0.50	0.0435	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.06
Sample Tag: MW-4 Duplicate L101070-06
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-47-3	Chromium	Not detected	0.005	0.0000965	mg/L	5	01/29/2021	
7440-42-8	Boron	0.05	0.04	0.00175	mg/L	5	01/29/2021	
7440-38-2	Arsenic	0.007	0.002	0.000255	mg/L	5	01/29/2021	
7782-49-2	Selenium	Not detected	0.005	0.00209	mg/L	5	01/29/2021	
7439-98-7	Molybdenum	Not detected	0.005	0.000217	mg/L	5	01/29/2021	
7440-43-9	Cadmium	Not detected	0.0005	0.000190	mg/L	5	01/29/2021	
7440-36-0	Antimony	Not detected	0.005	0.00255	mg/L	5	01/29/2021	
7440-39-3	Barium	0.153	0.005	0.000162	mg/L	5	01/29/2021	
7440-28-0	Thallium	Not detected	0.002	0.0000855	mg/L	5	01/29/2021	
7439-92-1	Lead	Not detected	0.003	0.000190	mg/L	5	01/29/2021	
7440-41-7	Beryllium	Not detected	0.001	0.000215	mg/L	5	01/29/2021	
7440-48-4	Cobalt	Not detected	0.005	0.000108	mg/L	5	01/29/2021	
7439-93-2	Lithium	0.010	0.010	0.00163	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.06
Sample Tag: MW-4 Duplicate L101070-06
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-70-2	Calcium	109	0.50	0.0435	mg/L	5	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.07
Sample Tag: Field Blank L101070-07
Date Collected: 01/27/2021
Matrix: Water

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-47-3	Chromium	Not detected	0.005	0.0000386	mg/L	2	01/29/2021	
7440-42-8	Boron	Not detected	0.04	0.000702	mg/L	2	01/29/2021	
7440-38-2	Arsenic	Not detected	0.002	0.000102	mg/L	2	01/29/2021	
7782-49-2	Selenium	Not detected	0.005	0.000838	mg/L	2	01/29/2021	
7439-98-7	Molybdenum	Not detected	0.005	0.0000868	mg/L	2	01/29/2021	
7440-43-9	Cadmium	Not detected	0.0005	0.0000760	mg/L	2	01/29/2021	
7440-36-0	Antimony	Not detected	0.005	0.00102	mg/L	2	01/29/2021	
7440-39-3	Barium	Not detected	0.005	0.0000648	mg/L	2	01/29/2021	
7440-28-0	Thallium	Not detected	0.002	0.0000342	mg/L	2	01/29/2021	
7439-92-1	Lead	Not detected	0.003	0.0000760	mg/L	2	01/29/2021	
7440-41-7	Beryllium	Not detected	0.001	0.0000862	mg/L	2	01/29/2021	
7440-48-4	Cobalt	Not detected	0.005	0.0000434	mg/L	2	01/29/2021	
7439-93-2	Lithium	Not detected	0.010	0.000654	mg/L	2	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Lab Sample ID: S21073.07
Sample Tag: Field Blank L101070-07
Date Collected: 01/27/2021
Matrix: Water

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7440-70-2	Calcium	Not detected	0.50	0.0174	mg/L	2	01/29/2021	

Form 1: Metals Analysis Data Sheet - Flag Description Key

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Note/Qualifier Key	
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
m	Duplicate injection precision not met
n	Spiked sample recovery outside control limits
s	Reported value determined by the MSA
u	Analyte not detected above reporting limit
A	TIC is a suspected aldol-condensation product
B	Compound also found in associated method blank
C	Analyte presence confirmed by GC/MS
D	Identified in an analysis at a secondary dilution factor
E	Concentration exceeds calibration range
J	Estimated value less than reporting limit, but greater than MDL
N	Presumptive evidence of TIC
P	Pesticide/Aroclor 2-column RPD exceeds limit
U	Analyte not detected above reporting limit
!	Result is outside of stated limit criteria
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
K	Elevated reporting limit due to low total solids
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
Q	Reported result represents most abundant aroclor
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
V	Accurate value not available due to presence of multiple aroclors
W	Surrogate result not applicable due to sample dilution
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
Z	Estimated result due to matrix interference
a	ASTM prep method F963-11
d	Duplicate analysis not within control limits
f	Filtered and preserved in lab
i	Incremental sampling
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one
r	This analyte is being reported as the best result from multiple
v	VOCs analyzed outside of holding time based on the measurement of
x	Preserved from bulk sample
c	Filtered in lab

Form 2A: Initial and Continuing Calibration Verification

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Sample Name	QC Type	Dilute	Element	Sample Conc	Actual Conc	%Rec	LCL/UCL	Units	Matrix
009 ICV-0.1	ICV	1	Li	0.0971	0.1	97	90/110	mg/L	Liquid
			Be	0.101	0.1	101	90/110		
			B	0.101	0.1	101	90/110		
			Cr	0.0995	0.1	100	90/110		
			Co	0.100	0.1	100	90/110		
			As	0.0974	0.1	97	90/110		
			Mo	0.100	0.1	100	90/110		
			Cd	0.102	0.1	102	90/110		
			Sb	0.0982	0.1	98	90/110		
			Ba	0.0974	0.1	97	90/110		
			Tl	0.101	0.1	101	90/110		
			Pb	0.102	0.1	102	90/110		
			Se	0.101	0.1	101	90/110		
010 CCV-0.1	CCV	1	Li	0.0982	0.1	98	90/110	mg/L	Liquid
			Be	0.100	0.1	100	90/110		
			B	0.101	0.1	101	90/110		
			Cr	0.100	0.1	100	90/110		
			Co	0.107	0.1	107	90/110		
			As	0.102	0.1	102	90/110		
			Mo	0.103	0.1	103	90/110		
			Cd	0.104	0.1	104	90/110		
			Sb	0.104	0.1	104	90/110		
			Ba	0.102	0.1	102	90/110		
			Tl	0.101	0.1	101	90/110		
			Pb	0.102	0.1	102	90/110		
			Se	0.108	0.1	108	90/110		
038 CCV2-0.1	CCV	1	Li	0.0971	0.1	97	90/110	mg/L	Liquid
			Be	0.0989	0.1	99	90/110		
			B	0.104	0.1	104	90/110		
			Cr	0.101	0.1	101	90/110		
			Co	0.104	0.1	104	90/110		
			As	0.0991	0.1	99	90/110		
			Mo	0.101	0.1	101	90/110		
			Cd	0.107	0.1	107	90/110		
			Sb	0.102	0.1	102	90/110		
			Ba	0.0991	0.1	99	90/110		
			Tl	0.102	0.1	102	90/110		
			Pb	0.102	0.1	102	90/110		
			Se	0.105	0.1	105	90/110		

Form 2A: Initial and Continuing Calibration Verification

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Sample Name	*QC Type*	*Dilute*	*Element*	*Sample Conc*	*Actual Conc*	*%Rec*	*LCL/UCL*	*Units*	*Matrix*
008 ICV-2.0	ICV	1	Na	1.97	2.0	99	90/110	mg/L	Liquid
			Ca	1.94	2.0	97	90/110		
009 CCV-2.0	CCV	1	Na	1.88	2.0	94	90/110	mg/L	Liquid
			Ca	1.95	2.0	98	90/110		
039 CCV2-2.0	CCV	1	Na	1.96	2.0	98	90/110	mg/L	Liquid
			Ca	1.97	2.0	99	90/110		

Form 3: Blanks

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Sample Name	QC Type	Dilute	Element	Sample Conc	Raw Conc	Units	Matrix
012 ICB	ICB	1	Li	<0.002	0.000128	mg/L	Liquid
			Be	<0.0002	0.000004		
			B	<0.008	0.000331		
			Cr	<0.001	0.000011		
			Co	<0.001	0.000006		
			As	<0.0004	0.000044		
			Mo	<0.001	0.000006		
			Cd	<0.0001	-0.000016		
			Sb	<0.001	-0.000001		
			Ba	<0.001	0.000018		
			Tl	<0.0004	0.000003		
			Pb	<0.0006	0.000004		
			Se	<0.001	-0.000173		
013 CCB	CCB	1	Li	<0.002	0.000162	mg/L	Liquid
			Be	<0.0002	0.000004		
			B	<0.008	0.000180		
			Cr	<0.001	-0.000000		
			Co	<0.001	0.000003		
			As	<0.0004	0.000057		
			Mo	<0.001	-0.000011		
			Cd	<0.0001	0.000006		
			Sb	<0.001	0.000004		
			Ba	<0.001	0.000008		
			Tl	<0.0004	0.000002		
			Pb	<0.0006	0.000002		
			Se	<0.001	0.000080		
022 012921_3 LRB	LRB	1	Li	<0.002	-0.000081	mg/L	Liquid
			Be	<0.0002	0.000002		
			B	<0.008	0.000102		
			Cr	<0.001	-0.000001		
			Co	<0.001	0.000002		
			As	<0.0004	0.000050		
			Mo	<0.001	-0.000002		
			Cd	<0.0001	0.000005		
			Sb	<0.001	0.000011		
			Ba	<0.001	0.000001		
			Tl	<0.0004	0.000001		
			Pb	<0.0006	-0.000001		
			Se	<0.001	-0.000651		
040 CCB2	CCB	1	Li	<0.002	-0.000027	mg/L	Liquid
			Be	<0.0002	0.000022		
			B	<0.008	0.000426		
			Cr	<0.001	0.000027		
			Co	<0.001	0.000025		
			As	<0.0004	0.000108		
			Mo	<0.001	0.000029		
			Cd	<0.0001	0.000016		
			Sb	<0.001	0.000039		
			Ba	<0.001	0.000033		
			Tl	<0.0004	0.000026		
			Pb	<0.0006	0.000028		
			Se	<0.001	-0.000431		

Form 3: Blanks

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Sample Name	*QC Type*	*Dilute*	*Element*	*Sample Conc*	*Raw Conc*	*Units*	*Matrix*
010 ICB	ICB	1	Na	<0.05	-0.000305	mg/L	Liquid
			Ca	<0.05	-0.003418		
011 CCB	CCB	1	Na	<0.05	-0.000870	mg/L	Liquid
			Ca	<0.05	-0.006617		
014 012921_3 LRB	LRB	1	Na	<0.05	-0.000712	mg/L	Liquid
			Ca	<0.05	-0.007473		
040 CCB2	CCB	1	Na	<0.05	0.004381	mg/L	Liquid
			Ca	<0.05	-0.016777		

Form 4B: ICP Interference Check Sample

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Sample Name	*QC Type*	*Dilute*	*Element*	*Sample Conc*	*Actual Conc*	*%Rec*	*LCL/UCL*	*Units*	*Matrix*
018 Solu-AB	AB	1	Cr	0.0214	0.02	107	65/135	mg/L	Liquid
			Co	0.0214	0.02	107	65/135		
			As	0.0213	0.02	107	65/135		
			Mo	0.206	0.20	103	65/135		
			Cd	0.0217	0.02	109	65/135		
019 Solu-AA	AA	1	Li	<0.010	0.0	N/A	N/A	mg/L	Liquid
			Be	<0.001	0.0	N/A	N/A		
			B	<0.04	0.0	N/A	N/A		
			Cr	<0.005	0.0	N/A	N/A		
			Co	<0.005	0.0	N/A	N/A		
			As	<0.002	0.0	N/A	N/A		
			Mo	<0.005	0.0	N/A	N/A		
			Cd	<0.0005	0.0	N/A	N/A		
			Sb	<0.005	0.0	N/A	N/A		
			Ba	<0.005	0.0	N/A	N/A		
			Tl	<0.002	0.0	N/A	N/A		
			Pb	<0.003	0.0	N/A	N/A		
			Se	<0.005	0.0	N/A	N/A		

Form 5A: Matrix Spike Sample Recovery

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Spike Name	Sample Name	Dilute	Element	Spike Conc	Sample Conc	Spike Amount	%Rec	LCL/UCL	Units	Matrix
014 BS-0.0001		1	Be	0.000088	ND	0.0001	88	70/130	mg/L	Liquid
			Cr	0.000081	ND	0.0001	81	70/130		
			Mo	0.000074	ND	0.0001	74	70/130		
			Cd	0.000082	ND	0.0001	82	70/130		
			Ba	0.000105	ND	0.0001	105	70/130		
			Tl	0.000116	ND	0.0001	116	70/130		
			Pb	0.000118	ND	0.0001	118	70/130		
015 BS-0.0005		1	Li	0.000531	ND	0.0005	106	70/130	mg/L	Liquid
			Be	0.000477	ND	0.0005	95	70/130		
			B	0.000562	ND	0.0005	112	70/130		
			Cr	0.000536	ND	0.0005	107	70/130		
			Co	0.000553	ND	0.0005	111	70/130		
			As	0.000539	ND	0.0005	108	70/130		
			Mo	0.000505	ND	0.0005	101	70/130		
			Cd	0.000538	ND	0.0005	108	70/130		
			Sb	0.000572	ND	0.0005	114	70/130		
			Ba	0.000424	ND	0.0005	85	70/130		
			Tl	0.000511	ND	0.0005	102	70/130		
			Pb	0.000509	ND	0.0005	102	70/130		
016 BS-0.001		1	Li	0.00101	ND	0.001	101	70/130	mg/L	Liquid
			Be	0.00112	ND	0.001	112	70/130		
			Cr	0.00100	ND	0.001	100	70/130		
			Co	0.00107	ND	0.001	107	70/130		
			As	0.00100	ND	0.001	100	70/130		
			Mo	0.00100	ND	0.001	100	70/130		
			Cd	0.000967	ND	0.001	97	70/130		
			Sb	0.00104	ND	0.001	104	70/130		
			Ba	0.000985	ND	0.001	99	70/130		
			Tl	0.00100	ND	0.001	100	70/130		
			Pb	0.00105	ND	0.001	105	70/130		
			Se	0.000928	ND	0.001	93	70/130		
017 BS-0.002		1	Li	0.00239	ND	0.002	120	70/130	mg/L	Liquid
			Be	0.00226	ND	0.002	113	70/130		
			B	0.00203	ND	0.002	102	70/130		
			Cr	0.00198	ND	0.002	99	70/130		
			Co	0.00215	ND	0.002	108	70/130		
			As	0.00207	ND	0.002	104	70/130		
			Mo	0.00210	ND	0.002	105	70/130		
			Cd	0.00197	ND	0.002	99	70/130		
			Sb	0.00221	ND	0.002	111	70/130		
			Ba	0.00207	ND	0.002	104	70/130		
			Tl	0.00210	ND	0.002	105	70/130		
			Pb	0.00208	ND	0.002	104	70/130		
			Se	0.00150	ND	0.002	75	70/130		
036 21073.06	**035 21073.06s**	5	Li	0.263	0.010	0.25	101	75/125	mg/L	Liquid
			Be	0.279	<0.001	0.25	112	75/125		
			B	0.306	0.05	0.25	102	75/125		
			Cr	0.253	<0.005	0.25	101	75/125		
			Co	0.263	<0.005	0.25	105	75/125		
			As	0.271	0.007	0.25	106	75/125		
			Mo	0.270	<0.005	0.25	108	75/125		
			Cd	0.256	<0.0005	0.25	102	75/125		
			Sb	0.250	<0.005	0.25	100	75/125		
			Ba	0.409	0.153	0.25	102	75/125		
			Tl	0.251	<0.002	0.25	100	75/125		
			Pb	0.247	<0.003	0.25	99	75/125		
			Se	0.254	<0.005	0.25	102	75/125		

Form 5A: Matrix Spike Sample Recovery

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Spike Name	Sample Name	Dilute	Element	Spike Conc	Sample Conc	Spike Amount	%Rec	LCL/UCL	Units	Matrix
012 BS-0.1		1	Na	0.100	ND	0.1	100	70/130	mg/L	Liquid
			Ca	0.0842	ND	0.1	84	70/130		
037 21073.06 MS-2.0	**036 21073.06s**	5	Na	37.4	27.2	10.0	102	75/125	mg/L	Liquid
			Ca	121	109	10.0	120	75/125		

Form 5B: Matrix Spike Duplicate Evaluation

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Duplicate Name	Sample Name	Dilute	Element	Dup Conc	Samp Conc	%RPD	LCL/UCL	Units	Matrix
037 21073.06	**036 21073.06 MS-0.05**	5	Li	0.265	0.263	1	0/20	mg/L	Liquid
			Be	0.269	0.279	4	0/20		
			B	0.295	0.306	4	0/20		
			Cr	0.235	0.253	7	0/20		
			Co	0.246	0.263	7	0/20		
			As	0.247	0.271	9	0/20		
			Mo	0.253	0.270	7	0/20		
			Cd	0.249	0.256	3	0/20		
			Sb	0.248	0.250	1	0/20		
			Ba	0.402	0.409	2	0/20		
			Tl	0.248	0.251	1	0/20		
			Pb	0.246	0.247	0	0/20		
			Se	0.255	0.254	0	0/20		

Form 5B: Matrix Spike Duplicate Evaluation

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Duplicate Name	Sample Name	Dilute	Element	Dup Conc	Samp Conc	%RPD	LCL/UCL	Units	Matrix
038 21073.06 MSD-2.0	**037 21073.06 MS-2.0**	5	Na	35.8	37.4	4	0/20	mg/L	Liquid
			Ca	118	121	3	0/20		

Form 7: Laboratory Control Sample

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Sample Name	Dilute	Element	Sample Conc	Actual Conc	%Rec	LCL/UCL	Units	Matrix
020 012921_3 LCS-0.05	1	Li	0.0521	0.05	104	85/115	mg/L	Liquid
		Be	0.0532	0.05	106	85/115		
		B	0.0524	0.05	105	85/115		
		Cr	0.0504	0.05	101	85/115		
		Co	0.0536	0.05	107	85/115		
		As	0.0503	0.05	101	85/115		
		Mo	0.0508	0.05	102	85/115		
		Cd	0.0515	0.05	103	85/115		
		Sb	0.0516	0.05	103	85/115		
		Ba	0.0515	0.05	103	85/115		
		Tl	0.0493	0.05	99	85/115		
		Pb	0.0497	0.05	99	85/115		
		Se	0.0514	0.05	103	85/115		

Form 7: Laboratory Control Sample

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Sample Name	*Dilute*	*Element*	*Sample Conc*	*Actual Conc*	*%Rec*	*LCL/UCL*	*Units*	*Matrix*
013 012921_3 LCS-1.0	1	Na	1.03	1.0	103	85/115	mg/L	Liquid
		Ca	0.981	1.0	98	85/115		

Form 8: Serial Dilutions

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Duplicate Name	Sample Name	Dilute	Element	Dup Conc	Samp Conc	%D	LCL/UCL	Units	Matrix
024 21073.01 dil	**025 21073.01s**	25	Li	0.022	0.019	16*	0/10	mg/L	Liquid
			Be	<0.001	<0.001	NC	0/10		
			B	0.22	0.21	5	0/10		
			Cr	<0.005	<0.005	NC	0/10		
			Co	<0.005	<0.005	NC	0/10		
			As	0.008	0.005	60*	0/10		
			Mo	<0.005	<0.005	NC	0/10		
			Cd	<0.0005	<0.0005	NC	0/10		
			Sb	<0.005	<0.005	NC	0/10		
			Ba	0.122	0.121	1	0/10		
			Tl	<0.002	<0.002	NC	0/10		
			Pb	<0.003	<0.003	NC	0/10		
			Se	<0.005	<0.005	NC	0/10		

Serial Dilution test not applicable if measured sample concentration is < 100 x MDL.

Form 8: Serial Dilutions

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Duplicate Name	*Sample Name*	*Dilute*	*Element*	*Dup Conc*	*Samp Conc*	*%D*	*LCL/UCL*	*Units*	*Matrix*
023 21073.01 dil	**024 21073.01s**	25	Na	41.1	40.5	1	0/10	mg/L	Liquid
			Ca	171	173	1	0/10		
028 21073.02 dil	**026 21073.02s**	100	Na	67.3	71.3	6	0/10	mg/L	Liquid
			Ca	263	260	1	0/10		

Serial Dilution test not applicable if measured sample concentration is < 100 x MDL.

Form 13: Analysis Run Log

Data Set ID: MT4-21-0129A
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Filename	*Run Time*	*Matrix*	*Analytes*
001 Blank	10:54:20 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
002 Std-0.0	10:55:43 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
003 Std-0.0001	10:57:06 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
004 Std-0.0005	10:58:29 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
005 Std-0.005	10:59:52 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
006 Std-0.02	11:01:14 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
007 Std-0.05	11:02:37 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
008 Std-0.2	11:03:58 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
009 ICV-0.1	11:05:19 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
010 CCV-0.1	11:06:42 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
011 rinse	11:08:06 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
012 ICB	11:09:29 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
013 CCB	11:10:52 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
014 BS-0.0001	11:13:31 Fri	Liquid	Ba,Be,Cd,Cr,Mo,Pb,Tl
015 BS-0.0005	11:15:05 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Tl
016 BS-0.001	11:16:28 Fri	Liquid	As,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
017 BS-0.002	11:18:28 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
018 Solu-AB	11:19:59 Fri	Liquid	As,Cd,Co,Cr,Mo
019 Solu-AA	11:21:22 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
020 012921_3 LCS-0.05	11:24:31 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
021 Rinse	11:25:54 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
022 012921_3 LRB	11:27:18 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
023 21073.07s	11:29:20 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
024 21073.01 dil	11:31:20 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
025 21073.01s	11:32:41 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
026 Rinse	11:34:17 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
027 21073.02s	11:35:38 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
028 Rinse	11:38:27 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
029 21073.03s	11:39:49 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
030 Rinse	11:41:12 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
031 21073.04s	11:42:42 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
032 Rinse	11:45:28 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
033 21073.05s	11:46:50 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
034 Rinse	11:48:14 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
035 21073.06s	11:49:50 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
036 21073.06 MS-0.05	11:51:54 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
037 21073.06 MSD-0.05	11:53:15 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
038 CCV2-0.1	11:54:47 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
039 Rinse	11:56:15 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl
040 CCB2	11:57:38 Fri	Liquid	As,B,Ba,Be,Cd,Co,Cr,Li,Mo,Pb,Sb,Se,Tl

Form 13: Analysis Run Log

Data Set ID: MT4-21-0129B
Instrument ID: PE NEXION
Analysis Date: 01/29/21
Analyst: CCM

Filename	*Run Time*	*Matrix*	*Analytes*
001 Blank	12:15:53 Fri	Liquid	Ca,Na
002 Std-0.0	12:16:42 Fri	Liquid	Ca,Na
003 Std-0.20	12:17:30 Fri	Liquid	Ca,Na
004 Std-0.50	12:18:19 Fri	Liquid	Ca,Na
005 Std-1.0	12:19:08 Fri	Liquid	Ca,Na
006 Std-2.0	12:19:56 Fri	Liquid	Ca,Na
007 Std-5.0	12:20:45 Fri	Liquid	Ca,Na
008 ICV-2.0	12:21:34 Fri	Liquid	Ca,Na
009 CCV-2.0	12:22:59 Fri	Liquid	Ca,Na
010 ICB	12:23:48 Fri	Liquid	Ca,Na
011 CCB	12:24:37 Fri	Liquid	Ca,Na
012 BS-0.1	12:25:25 Fri	Liquid	Ca,Na
013 012921_3 LCS-1.0	12:26:27 Fri	Liquid	Ca,Na
014 012921_3 LRB	12:27:16 Fri	Liquid	Ca,Na
015 21073.07s	12:29:02 Fri	Liquid	Ca,Na
016 RINSE	12:30:04 Fri	Liquid	Ca,Na
017 21040.01s	12:30:50 Fri	Liquid	Ca,Na
018 RINSE	12:31:39 Fri	Liquid	Ca,Na
019 21042.01s	12:32:25 Fri	Liquid	Ca,Na
020 RINSE	12:33:13 Fri	Liquid	Ca,Na
021 21102.01s	12:34:00 Fri	Liquid	Ca,Na
022 RINSE	12:34:48 Fri	Liquid	Ca,Na
023 21073.01 dil	12:35:34 Fri	Liquid	Ca,Na
024 21073.01s	12:36:21 Fri	Liquid	Ca,Na
025 RINSE	12:37:09 Fri	Liquid	Ca,Na
026 21073.02s	12:37:59 Fri	Liquid	Ca,Na
027 RINSE	12:38:47 Fri	Liquid	Ca,Na
028 21073.02 dil	12:40:52 Fri	Liquid	Ca,Na
029 RINSE	12:41:41 Fri	Liquid	Ca,Na
030 21073.03s	12:42:47 Fri	Liquid	Ca,Na
031 RINSE	12:43:35 Fri	Liquid	Ca,Na
032 21073.04s	12:44:22 Fri	Liquid	Ca,Na
033 RINSE	12:45:11 Fri	Liquid	Ca,Na
034 21073.05s	12:45:58 Fri	Liquid	Ca,Na
035 RINSE	12:46:47 Fri	Liquid	Ca,Na
036 21073.06s	12:47:33 Fri	Liquid	Ca,Na
037 21073.06 MS-2.0	12:48:19 Fri	Liquid	Ca,Na
038 21073.06 MSD-2.0	12:49:51 Fri	Liquid	Ca,Na
039 CCV2-2.0	12:50:46 Fri	Liquid	Ca,Na
040 CCB2	12:51:34 Fri	Liquid	Ca,Na

Performance Check Report

Sample ID: STD Performance Check
Sample Date/Time: Friday, January 29, 2021 10:45:55
Sample Description:
Method File: C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\Method\STD Performance Check.mth
Dataset File: C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\DataSet\Optimize2021\STD Performance Check.197
MassCal File: C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\MassCal\Default.tun
Conditions File: C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\Conditions\Default.dac
Dual Detector Mode: Pulse
Acq. Dead Time (ns): 35
Current Dead Time (ns): 35
Torch Z position (mm): 0.00

Summary

	Analyte	Mass	Meas. Intens. Mean	Net Intens. Mean	Net Intens. SD	Net Intens. RSD	Mode
	Be	9.0	5655.7	5655.653	64.542	1.1	Standard
	In	114.9	58000.0	57999.989	861.109	1.5	Standard
	U	238.1	51028.5	51028.511	321.038	0.6	Standard
⌈	CeO	155.9	1564.3	0.021	0.000	1.4	Standard
|>	Ce	139.9	74173.6	74173.616	864.284	1.2	Standard
⌊	Ce++	70.0	1036.8	0.014	0.000	2.3	Standard
	Bkgd	220.0	0.7	0.700	0.321	45.8	Standard

Current Conditions File Data

Current Value	Description
0.91	Nebulizer Gas Flow STD/KED [NEB]
1.20	Auxiliary Gas Flow
18.00	Plasma Gas Flow
-12.00	Deflector Voltage
1600.00	ICP RF Power
-1675.00	Analog Stage Voltage
1300.00	Pulse Stage Voltage
-4.00	Quadrupole Rod Offset STD [QRO]
-15.00	Cell Rod Offset STD [CRO]
14.00	Discriminator Threshold
-9.00	Cell Entrance/Exit Voltage STD
0.00	RPa
0.45	RPq
0.91	DRC Mode NEB
-9.00	DRC Mode QRO
-2.00	DRC Mode CRO
-7.00	DRC Mode Cell Entrance/Exit Voltage
0.60	Cell Gas A
200.00	Axial Field Voltage
-13.00	KED Mode CRO
-12.00	KED Mode QRO
-8.00	KED Mode Cell Entrance Voltage
-32.00	KED Mode Cell Exit Voltage
4.00	KED Cell Gas A
0.00	KED RPa
0.25	KED RPq
475.00	KED Mode Axial Field Voltage

SmartTune Wizard - Summary

ptimization Summary

martTune file: C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\Wizard\SmartTune\daily optimization.swz

tart Time: 1/29/2021 10:40:07 AM
nd Time: 1/29/2021 10:47:59 AM

orch Alignment - [Passed]

Vertical	Horizontal	Intensity
0.45 mm	0.09 mm	59501.66

ebulizer Gas Flow STD/KED [NEB] - [Passed] Optimum value(s): 0.91
Obtained Intensity (In 115): 57932.23
Obtained Formula (CeO 156 / Ce 140): 0.0221 (=1602.09 / 72354.77)

ID STD/DRC - Optimum value(s): Correlation Coefficient = 0.972; Intercept = -12.33

ED Mode QID - Optimum value(s): Correlation Coefficient = 1.000; Intercept = -14.39

ass Calibration and Resolution - [Passed] Optimum value(s): N/A
Target/Obtained mass (7.016/7.025), Target/Obtained resolution (0.7/0.696)
Target/Obtained mass (23.985/23.975), Target/Obtained resolution (0.7/0.696)
Target/Obtained mass (114.904/114.875), Target/Obtained resolution (0.7/0.686)
Target/Obtained mass (238.05/238.025), Target/Obtained resolution (0.7/0.697)

TD Performance Check - [Passed] Optimum value(s): N/A
Obtained Intensity (Be 9): 5655.65
Obtained Intensity (In 115): 57999.99
Obtained Intensity (U 238): 51028.51
Obtained Intensity (Bkgd 220): 0.70
Obtained Formula (CeO 156 / Ce 140): 0.021 (=1564.29 / 74173.62)
Obtained Formula (Ce++ 70 / Ce 140): 0.014 (=1036.77 / 74173.62)

SmartTune Wizard - Details

Optimization Details

SmartTune file: C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\Wizard\SmartTune\daily optimization.swz

Optimization Status

Start Time: 1/29/2021 10:40:07 AM

Torch Alignment
Optimization Settings:
Method: Torch Alignment.mth.
Intensity Criterion: In 115 Maximum

Optimization Results:

	Vertical	Horizontal	Intensity
[Passed]	0.45 mm	0.09 mm	59501.66

Nebulizer Gas Flow STD/KED [NEB]
Optimization Settings:
Method: Optimize.mth.
Initial Try - Start/End/Step: 0.87/0.96/0.01.
Intensity Criterion: In 115 Maximum
Formula Criterion: CeO 156 / Ce 140 <= 0.025

Optimization Results:
Initial Try

Obtained Intensity (In 115): 57932.23
Obtained Formula (CeO 156 / Ce 140): 0.0221 (=1602.09 / 72354.77)
[Passed] Optimum value(s): 0.91

QID STD/DRC
Optimization Settings:
Method: QID Calibration.mth.
Initial Try - Start/End/Step: -20/0/0.5.

Optimization Results:
Initial Try

Optimum value(s): Correlation Coefficient = 0.972; Intercept = -12.33

Analyte	Mass	Points	DAC	MaxIntensity
Li	7	41	-13	27029.5
Mg	24	41	-14.5	40007.9
In	115	41	-10.5	61210.9
Ce	140	41	-10.5	75495
Pb	208	41	-8.5	29362.1
U	238	41	-8.5	48289.5

KED Mode QID
Optimization Settings:
Method: QID Calibration.mth.
Initial Try - Start/End/Step: -20/0/0.5.

Optimization Results:
Initial Try

Optimum value(s): Correlation Coefficient = 1.000; Intercept = -14.39

Analyte	Mass	Points	DAC	MaxIntensity
Li	7	41	-14	20014
Mg	24	41	-13.5	47587.1
In	115	41	-11.5	67985.4
Ce	140	41	-10	46246.7
Pb	208	41	-6	19020.7
U	238	41	-7.5	42860.2

Mass Calibration and Resolution

Optimization Settings:

Method: Tuning.mth.

MassCal File: C:\Users\Public\Documents\PerkinElmer Syngistix\ICPMS\MassCal\Default.tun

Iterations: 6

Target accuracy (+/- amu): 0.05 for Mass Cal. and 0.03 for Resolution

Peak height (%) for Res. Opt.: 10

Optimization Results:

Initial Try

Target/Obtained mass (7.016/7.025), Target/Obtained resolution (0.7/0.696)

Target/Obtained mass (23.985/23.975), Target/Obtained resolution (0.7/0.696)

Target/Obtained mass (114.904/114.875), Target/Obtained resolution (0.7/0.686)

Target/Obtained mass (238.05/238.025), Target/Obtained resolution (0.7/0.697)

[Passed] Optimum value(s): N/A

STD Performance Check

Optimization Settings:

Method: STD Performance Check.mth.

Intensity Criterion: Be 9 > 2000

Intensity Criterion: In 115 > 30000

Intensity Criterion: U 238 > 30000

Intensity Criterion: Bkgd 220 <= 5

Formula Criterion: CeO 156 / Ce 140 <= 0.03

Formula Criterion: Ce++ 70 / Ce 140 <= 0.03

Optimization Results:

Initial Try

Obtained Intensity (Be 9): 5655.65

Obtained Intensity (In 115): 57999.99

Obtained Intensity (U 238): 51028.51

Obtained Intensity (Bkgd 220): 0.70

Obtained Formula (CeO 156 / Ce 140): 0.021 (=1564.29 / 74173.62)

Obtained Formula (Ce++ 70 / Ce 140): 0.014 (=1036.77 / 74173.62)

[Passed] Optimum value(s): N/A

End Time: 1/29/2021 10:47:59 AM

Form 15: Internal Standards Summary

IS Check Reference Sample: 001 Blank

Data Set ID: MT4-21-0129A

Instrument ID: PE NEXION

Analysis Date: 01/29/21

Analyst: CCM

		non-ICB/CCB/ICV/CCV		ICB/CCB/ICV/CCV		
Element	Count	LCL-UCL	Accept.Range	LCL-UCL	Accept.Range	Flags
Li	140906	70-125	98634-176133	80-120	112725-169087	0
Y	280122	70-125	196085-350153	80-120	224098-336146	0
Re	353994	70-125	247796-442493	80-120	283195-424793	0
Y-1	1851278	70-125	1295895-2314098	80-120	1481022-2221534	0

Seq ID	QC Type	Li	Y	Re	Y-1
001		100	100	100	100
002		106	104	98	109
003		109	106	104	110
004		108	103	100	110
005		103	103	106	112
006		107	105	109	113
007		98	107	104	115
008		107	115	112	114
009	ICV	100	112	106	109
010	CCV	100	108	105	105
011		97	100	102	111
012	ICB	103	103	103	108
013	CCB	100	104	99	108
014	BS	108	106	102	110
015	BS	106	105	102	115
016	BS	101	106	103	109
017	BS	102	105	101	115
018	AB	104	103	97	107
019	AA	101	106	100	115
020	LCS	99	107	104	112
021		99	106	98	113
022	LRB	100	103	104	116
023	S	101	107	100	112
024	DIL	104	106	102	111
025	S	100	102	95	107
026		104	110	102	117
027	S	99	103	96	107
028		115	107	102	115
029	S	101	105	95	113
030		111	107	101	117
031	S	100	104	94	108
032		113	109	100	113
033	S	105	99	95	108
034		114	108	100	120
035	S	108	108	95	115
036	MS	104	107	101	115
037	MSD	104	110	100	111
038	CCV	109	109	103	112
039		113	109	103	114
040	CCB	110	110	100	112

Form 15: Internal Standards Summary

IS Check Reference Sample: 001 Blank

Data Set ID: MT4-21-0129B

Instrument ID: PE NEXION

Analysis Date: 01/29/21

Analyst: CCM

		non-ICB/CCB/ICV/CCV		ICB/CCB/ICV/CCV		
Element	Count	LCL-UCL	Accept.Range	LCL-UCL	Accept.Range	Flags
Rh	68053	70-125	47637-85066	80-120	54442-81664	0

Seq ID	QC Type	Rh
001		100
002		101
003		105
004		104
005		103
006		99
007		103
008	ICV	105
009	CCV	103
010	ICB	101
011	CCB	101
012	BS	105
013	LCS	104
014	LRB	103
015	S	102
016		103
017	S	96
018		102
019	S	98
020		101
021	S	97
022		99
023	DIL	99
024	S	96
025		102
026	S	99
027		102
028	DIL	103
029		98
030	S	98
031		102
032	S	97
033		102
034	S	95
035		102
036	S	101
037	MS	98
038	MSD	101
039	CCV	102
040	CCB	103

Form 9

Analysis Date	varies	
Analytical Method	6020A/6020/200.8	
Digestion Date	varies	
Spiked Value	varies	(ug/L)
Estimated Limit	varies	(ug/L)

Element/Mass	Date	Spike (ug/l)	MDL (ug/l)	Prep Batch
Al-27	4/9/2012	0.50	0.189	MTD-040212-1
Sb-121	3/20/2012	1.00	0.105	MTD-032012-3
As-75	3/20/2012	0.05	0.032	MTD-032012-2
Ba-137	3/20/2012	0.50	0.202	MTD-032012-2
Be-9	4/10/2012	0.10	0.079	MTD-041012-1
B-10	3/20/2012	1.00	0.589	MTD-032012-3
B-11	3/20/2012	1.00	0.277	MTD-032012-3
Cd-111	3/20/2012	0.05	0.038	MTD-032012-2
Cd-114	3/20/2012	0.10	0.030	MTD-032012-2
Cr-52	3/20/2012	0.10	0.023	MTD-032012-2
Cr-53	3/20/2012	0.10	0.054	MTD-032012-2
Co-59	3/20/2012	0.10	0.035	MTD-032012-2
Cu-65	3/20/2012	0.50	0.068	MTD-032012-2
Fe-56	4/9/2012	2.00	0.470	MTD-040912-1
Fe-57	4/9/2012	2.00	0.824	MTD-040912-1
Pb-208	3/20/2012	0.10	0.052	MTD-032012-2
Li-7	3/20/2012	1.00	0.166	MTD-032012-3
Mn-55	3/20/2012	0.10	0.187	MTD-032012-2
Mo-95	4/9/2012	0.50	0.442	MTD-040212-1
Ni-60	4/13/2012	0.10	0.035	MTD-041012-1
Se-78	3/20/2012	0.10	0.058	MTD-032012-2
Se-82	3/20/2012	0.50	0.475	MTD-032012-2
Ag-107	3/20/2012	0.10	0.025	MTD-032012-2
Sr-88	3/20/2012	0.10	0.016	MTD-032012-2
Tl-205	4/9/2012	0.50	0.089	MTD-040212-1
Sn-118	3/20/2012	0.10	0.079	MTD-032012-2
Ti-47	3/20/2012	0.50	0.124	MTD-032012-2
V-51	3/20/2012	0.05	0.018	MTD-032012-2
Zn-66	4/9/2012	2.00	0.366	MTD-040912-1

Element/Mass	Date	Spike (mg/l)	MDL (mg/l)	Prep Batch
Ca-43	4/16/2012	0.01	0.0101	MTD-041012-4
Ca-44	4/16/2012	0.01	0.0041	MTD-041012-4
Mg-24	4/16/2012	0.01	0.0006	MTD-041012-4
K-39	4/16/2012	0.01	0.0030	MTD-041012-4
Na-23	4/16/2012	0.10	0.0101	MTD-041012-4

Linear Range June 2012

		Prep Batch	Run Batch
Aluminum	5.0ppm	MTD-061912-5	MT3-12-0619C
Antimony	5.0ppm	MTD-061912-5	MT3-12-0619C
Arsenic	1.0ppm	MTD-061912-5	MT3-12-0619C
Barium	5.0ppm	MTD-061912-5	MT3-12-0619C
Boron-10	5.0ppm	MTD-061912-5	MT3-12-0619C
Boron-11	5.0ppm	MTD-061912-5	MT3-12-0619C
Beryllium	2.0ppm	MTD-061912-5	MT3-12-0619C
Cadmium-111	5.0ppm	MTD-061912-5	MT3-12-0619C
Cadmium-114	5.0ppm	MTD-061912-5	MT3-12-0619C
Chromium	2.0ppm	MTD-061912-5	MT3-12-0619C
Cobalt	2.0ppm	MTD-061912-5	MT3-12-0619C
Copper	5.0ppm	MTD-061912-5	MT3-12-0619C
Iron-56	5.0ppm	MTD-061912-5	MT3-12-0619C
Iron-57	2.0ppm	MTD-061912-5	MT3-12-0619C
Lead	5.0ppm	MTD-061912-5	MT3-12-0619C
Lithium	2.0ppm	MTD-061912-5	MT3-12-0619C
Manganese	1.0ppm	MTD-061912-5	MT3-12-0619C
Molybdenum	1.0ppm	MTD-061912-5	MT3-12-0619C
Nickel	5.0ppm	MTD-061912-5	MT3-12-0619C
Selenium-78	5.0ppm	MTD-061912-5	MT3-12-0619C
Selenium-82	5.0ppm	MTD-061912-5	MT3-12-0619C
Silver	1.0ppm	MTD-061912-5	MT3-12-0619C
Strontium-86	5.0ppm	MTD-061912-5	MT3-12-0619C
Thallium	5.0ppm	MTD-061912-5	MT3-12-0619C
Tin	1.0ppm	MTD-061912-5	MT3-12-0619C
Titanium	1.0ppm	MTD-061912-5	MT3-12-0619C
Vanadium	1.0ppm	MTD-061912-5	MT3-12-0619C
Zinc	2.0ppm	MTD-061912-5	MT3-12-0619C

Sodium-23	50ppm	MTD-061912-5	MT3-12-0619B
Magnesium-24	50ppm	MTD-061912-5	MT3-12-0619B
Potassium-39	50ppm	MTD-061912-5	MT3-12-0619B
Calcium-43	50ppm	MTD-061912-5	MT3-12-0619B
Calcium-44	50ppm	MTD-061912-5	MT3-12-0619B

Maximum spiking levels are instated to ensure the safety and longevity of the instrument. Any sample results above this level result in extended wash runs and sample dilution.

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 001
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 10:54:20 Fri 29-Jan-21
Sample Name: Blank
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	7788.791	0	mg/L		3
Be	9	0.000	0	mg/L		3
B	11	481.675	0	mg/L		3
Cr	52	360.005	0	mg/L		3
Co	59	20.000	0	mg/L		3
As	75	46.667	0	mg/L		3
Mo	95	114.222	0	mg/L		3
Cd	111	95.000	0	mg/L		3
Sb	121	80.000	0	mg/L		3
Ba	137	58.333	0	mg/L		3
Tl	205	3.333	0	mg/L		3
Pb	208	223.667	0	mg/L		3
Se	78	1509.013	0	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 002
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 10:55:43 Fri 29-Jan-21
Sample Name: Std-0.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	8535.892	0.000094	mg/L		3
Be	9	1.667	0.000002	mg/L		3
B	11	475.008	-0.000047	mg/L		3
Cr	52	338.337	-0.000010	mg/L		3
Co	59	18.333	-0.000000	mg/L		3
As	75	68.334	0.000075	mg/L		3
Mo	95	84.587	-0.000014	mg/L		3
Cd	111	100.000	0.000001	mg/L		3
Sb	121	73.334	-0.000005	mg/L		3
Ba	137	68.334	0.000006	mg/L		3
Tl	205	10.000	0.000001	mg/L		3
Pb	208	222.000	0.000000	mg/L		3
Se	78	1513.769	-0.000397	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 003
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 10:57:06 Fri 29-Jan-21
Sample Name: Std-0.0001
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	8465.852	-0.000005	mg/L		3
Be	9	76.667	0.000096	mg/L		3
B	11	291.670	-0.000339	mg/L		3
Cr	52	781.688	0.000110	mg/L		3
Co	59	1278.391	0.000180	mg/L		3
As	75	88.334	0.000144	mg/L		3
Mo	95	279.430	0.000066	mg/L		3
Cd	111	173.334	0.000087	mg/L		3
Sb	121	670.016	0.000264	mg/L		3
Ba	137	198.335	0.000108	mg/L		3
Tl	205	848.359	0.000111	mg/L		3
Pb	208	1120.350	0.000112	mg/L		3
Se	78	1618.577	-0.000096	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 004
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 10:58:29 Fri 29-Jan-21
Sample Name: Std-0.0005
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	9576.547	0.000427	mg/L		3
Be	9	408.339	0.000511	mg/L		3
B	11	818.357	0.000444	mg/L		3
Cr	52	2335.191	0.000552	mg/L		3
Co	59	4110.592	0.000601	mg/L		3
As	75	200.001	0.000577	mg/L		3
Mo	95	1287.431	0.000497	mg/L		3
Cd	111	550.011	0.000548	mg/L		3
Sb	121	1286.725	0.000558	mg/L		3
Ba	137	683.350	0.000504	mg/L		3
Tl	205	3705.481	0.000507	mg/L		3
Pb	208	4374.003	0.000544	mg/L		3
Se	78	1805.359	0.000431	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 005
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 10:59:52 Fri 29-Jan-21
Sample Name: Std-0.005
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	21963.569	0.005209	mg/L		3
Be	9	4095.588	0.005388	mg/L		3
B	11	3553.779	0.004741	mg/L		3
Cr	52	19683.567	0.005425	mg/L		3
Co	59	37552.665	0.005513	mg/L		3
As	75	1580.087	0.005808	mg/L		3
Mo	95	12142.564	0.005108	mg/L		3
Cd	111	4454.028	0.005266	mg/L		3
Sb	121	11873.267	0.005455	mg/L		3
Ba	137	6323.066	0.005055	mg/L		3
Tl	205	38531.907	0.004989	mg/L		3
Pb	208	41277.619	0.005102	mg/L		3
Se	78	3272.542	0.004463	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 006
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:01:14 Fri 29-Jan-21
Sample Name: Std-0.02
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	63020.663	0.019516	mg/L		3
Be	9	15950.575	0.020159	mg/L		3
B	11	14061.929	0.020235	mg/L		3
Cr	52	76829.498	0.020996	mg/L		3
Co	59	154454.148	0.022198	mg/L		3
As	75	5611.107	0.020606	mg/L		3
Mo	95	51339.666	0.021278	mg/L		3
Cd	111	17615.870	0.020717	mg/L		3
Sb	121	47545.671	0.021484	mg/L		3
Ba	137	27316.127	0.021510	mg/L		3
Tl	205	158000.732	0.019942	mg/L		3
Pb	208	165985.151	0.020104	mg/L		3
Se	78	9088.148	0.020720	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 007
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:02:37 Fri 29-Jan-21
Sample Name: Std-0.05
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	149709.012	0.055673	mg/L		3
Be	9	39080.049	0.054072	mg/L		3
B	11	32642.273	0.052484	mg/L		3
Cr	52	184828.591	0.050030	mg/L		3
Co	59	380115.603	0.053833	mg/L		3
As	75	14055.244	0.051274	mg/L		3
Mo	95	124623.311	0.051025	mg/L		3
Cd	111	44597.892	0.052007	mg/L		3
Sb	121	118064.289	0.052719	mg/L		3
Ba	137	66760.721	0.052006	mg/L		3
Tl	205	388268.637	0.051208	mg/L		3
Pb	208	405949.239	0.051400	mg/L		3
Se	78	19424.627	0.049022	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 008
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:03:58 Fri 29-Jan-21
Sample Name: Std-0.2
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	566124.712	0.198625	mg/L		3
Be	9	158321.240	0.198957	mg/L		3
B	11	135197.232	0.199362	mg/L		3
Cr	52	793753.280	0.199882	mg/L		3
Co	59	1508842.575	0.198809	mg/L		3
As	75	58720.485	0.199600	mg/L		3
Mo	95	524096.574	0.199613	mg/L		3
Cd	111	183829.387	0.199420	mg/L		3
Sb	121	479772.697	0.199160	mg/L		3
Ba	137	275379.491	0.199346	mg/L		3
Tl	205	1628695.606	0.199704	mg/L		3
Pb	208	1695816.263	0.199637	mg/L		3
Se	78	73185.183	0.200186	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 009
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:05:19 Fri 29-Jan-21
Sample Name: ICV-0.1
Sample Type: Sample
Matrix: Liquid
Comments: Spex-std made 01/20/
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	260877.687	0.097119	mg/L		3
Be	9	75195.969	0.101863	mg/L		3
B	11	63649.697	0.101087	mg/L		3
Cr	52	387990.280	0.099588	mg/L		3
Co	59	747162.347	0.100470	mg/L		3
As	75	28141.034	0.097475	mg/L		3
Mo	95	258753.780	0.100503	mg/L		3
Cd	111	93012.035	0.102888	mg/L		3
Sb	121	231878.880	0.098232	mg/L		3
Ba	137	131891.391	0.097404	mg/L		3
Tl	205	785620.602	0.101228	mg/L		3
Pb	208	831197.026	0.102850	mg/L		3
Se	78	36626.641	0.101874	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 010
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:06:42 Fri 29-Jan-21
Sample Name: CCV-0.1
Sample Type: Sample
Matrix: Liquid
Comments: IV-std made 01/20/21
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	265708.373	0.098215	mg/L		3
Be	9	74585.911	0.100439	mg/L		3
B	11	64746.419	0.101967	mg/L		3
Cr	52	374987.162	0.100621	mg/L		3
Co	59	763092.575	0.107309	mg/L		3
As	75	28284.647	0.102502	mg/L		3
Mo	95	254048.639	0.103154	mg/L		3
Cd	111	90121.743	0.104191	mg/L		3
Sb	121	236581.037	0.104784	mg/L		3
Ba	137	133144.424	0.102744	mg/L		3
Tl	205	778662.704	0.101735	mg/L		3
Pb	208	814653.948	0.102174	mg/L		3
Se	78	37653.377	0.108960	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 011
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:08:06 Fri 29-Jan-21
Sample Name: rinse
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	8314.091	0.000330	mg/L		3
Be	9	13.333	0.000018	mg/L		3
B	11	790.022	0.000538	mg/L		3
Cr	52	458.341	0.000028	mg/L		3
Co	59	83.334	0.000010	mg/L		3
As	75	60.000	0.000052	mg/L		3
Mo	95	117.943	0.000002	mg/L		3
Cd	111	113.334	0.000023	mg/L		3
Sb	121	105.000	0.000012	mg/L		3
Ba	137	60.000	0.000001	mg/L		3
Tl	205	48.333	0.000006	mg/L		3
Pb	208	248.667	0.000003	mg/L		3
Se	78	1623.070	-0.000136	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 012
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:09:29 Fri 29-Jan-21
Sample Name: ICB
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	8309.090	0.000128	mg/L		3
Be	9	3.333	0.000004	mg/L		3
B	11	705.018	0.000331	mg/L		3
Cr	52	411.673	0.000011	mg/L		3
Co	59	61.667	0.000006	mg/L		3
As	75	60.000	0.000044	mg/L		3
Mo	95	131.642	0.000006	mg/L		3
Cd	111	85.000	-0.000016	mg/L		3
Sb	121	80.000	-0.000001	mg/L		3
Ba	137	83.334	0.000018	mg/L		3
Tl	205	26.667	0.000003	mg/L		3
Pb	208	263.667	0.000004	mg/L		3
Se	78	1563.825	-0.000173	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 013
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:10:52 Fri 29-Jan-21
Sample Name: CCB
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	8209.027	0.000162	mg/L		3
Be	9	3.333	0.000004	mg/L		3
B	11	596.679	0.000180	mg/L		3
Cr	52	371.672	-0.000000	mg/L		3
Co	59	40.000	0.000003	mg/L		3
As	75	63.333	0.000057	mg/L		3
Mo	95	91.824	-0.000011	mg/L		3
Cd	111	103.334	0.000006	mg/L		3
Sb	121	91.667	0.000004	mg/L		3
Ba	137	70.000	0.000008	mg/L		3
Tl	205	18.333	0.000002	mg/L		3
Pb	208	240.333	0.000002	mg/L		3
Se	78	1657.161	0.000080	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 014
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:13:31 Fri 29-Jan-21
Sample Name: BS-0.0001
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Be	9	70.000	0.000088	mg/L		3
Cr	52	676.683	0.000081	mg/L		3
Mo	95	298.516	0.000074	mg/L		3
Cd	111	170.001	0.000082	mg/L		3
Ba	137	195.001	0.000105	mg/L		3
Tl	205	863.359	0.000116	mg/L		3
Pb	208	1137.017	0.000118	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 015
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:15:05 Fri 29-Jan-21
Sample Name: BS-0.0005
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	9634.922	0.000531	mg/L		3
Be	9	373.338	0.000477	mg/L		3
B	11	880.027	0.000562	mg/L		3
Cr	52	2328.523	0.000536	mg/L		3
Co	59	3872.192	0.000553	mg/L		3
As	75	195.001	0.000539	mg/L		3
Mo	95	1334.490	0.000505	mg/L		3
Cd	111	555.011	0.000538	mg/L		3
Sb	121	1346.730	0.000572	mg/L		3
Ba	137	598.346	0.000424	mg/L		3
Tl	205	3787.169	0.000511	mg/L		3
Pb	208	4153.971	0.000509	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 016
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:16:28 Fri 29-Jan-21
Sample Name: BS-0.001
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	10545.569	0.001018	mg/L		3
Be	9	836.691	0.001123	mg/L		3
Cr	52	4045.573	0.001000	mg/L		3
Co	59	7577.010	0.001079	mg/L		3
As	75	323.337	0.001009	mg/L		3
Mo	95	2557.809	0.001006	mg/L		3
Cd	111	923.363	0.000967	mg/L		3
Sb	121	2406.869	0.001044	mg/L		3
Ba	137	1318.394	0.000985	mg/L		3
Tl	205	7545.328	0.001006	mg/L		3
Pb	208	8453.324	0.001055	mg/L		3
Se	78	1957.554	0.000928	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 017
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:18:28 Fri 29-Jan-21
Sample Name: BS-0.002
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	14193.730	0.002395	mg/L		3
Be	9	1700.101	0.002262	mg/L		3
B	11	1781.779	0.002035	mg/L		3
Cr	52	7575.342	0.001980	mg/L		3
Co	59	15006.213	0.002157	mg/L		3
As	75	608.346	0.002074	mg/L		3
Mo	95	5169.980	0.002103	mg/L		3
Cd	111	1763.442	0.001971	mg/L		3
Sb	121	4967.530	0.002215	mg/L		3
Ba	137	2685.252	0.002076	mg/L		3
Tl	205	15446.683	0.002103	mg/L		3
Pb	208	16116.939	0.002080	mg/L		3
Se	78	2282.755	0.001508	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 018
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:19:59 Fri 29-Jan-21
Sample Name: Solu-AB
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Cr	52	76970.832	0.021456	mg/L		3
Co	59	146768.986	0.021497	mg/L		3
As	75	5692.801	0.021348	mg/L		3
Mo	95	488105.289	0.206680	mg/L		3
Cd	111	18156.543	0.021792	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 019
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:21:22 Fri 29-Jan-21
Sample Name: Solu-AA
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	7923.864	0.000050	mg/L		3
Be	9	3.333	0.000005	mg/L		3
B	11	445.007	-0.000055	mg/L		3
Cr	52	380.005	-0.000000	mg/L		3
Co	59	26.667	0.000001	mg/L		3
As	75	66.667	0.000064	mg/L		3
Mo	95	126.299	0.000002	mg/L		3
Cd	111	90.000	-0.000013	mg/L		3
Sb	121	58.333	-0.000012	mg/L		3
Ba	137	65.000	0.000003	mg/L		3
Tl	205	5.000	0.000000	mg/L		3
Pb	208	218.667	-0.000001	mg/L		3
Se	78	1591.442	-0.000390	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 020
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:24:31 Fri 29-Jan-21
Sample Name: 012921_3 LCS-0.05
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	141970.052	0.052162	mg/L		3
Be	9	38877.845	0.053253	mg/L		3
B	11	32946.355	0.052426	mg/L		3
Cr	52	187960.261	0.050422	mg/L		3
Co	59	381828.350	0.053662	mg/L		3
As	75	13923.449	0.050358	mg/L		3
Mo	95	125120.825	0.050803	mg/L		3
Cd	111	44651.354	0.051585	mg/L		3
Sb	121	116819.679	0.051695	mg/L		3
Ba	137	66808.027	0.051544	mg/L		3
Tl	205	375928.331	0.049382	mg/L		3
Pb	208	393852.412	0.049724	mg/L		3
Se	78	19847.015	0.051499	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 022
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:27:18 Fri 29-Jan-21
Sample Name: 012921_3 LRB
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	7598.697	-0.000081	mg/L		3
Be	9	1.667	0.000002	mg/L		3
B	11	546.677	0.000102	mg/L		3
Cr	52	366.671	-0.000001	mg/L		3
Co	59	36.667	0.000002	mg/L		3
As	75	61.667	0.000050	mg/L		3
Mo	95	112.943	-0.000002	mg/L		3
Cd	111	101.667	0.000005	mg/L		3
Sb	121	106.667	0.000011	mg/L		3
Ba	137	61.667	0.000001	mg/L		3
Tl	205	13.333	0.000001	mg/L		3
Pb	208	223.667	-0.000001	mg/L		3
Se	78	1507.347	-0.000651	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 023
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:29:20 Fri 29-Jan-21
Sample Name: 21073.07s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 2

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	8255.723	0.000317	mg/L		3
Be	9	8.333	0.000022	mg/L		3
B	11	548.344	0.000210	mg/L		3
Cr	52	420.006	0.000019	mg/L		3
Co	59	40.000	0.000005	mg/L		3
As	75	96.667	0.000342	mg/L		3
Mo	95	124.450	0.000002	mg/L		3
Cd	111	90.000	-0.000027	mg/L		3
Sb	121	75.000	-0.000009	mg/L		3
Ba	137	106.667	0.000069	mg/L		3
Tl	205	1.667	-0.000000	mg/L		3
Pb	208	260.333	0.000009	mg/L		3
Se	78	1570.585	-0.000653	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 024
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:31:20 Fri 29-Jan-21
Sample Name: 21073.01 dil
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 25

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	10372.101	0.021755	mg/L		3
Be	9	10.000	0.000353	mg/L		3
B	10	1166.714	0.216287	mg/L		3
Cr	52	568.345	0.001290	mg/L		3
Co	59	541.677	0.001863	mg/L		3
As	75	133.334	0.007776	mg/L		3
Mo	95	334.591	0.002215	mg/L		3
Cd	111	85.000	-0.000449	mg/L		3
Sb	121	80.000	-0.000050	mg/L		3
Ba	137	6283.049	0.122339	mg/L		3
Tl	205	16.667	0.000045	mg/L		3
Pb	208	290.333	0.000204	mg/L		3
Se	78	1574.071	-0.006714	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 025
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:32:41 Fri 29-Jan-21
Sample Name: 21073.01s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	17642.554	0.019102	mg/L		3
Be	9	10.000	0.000068	mg/L		3
B	10	5107.586	0.212043	mg/L		3
Cr	52	856.692	0.000694	mg/L		3
Co	59	2438.542	0.001794	mg/L		3
As	75	330.004	0.005414	mg/L		3
Mo	95	1193.199	0.002313	mg/L		3
Cd	111	111.667	0.000094	mg/L		3
Sb	121	113.334	0.000074	mg/L		3
Ba	137	29864.549	0.121628	mg/L		3
Tl	205	5.000	0.000001	mg/L		3
Pb	208	432.001	0.000151	mg/L		3
Se	78	1584.326	-0.000541	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 027
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:35:38 Fri 29-Jan-21
Sample Name: 21073.02s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	42443.019	0.067056	mg/L		3
Be	9	11.667	0.000080	mg/L		3
B	11	723692.668	5.808912	mg/L		3
Cr	52	948.365	0.000812	mg/L		3
Co	59	5899.555	0.004319	mg/L		3
As	75	135.001	0.001656	mg/L		3
Mo	95	5016.798	0.010405	mg/L		3
Cd	111	106.667	0.000054	mg/L		3
Sb	121	115.000	0.000075	mg/L		3
Ba	137	10173.623	0.040819	mg/L		3
Tl	205	55.000	0.000037	mg/L		3
Pb	208	583.669	0.000254	mg/L		3
Se	78	1604.117	-0.000223	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 029
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:39:49 Fri 29-Jan-21
Sample Name: 21073.03s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	14015.218	0.011709	mg/L		3
Be	9	0.000	0.000000	mg/L		3
B	10	1345.063	0.051868	mg/L		3
Cr	52	423.340	0.000065	mg/L		3
Co	59	446.674	0.000308	mg/L		3
As	75	438.340	0.007245	mg/L		3
Mo	95	2157.720	0.004248	mg/L		3
Cd	111	116.667	0.000100	mg/L		3
Sb	121	86.667	0.000008	mg/L		3
Ba	137	39611.550	0.157048	mg/L		3
Tl	205	15.000	0.000009	mg/L		3
Pb	208	275.333	0.000044	mg/L		3
Se	78	1515.198	-0.002713	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 031
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:42:42 Fri 29-Jan-21
Sample Name: 21073.04s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	50109.470	0.080499	mg/L		3
Be	9	3.333	0.000022	mg/L		3
B	11	583681.920	4.619962	mg/L		3
Cr	52	876.694	0.000692	mg/L		3
Co	59	928.364	0.000658	mg/L		3
As	75	105.000	0.001040	mg/L		3
Mo	95	26165.612	0.054476	mg/L		3
Cd	111	115.000	0.000094	mg/L		3
Sb	121	165.001	0.000186	mg/L		3
Ba	137	9868.419	0.039067	mg/L		3
Tl	205	90.000	0.000063	mg/L		3
Pb	208	1125.351	0.000640	mg/L		3
Se	78	1558.748	-0.001051	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 033
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:46:50 Fri 29-Jan-21
Sample Name: 21073.05s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	34672.067	0.048490	mg/L		3
Be	9	0.000	0.000000	mg/L		3
B	11	120817.989	0.912780	mg/L		3
Cr	52	436.673	0.000118	mg/L		3
Co	59	765.020	0.000569	mg/L		3
As	75	86.667	0.000803	mg/L		3
Mo	95	11168.987	0.024422	mg/L		3
Cd	111	138.334	0.000283	mg/L		3
Sb	121	73.334	-0.000015	mg/L		3
Ba	137	12555.516	0.052439	mg/L		3
Tl	205	25.000	0.000016	mg/L		3
Pb	208	293.667	0.000057	mg/L		3
Se	78	1479.450	-0.002246	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 035
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:49:50 Fri 29-Jan-21
Sample Name: 21073.06s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	13858.401	0.009531	mg/L		3
Be	9	1.667	0.000010	mg/L		3
B	11	7533.653	0.051479	mg/L		3
Cr	52	413.339	0.000035	mg/L		3
Co	59	415.006	0.000276	mg/L		3
As	75	415.006	0.006599	mg/L		3
Mo	95	2067.181	0.003936	mg/L		3
Cd	111	81.667	-0.000123	mg/L		3
Sb	121	113.334	0.000058	mg/L		3
Ba	137	39900.660	0.153520	mg/L		3
Tl	205	10.000	0.000005	mg/L		3
Pb	208	235.333	0.000015	mg/L		3
Se	78	1565.373	-0.002383	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 036
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:51:54 Fri 29-Jan-21
Sample Name: 21073.06 MS-0.05
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	151555.752	0.263776	mg/L		3
Be	9	43018.017	0.279710	mg/L		3
B	11	40507.408	0.306399	mg/L		3
Cr	52	187679.798	0.253865	mg/L		3
Co	59	371555.353	0.263552	mg/L		3
As	75	14869.406	0.271426	mg/L		3
Mo	95	132249.625	0.270591	mg/L		3
Cd	111	44027.764	0.256551	mg/L		3
Sb	121	112434.074	0.250945	mg/L		3
Ba	137	105139.172	0.409017	mg/L		3
Tl	205	368881.969	0.251410	mg/L		3
Pb	208	378495.088	0.247690	mg/L		3
Se	78	20172.215	0.254740	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 037
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:53:15 Fri 29-Jan-21
Sample Name: 21073.06 MSD-0.05
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	152993.447	0.265444	mg/L		3
Be	9	41602.185	0.269469	mg/L		3
B	11	39222.136	0.295327	mg/L		3
Cr	52	179604.165	0.235634	mg/L		3
Co	59	358094.170	0.246535	mg/L		3
As	75	14010.206	0.247977	mg/L		3
Mo	95	127646.963	0.253589	mg/L		3
Cd	111	44113.027	0.249420	mg/L		3
Sb	121	114609.587	0.248317	mg/L		3
Ba	137	106386.562	0.402171	mg/L		3
Tl	205	362309.935	0.248524	mg/L		3
Pb	208	373443.564	0.246169	mg/L		3
Se	78	19551.880	0.255371	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 038
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:54:47 Fri 29-Jan-21
Sample Name: CCV2-0.1
Sample Type: Sample
Matrix: Liquid
Comments: IV-std made 01/20/21
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	286151.812	0.097117	mg/L		3
Be	9	80065.483	0.098930	mg/L		3
B	11	72637.660	0.104982	mg/L		3
Cr	52	382725.120	0.101377	mg/L		3
Co	59	751864.380	0.104277	mg/L		3
As	75	27766.984	0.099183	mg/L		3
Mo	95	254530.915	0.101988	mg/L		3
Cd	111	94496.968	0.107883	mg/L		3
Sb	121	234200.995	0.102310	mg/L		3
Ba	137	130253.203	0.099171	mg/L		3
Tl	205	771182.804	0.102969	mg/L		3
Pb	208	798003.604	0.102397	mg/L		3
Se	78	38915.378	0.105665	mg/L		3

Data Set: MT4-21-0129A
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 040
Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P
Acq Time: 11:57:38 Fri 29-Jan-21
Sample Name: CCB2
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129A.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.004

Element	Mass		Concentration	Units	RSD %	Rep
Li	7	8489.189	-0.000027	mg/L		3
Be	9	18.333	0.000022	mg/L		3
B	11	823.357	0.000426	mg/L		3
Cr	52	496.675	0.000027	mg/L		3
Co	59	205.002	0.000025	mg/L		3
As	75	81.667	0.000108	mg/L		3
Mo	95	198.698	0.000029	mg/L		3
Cd	111	118.334	0.000016	mg/L		3
Sb	121	178.335	0.000039	mg/L		3
Ba	137	108.334	0.000033	mg/L		3
Tl	205	190.002	0.000026	mg/L		3
Pb	208	428.668	0.000028	mg/L		3
Se	78	1543.552	-0.000431	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 001
Method: 02-Ca-Na.mth
Acq Time: 12:15:53 Fri 29-Jan-21
Sample Name: Blank
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	15705.000	0	mg/L		3
Ca	44	6385.000	0	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 002
Method: 02-Ca-Na.mth
Acq Time: 12:16:42 Fri 29-Jan-21
Sample Name: Std-0.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	14924.167	-0.000874	mg/L		3
Ca	44	6337.500	-0.003012	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 003
Method: 02-Ca-Na.mth
Acq Time: 12:17:30 Fri 29-Jan-21
Sample Name: Std-0.20
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	234884.167	0.208685	mg/L		3
Ca	44	12069.167	0.181519	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 004
Method: 02-Ca-Na.mth
Acq Time: 12:18:19 Fri 29-Jan-21
Sample Name: Std-0.50
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	542020.833	0.506863	mg/L		3
Ca	44	20869.167	0.483728	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 005
Method: 02-Ca-Na.mth
Acq Time: 12:19:08 Fri 29-Jan-21
Sample Name: Std-1.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	1043330.833	1.002013	mg/L		3
Ca	44	34308.333	0.953884	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 006
Method: 02-Ca-Na.mth
Acq Time: 12:19:56 Fri 29-Jan-21
Sample Name: Std-2.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	2046973.333	2.048411	mg/L		3
Ca	44	63304.167	2.026831	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 007
Method: 02-Ca-Na.mth
Acq Time: 12:20:45 Fri 29-Jan-21
Sample Name: Std-5.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	5121817.500	4.979199	mg/L		3
Ca	44	152149.167	5.000857	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 008
Method: 02-Ca-Na.mth
Acq Time: 12:21:34 Fri 29-Jan-21
Sample Name: ICV-2.0
Sample Type: Sample
Matrix: Liquid
Comments: Spex-std made 01/20/
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	2087819.167	1.977762	mg/L		3
Ca	44	64531.667	1.948748	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 009
Method: 02-Ca-Na.mth
Acq Time: 12:22:59 Fri 29-Jan-21
Sample Name: CCV-2.0
Sample Type: Sample
Matrix: Liquid
Comments: IV-std made 01/20/21
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	1949478.333	1.887346	mg/L		3
Ca	44	63450.833	1.959915	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 010
Method: 02-Ca-Na.mth
Acq Time: 12:23:48 Fri 29-Jan-21
Sample Name: ICB
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	15470.833	-0.000305	mg/L		3
Ca	44	6320.000	-0.003418	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 011
Method: 02-Ca-Na.mth
Acq Time: 12:24:37 Fri 29-Jan-21
Sample Name: CCB
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	15002.500	-0.000870	mg/L		3
Ca	44	6266.667	-0.006617	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 012
Method: 02-Ca-Na.mth
Acq Time: 12:25:25 Fri 29-Jan-21
Sample Name: BS-0.1
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	122006.667	0.100945	mg/L		3
Ca	44	9185.000	0.084207	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 013
Method: 02-Ca-Na.mth
Acq Time: 12:26:27 Fri 29-Jan-21
Sample Name: 012921_3 LCS-1.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	1093380.833	1.032621	mg/L		3
Ca	44	35660.833	0.981035	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 014
Method: 02-Ca-Na.mth
Acq Time: 12:27:16 Fri 29-Jan-21
Sample Name: 012921_3 LRB
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	15427.500	-0.000712	mg/L		3
Ca	44	6351.667	-0.007473	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 015
Method: 02-Ca-Na.mth
Acq Time: 12:29:02 Fri 29-Jan-21
Sample Name: 21073.07s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 2

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	8054.167	-0.015647	mg/L		3
Ca	44	8978.333	0.170832	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 023
Method: 02-Ca-Na.mth
Acq Time: 12:35:34 Fri 29-Jan-21
Sample Name: 21073.01 dil
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 25

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	1642083.333	41.124840	mg/L		3
Ca	44	199074.167	171.966459	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 024
Method: 02-Ca-Na.mth
Acq Time: 12:36:21 Fri 29-Jan-21
Sample Name: 21073.01s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	7820122.500	40.599957	mg/L		3
Ca	44	948782.500	173.080357	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 026
Method: 02-Ca-Na.mth
Acq Time: 12:37:59 Fri 29-Jan-21
Sample Name: 21073.02s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	14135355.833	71.385982	mg/L		3
Ca	44	1466886.667	260.563475	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 028
Method: 02-Ca-Na.mth
Acq Time: 12:40:52 Fri 29-Jan-21
Sample Name: 21073.02 dil
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 100

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	707304.167	67.336974	mg/L		3
Ca	44	83069.167	263.230510	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 030
Method: 02-Ca-Na.mth
Acq Time: 12:42:47 Fri 29-Jan-21
Sample Name: 21073.03s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	5543502.500	28.384500	mg/L		3
Ca	44	625871.667	112.090144	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 032
Method: 02-Ca-Na.mth
Acq Time: 12:44:22 Fri 29-Jan-21
Sample Name: 21073.04s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	15179296.667	78.775903	mg/L		3
Ca	44	1346141.667	245.424390	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 034
Method: 02-Ca-Na.mth
Acq Time: 12:45:58 Fri 29-Jan-21
Sample Name: 21073.05s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	9647305.000	50.689247	mg/L		3
Ca	44	1037167.500	191.557509	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 036
Method: 02-Ca-Na.mth
Acq Time: 12:47:33 Fri 29-Jan-21
Sample Name: 21073.06s
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	5483349.167	27.245459	mg/L		3
Ca	44	631034.167	109.735426	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 037
Method: 02-Ca-Na.mth
Acq Time: 12:48:19 Fri 29-Jan-21
Sample Name: 21073.06 MS-2.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	7323744.167	37.423769	mg/L		3
Ca	44	680691.667	121.893234	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 038
Method: 02-Ca-Na.mth
Acq Time: 12:49:51 Fri 29-Jan-21
Sample Name: 21073.06 MSD-2.0
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 5

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	7244835.000	35.804494	mg/L		3
Ca	44	683590.833	118.240869	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 039
Method: 02-Ca-Na.mth
Acq Time: 12:50:46 Fri 29-Jan-21
Sample Name: CCV2-2.0
Sample Type: Sample
Matrix: Liquid
Comments: IV-std made 01/20/21
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	2029150.833	1.969773	mg/L		3
Ca	44	63802.500	1.976690	mg/L		3

Data Set: MT4-21-0129B
Run Date: 01/29/21

Metals Quantitation Summary Report

Analyst: CCM
Instrument: PE NEXION

Sequence #: 040
Method: 02-Ca-Na.mth
Acq Time: 12:51:34 Fri 29-Jan-21
Sample Name: CCB2
Sample Type: Sample
Matrix: Liquid
Comments:
Dilution: 1

Operator:
Acq Mode: Data Acquisition
Cal Title: 21-0129B.cal
Cal Type: External Calibration
Last Calib: mtd-012921-3
Bkg File:
Int Correct:
Blank File: Blank.009

Element	Mass		Concentration	Units	RSD %	Rep
Na	23	20641.667	0.004381	mg/L		3
Ca	44	6077.500	-0.016777	mg/L		3

Metals Digestion 3015A \ 3050B

DATE 1-29-21 PREP BATCH MTD-012921-3

TIME START 10:00 TIME FINISH 10:30 ANALYST CCM

Pipet Calibration:

Pipet #	Test #	Pipet Volume Setting mL	Wt. of water from pipet, g	Criteria	Pipet #	Test #	Pipet Volume Setting mL	Wt. of water from pipet, g	Criteria
2	1			Bias: Mean ± 2% of nominal value Precision: RSD ≤1% of nominal value	3	1			Bias: Mean ± 2% of nominal value Precision: RSD ≤1% of nominal value
	2					2			
	3					3			

SAMPLE#	BTL ID	SAMPLE AMOUNT GRAMS (g)	FINAL VOLUME (ml)	REMARKS	% TOTAL SOLIDS	DILUTION FACTOR
LCS - 012921-3	----	50	50		—	1
LRB-012921-3	----	50	50		—	1
21073.01		10				5
.02						
.03						
.04						
.05						
.06						
.06 MS						
.06 MSD						
.07		25				2
21040.01		1				50
21042.01						
21102.01						

NOTES: *1) Spike values (unless otherwise stated):*

LCS = 0.05 ppm = 50 mls / 0.50 mls of 5ppm Spiking Solution

Samples: Water = 0.05 ppm = 50 mls / 0.50 mls of 5ppm Spiking Solution

Soil = 0.10 ppm = 50 mls / 1.0 mls of 5ppm Spiking Solution

Spiking Solution – Date Prepared: 1-20-21

2) Spike values for minerals (Ca-Mg-K-Na)

LCS = 1.0 ppm = 50 mls / 0.50 mls HM Stock Solution

Samples (Water or Soil) = 2.0 ppm = 50 mls / 1.0 mls HM Stock Solution

High Purity Stock Solution (HM)- Lot # 20226305

3) HNO_3 Lot # 258255

4) Centrifuge Tube Lot # 200413-C10

5) Balance ID: M1

Reviewed by [signature] *On* 1/29/21

Form 0: Sequence Log

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Filename	*Run Time*	*Sample ID*	*Matrix*	*QC Type*
001	1/29/2021 11:40:01 AM	Calibration Blank	Liquid	
002	1/29/2021 11:41:53 AM	Standard #1	Liquid	
003	1/29/2021 11:43:45 AM	Standard #2	Liquid	
004	1/29/2021 11:45:36 AM	Standard #3	Liquid	
005	1/29/2021 11:47:28 AM	Standard #4	Liquid	
006	1/29/2021 11:49:20 AM	Standard #5	Liquid	
007	1/29/2021 11:51:11 AM	Standard #6	Liquid	
008	1/29/2021 11:54:03 AM	Standard #7	Liquid	
009	1/29/2021 11:57:18 AM	Standard #8	Liquid	
010	1/29/2021 12:00:30 PM	ICV-5.0 ppb	Liquid	ICV
011	1/29/2021 12:02:21 PM	ICB	Liquid	ICB
012	1/29/2021 12:04:13 PM	CCV1-2.0 ppb	Liquid	CCV
013	1/29/2021 12:06:04 PM	CCB1	Liquid	CCB
014	1/29/2021 12:07:56 PM	BS-0.10	Liquid	BS
015	1/29/2021 12:58:54 PM	012921_1 LCS-2.0	Liquid	LCS
016	1/29/2021 1:00:45 PM	012921_1 LRB	Liquid	LRB
017	1/29/2021 1:02:31 PM	21073.01s	Liquid	S
018	1/29/2021 1:04:18 PM	21073.02s	Liquid	S
019	1/29/2021 1:06:05 PM	21073.03s	Liquid	S
020	1/29/2021 1:07:53 PM	21073.04s	Liquid	S
021	1/29/2021 1:09:42 PM	21073.05s	Liquid	S
022	1/29/2021 1:11:30 PM	21073.06s	Liquid	S
023	1/29/2021 1:13:20 PM	21073.06 MS-2.0	Liquid	MS
024	1/29/2021 1:15:06 PM	21073.06 MSD	Liquid	MSD
025	1/29/2021 1:16:53 PM	21073.07s	Liquid	S
026	1/29/2021 1:18:40 PM	20934.04s tclp	Liquid	S
027	1/29/2021 1:20:28 PM	20934.07s tclp	Liquid	S
028	1/29/2021 1:22:16 PM	20934.08s tclp	Liquid	S
029	1/29/2021 1:24:08 PM	CCV2-2.0 ppb	Liquid	CCV
030	1/29/2021 1:26:00 PM	CCB2	Liquid	CCB
031	1/29/2021 1:27:49 PM	20934.20s tclp	Liquid	S
032	1/29/2021 1:29:38 PM	20934.21s tclp	Liquid	S
033	1/29/2021 1:31:25 PM	20934.22s tclp	Liquid	S
034	1/29/2021 1:33:12 PM	20934.25s tclp	Liquid	S
035	1/29/2021 1:34:59 PM	21036.01s tclp	Liquid	S
036	1/29/2021 1:36:47 PM	21091.01s	Liquid	S
037	1/29/2021 1:38:35 PM	21091.01 MS-2.0	Liquid	MS
038	1/29/2021 1:40:24 PM	21091.01 MSD	Liquid	MSD
039	1/29/2021 1:42:14 PM	21091.02s	Liquid	S
040	1/29/2021 1:44:01 PM	21097.02s	Liquid	S
041	1/29/2021 1:45:53 PM	CCV3-2.0 ppb	Liquid	CCV
042	1/29/2021 1:47:44 PM	CCB3	Liquid	CCB
043	1/29/2021 1:53:42 PM	012921_2 LCS-2.0	Liquid	
044	1/29/2021 1:55:33 PM	012921_2 LRB	Liquid	
045	1/29/2021 1:57:21 PM	21044.01s tclp	Liquid	
046	1/29/2021 2:01:29 PM	21048.01s tclp	Liquid	
047	1/29/2021 2:03:17 PM	21048.01 MS-2.0	Liquid	
048	1/29/2021 2:05:05 PM	21048.01 MSD	Liquid	
049	1/29/2021 2:06:57 PM	CCV4-2.0 ppb	Liquid	
050	1/29/2021 2:08:48 PM	CCV4-2.0 ppb	Liquid	
051	1/29/2021 2:10:40 PM	CCB4	Liquid	
052	1/29/2021 2:26:45 PM	Calibration Blank	Liquid	
053	1/29/2021 2:28:37 PM	Standard #1	Liquid	
054	1/29/2021 2:30:28 PM	Standard #2	Liquid	
055	1/29/2021 2:32:20 PM	Standard #3	Liquid	
056	1/29/2021 2:34:11 PM	Standard #4	Liquid	

Form 0: Sequence Log

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Filename	*Run Time*	*Sample ID*	*Matrix*	*QC Type*
057	1/29/2021 2:36:03 PM	Standard #5	Liquid	
058	1/29/2021 2:37:55 PM	Standard #6	Liquid	
059	1/29/2021 2:41:05 PM	Standard #7	Liquid	
060	1/29/2021 2:44:28 PM	Standard #8	Liquid	
061	1/29/2021 2:46:22 PM	ICV-5.0 ppb	Liquid	ICV
062	1/29/2021 2:48:13 PM	ICB	Liquid	
063	1/29/2021 2:50:05 PM	ICB	Liquid	
064	1/29/2021 2:53:51 PM	ICB	Liquid	ICB
065	1/29/2021 2:55:42 PM	BS-0.10	Liquid	BS
066	1/29/2021 2:57:33 PM	012921_2 LCS-2.0	Liquid	LCS
067	1/29/2021 2:59:24 PM	012921_2 LRB	Liquid	LRB
068	1/29/2021 3:01:12 PM	21044.01s tclp	Liquid	S
069	1/29/2021 3:02:59 PM	21048.01s tclp	Liquid	S
070	1/29/2021 3:04:47 PM	21048.01 MS-2.0	Liquid	MS
071	1/29/2021 3:06:35 PM	21048.01 MSD	Liquid	MSD
072	1/29/2021 3:08:27 PM	CCV4-2.0 ppb	Liquid	CCV
073	1/29/2021 3:10:19 PM	CCB4	Liquid	CCB

Form 1: Metals Analysis Data Sheet

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Lab Sample ID: S21073.01
Sample Tag: MW-1 L101070-01
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7439-97-6	Mercury	Not detected	0.0002	0.000016	mg/L	1	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Lab Sample ID: S21073.02
Sample Tag: MW-2 L101070-02
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7439-97-6	Mercury	Not detected	0.0002	0.000016	mg/L	1	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Lab Sample ID: S21073.03
Sample Tag: MW-4 L101070-03
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7439-97-6	Mercury	Not detected	0.0002	0.000016	mg/L	1	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Lab Sample ID: S21073.04
Sample Tag: MW-5 L101070-04
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7439-97-6	Mercury	Not detected	0.0002	0.000016	mg/L	1	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Lab Sample ID: S21073.05
Sample Tag: MW-6 L101070-05
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7439-97-6	Mercury	Not detected	0.0002	0.000016	mg/L	1	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Lab Sample ID: S21073.06
Sample Tag: MW-4 Duplicate L101070-06
Date Collected: 01/27/2021
Matrix: Groundwater

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7439-97-6	Mercury	Not detected	0.0002	0.000016	mg/L	1	01/29/2021	

Form 1: Metals Analysis Data Sheet

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Lab Sample ID: S21073.07
Sample Tag: Field Blank L101070-07
Date Collected: 01/27/2021
Matrix: Water

CAS #	Analyte	Result	RL	MDL	Units	Dilute	Run Date	Notes
7439-97-6	Mercury	Not detected	0.0002	0.000016	mg/L	1	01/29/2021	

Form 1: Metals Analysis Data Sheet - Flag Description Key

Data Set ID: HG2-HG3-21-0129A
Analysis Date: 01/29/21

Instrument ID: HG QuickTrace
Analyst: JRH

Note/Qualifier Key	
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
m	Duplicate injection precision not met
n	Spiked sample recovery outside control limits
s	Reported value determined by the MSA
u	Analyte not detected above reporting limit
A	TIC is a suspected aldol-condensation product
B	Compound also found in associated method blank
C	Analyte presence confirmed by GC/MS
D	Identified in an analysis at a secondary dilution factor
E	Concentration exceeds calibration range
J	Estimated value less than reporting limit, but greater than MDL
N	Presumptive evidence of TIC
P	Pesticide/Aroclor 2-column RPD exceeds limit
U	Analyte not detected above reporting limit
!	Result is outside of stated limit criteria
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
K	Elevated reporting limit due to low total solids
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
Q	Reported result represents most abundant aroclor
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
V	Accurate value not available due to presence of multiple aroclors
W	Surrogate result not applicable due to sample dilution
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
Z	Estimated result due to matrix interference
a	ASTM prep method F963-11
d	Duplicate analysis not within control limits
f	Filtered and preserved in lab
i	Incremental sampling
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one
r	This analyte is being reported as the best result from multiple
v	VOCs analyzed outside of holding time based on the measurement of
x	Preserved from bulk sample
c	Filtered in lab

Form 2A: Initial and Continuing Calibration Verification

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Sample Name	*QC Type*	*Dilute*	*Element*	*Sample Conc*	*Actual Conc*	*%Rec*	*LCL/UCL*	*Units*	*Matrix*
010 ICV-5.0 ppb	ICV	1.0	Hg	4.901	5.0	98	90/110	ug/L	Liquid
012 CCV1-2.0 ppb	CCV	1.0	Hg	2.009	2.0	101	90/110	ug/L	Liquid
029 CCV2-2.0 ppb	CCV	1.0	Hg	2.129	2.0	107	90/110	ug/L	Liquid
041 CCV3-2.0 ppb	CCV	1.0	Hg	2.161	2.0	108	90/110	ug/L	Liquid
061 ICV-5.0 ppb	ICV	1.0	Hg	4.887	5.0	98	90/110	ug/L	Liquid
072 CCV4-2.0 ppb	CCV	1.0	Hg	1.947	2.0	97	90/110	ug/L	Liquid

Form 3: Blanks

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Sample Name	*QC Type*	*Dilute*	*Element*	*Sample Conc*	*Raw Conc*	*Units*	*Matrix*
011 ICB	ICB	1.0	Hg	<0.03	-0.0565	ug/L	Liquid
013 CCB1	CCB	1.0	Hg	<0.03	-0.0573	ug/L	Liquid
016 012921_1 LRB	LRB	1.0	Hg	<0.03	-0.0568	ug/L	Liquid
030 CCB2	CCB	1.0	Hg	<0.03	-0.0558	ug/L	Liquid
042 CCB3	CCB	1.0	Hg	<0.03	-0.0544	ug/L	Liquid
064 ICB	ICB	1.0	Hg	<0.03	-0.0753	ug/L	Liquid
067 012921_2 LRB	LRB	1.0	Hg	<0.03	-0.0734	ug/L	Liquid
073 CCB4	CCB	1.0	Hg	<0.03	-0.0788	ug/L	Liquid

Form 5A: Matrix Spike Sample Recovery

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Spike Name	Sample Name	Dilute	Element	Spike Conc	Sample Conc	Spike Amount	%Rec	LCL/UCL	Units	Matrix
014 BS-0.10		1.0	Hg	0.104	ND	0.10	104	70/130	ug/L	Liquid
023 21073.06 MS-2.0	**022 21073.06s**	1.0	Hg	1.980	<0.5	2.0	99	80/120	ug/L	Liquid
037 21091.01 MS-2.0	**036 21091.01s**	1.0	Hg	2.104	<0.5	2.0	105	80/120	ug/L	Liquid
065 BS-0.10		1.0	Hg	0.071	ND	0.10	71	70/130	ug/L	Liquid
070 21048.01 MS-2.0	**069 21048.01s tclp**	5.0	Hg	9.950	<0.5	10.0	100	80/120	ug/L	Liquid

Form 5B: Matrix Spike Duplicate Evaluation

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Duplicate Name	*Sample Name*	*Dilute*	*Element*	*Dup Conc*	*Samp Conc*	*%RPD*	*LCL/UCL*	*Units*	*Matrix*
024 21073.06 MSD	**023 21073.06 MS-2.0**	1.0	Hg	1.967	1.980	1	0/20	ug/L	Liquid
038 21091.01 MSD	**037 21091.01 MS-2.0**	1.0	Hg	2.103	2.104	0	0/20	ug/L	Liquid
071 21048.01 MSD	**070 21048.01 MS-2.0**	5.0	Hg	9.995	9.950	0	0/20	ug/L	Liquid

Form 7: Laboratory Control Sample

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Sample Name	*Dilute*	*Element*	*Sample Conc*	*Actual Conc*	*%Rec*	*LCL/UCL*	*Units*	*Matrix*
015 012921_1 LCS-2.0	1.0	Hg	2.072	2.0	104	85/115	ug/L	Liquid
066 012921_2 LCS-2.0	1.0	Hg	1.811	2.0	91	85/115	ug/L	Liquid

Form 13: Analysis Run Log

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Filename	*Run Time*	*Matrix*	*Analytes*
001 Calibration Blank	1/29/2021 11:40:01 AM	Liquid	Hg
002 Standard #1	1/29/2021 11:41:53 AM	Liquid	Hg
003 Standard #2	1/29/2021 11:43:45 AM	Liquid	Hg
004 Standard #3	1/29/2021 11:45:36 AM	Liquid	Hg
005 Standard #4	1/29/2021 11:47:28 AM	Liquid	Hg
006 Standard #5	1/29/2021 11:49:20 AM	Liquid	Hg
007 Standard #6	1/29/2021 11:51:11 AM	Liquid	Hg
008 Standard #7	1/29/2021 11:54:03 AM	Liquid	Hg
009 Standard #8	1/29/2021 11:57:18 AM	Liquid	Hg
010 ICV-5.0 ppb	1/29/2021 12:00:30 PM	Liquid	Hg
011 ICB	1/29/2021 12:02:21 PM	Liquid	Hg
012 CCV1-2.0 ppb	1/29/2021 12:04:13 PM	Liquid	Hg
013 CCB1	1/29/2021 12:06:04 PM	Liquid	Hg
014 BS-0.10	1/29/2021 12:07:56 PM	Liquid	Hg
015 012921_1 LCS-2.0	1/29/2021 12:58:54 PM	Liquid	Hg
016 012921_1 LRB	1/29/2021 1:00:45 PM	Liquid	Hg
017 21073.01s	1/29/2021 1:02:31 PM	Liquid	Hg
018 21073.02s	1/29/2021 1:04:18 PM	Liquid	Hg
019 21073.03s	1/29/2021 1:06:05 PM	Liquid	Hg
020 21073.04s	1/29/2021 1:07:53 PM	Liquid	Hg
021 21073.05s	1/29/2021 1:09:42 PM	Liquid	Hg
022 21073.06s	1/29/2021 1:11:30 PM	Liquid	Hg
023 21073.06 MS-2.0	1/29/2021 1:13:20 PM	Liquid	Hg
024 21073.06 MSD	1/29/2021 1:15:06 PM	Liquid	Hg
025 21073.07s	1/29/2021 1:16:53 PM	Liquid	Hg
026 20934.04s tclp	1/29/2021 1:18:40 PM	Liquid	Hg
027 20934.07s tclp	1/29/2021 1:20:28 PM	Liquid	Hg
028 20934.08s tclp	1/29/2021 1:22:16 PM	Liquid	Hg
029 CCV2-2.0 ppb	1/29/2021 1:24:08 PM	Liquid	Hg
030 CCB2	1/29/2021 1:26:00 PM	Liquid	Hg
031 20934.20s tclp	1/29/2021 1:27:49 PM	Liquid	Hg
032 20934.21s tclp	1/29/2021 1:29:38 PM	Liquid	Hg
033 20934.22s tclp	1/29/2021 1:31:25 PM	Liquid	Hg
034 20934.25s tclp	1/29/2021 1:33:12 PM	Liquid	Hg
035 21036.01s tclp	1/29/2021 1:34:59 PM	Liquid	Hg
036 21091.01s	1/29/2021 1:36:47 PM	Liquid	Hg
037 21091.01 MS-2.0	1/29/2021 1:38:35 PM	Liquid	Hg
038 21091.01 MSD	1/29/2021 1:40:24 PM	Liquid	Hg
039 21091.02s	1/29/2021 1:42:14 PM	Liquid	Hg
040 21097.02s	1/29/2021 1:44:01 PM	Liquid	Hg
041 CCV3-2.0 ppb	1/29/2021 1:45:53 PM	Liquid	Hg
042 CCB3	1/29/2021 1:47:44 PM	Liquid	Hg
043 012921_2 LCS-2.0	1/29/2021 1:53:42 PM	Liquid	Hg
044 012921_2 LRB	1/29/2021 1:55:33 PM	Liquid	Hg
045 21044.01s tclp	1/29/2021 1:57:21 PM	Liquid	Hg
046 21048.01s tclp	1/29/2021 2:01:29 PM	Liquid	Hg
047 21048.01 MS-2.0	1/29/2021 2:03:17 PM	Liquid	Hg
048 21048.01 MSD	1/29/2021 2:05:05 PM	Liquid	Hg
049 CCV4-2.0 ppb	1/29/2021 2:06:57 PM	Liquid	Hg
050 CCV4-2.0 ppb	1/29/2021 2:08:48 PM	Liquid	Hg
051 CCB4	1/29/2021 2:10:40 PM	Liquid	Hg
052 Calibration Blank	1/29/2021 2:26:45 PM	Liquid	Hg
053 Standard #1	1/29/2021 2:28:37 PM	Liquid	Hg
054 Standard #2	1/29/2021 2:30:28 PM	Liquid	Hg
055 Standard #3	1/29/2021 2:32:20 PM	Liquid	Hg
056 Standard #4	1/29/2021 2:34:11 PM	Liquid	Hg

Form 13: Analysis Run Log

Data Set ID: HG2-HG3-21-0129A
Instrument ID: HG QuickTrace
Analysis Date: 01/29/21
Analyst: JRH

Filename	*Run Time*	*Matrix*	*Analytes*
057 Standard #5	1/29/2021 2:36:03 PM	Liquid	Hg
058 Standard #6	1/29/2021 2:37:55 PM	Liquid	Hg
059 Standard #7	1/29/2021 2:41:05 PM	Liquid	Hg
060 Standard #8	1/29/2021 2:44:28 PM	Liquid	Hg
061 ICV-5.0 ppb	1/29/2021 2:46:22 PM	Liquid	Hg
062 ICB	1/29/2021 2:48:13 PM	Liquid	Hg
063 ICB	1/29/2021 2:50:05 PM	Liquid	Hg
064 ICB	1/29/2021 2:53:51 PM	Liquid	Hg
065 BS-0.10	1/29/2021 2:55:42 PM	Liquid	Hg
066 012921_2 LCS-2.0	1/29/2021 2:57:33 PM	Liquid	Hg
067 012921_2 LRB	1/29/2021 2:59:24 PM	Liquid	Hg
068 21044.01s tclp	1/29/2021 3:01:12 PM	Liquid	Hg
069 21048.01s tclp	1/29/2021 3:02:59 PM	Liquid	Hg
070 21048.01 MS-2.0	1/29/2021 3:04:47 PM	Liquid	Hg
071 21048.01 MSD	1/29/2021 3:06:35 PM	Liquid	Hg
072 CCV4-2.0 ppb	1/29/2021 3:08:27 PM	Liquid	Hg
073 CCB4	1/29/2021 3:10:19 PM	Liquid	Hg

Data Set: HG2-HG3-21-0129A
Run Date: 01/29/21

Mercury Summary Report

Analyst: JRH
Instrument: HG QuickTrace

Element	Seq #	Acquisition Time	Sample Name	Peak	Concentration	Units	Matrix	Dilution	Sample Wt.	Sample Vol.
Hg	001	1/29/2021 11:40:01 AM	Calibration Blank	102.7000	0.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	002	1/29/2021 11:41:53 AM	Standard #1	1439.0000	0.1000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	003	1/29/2021 11:43:45 AM	Standard #2	2489.0000	0.2000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	004	1/29/2021 11:45:36 AM	Standard #3	5579.0000	0.5000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	005	1/29/2021 11:47:28 AM	Standard #4	9917.0000	1.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	006	1/29/2021 11:49:20 AM	Standard #5	18470.0000	2.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	007	1/29/2021 11:51:11 AM	Standard #6	55210.0000	6.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	008	1/29/2021 11:54:03 AM	Standard #7	73210.0000	8.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	009	1/29/2021 11:57:18 AM	Standard #8	91800.0000	10.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	010	1/29/2021 12:00:30 PM	ICV-5.0 ppb	45200.0000	4.9010	ug/L	Liquid	1.0	1.0000	1.0000
Hg	011	1/29/2021 12:02:21 PM	ICB	45.2300	-0.0565	ug/L	Liquid	1.0	1.0000	1.0000
Hg	012	1/29/2021 12:04:13 PM	CCV1-2.0 ppb	18860.0000	2.0090	ug/L	Liquid	1.0	1.0000	1.0000
Hg	013	1/29/2021 12:06:04 PM	CCB1	37.9500	-0.0573	ug/L	Liquid	1.0	1.0000	1.0000
Hg	014	1/29/2021 12:07:56 PM	BS-0.10	1510.0000	0.1043	ug/L	Liquid	1.0	1.0000	1.0000
Hg	015	1/29/2021 12:58:54 PM	012921_1 LCS-2.0	19430.0000	2.0720	ug/L	Liquid	1.0	1.0000	1.0000
Hg	016	1/29/2021 1:00:45 PM	012921_1 LRB	42.7400	-0.0568	ug/L	Liquid	1.0	1.0000	1.0000
Hg	017	1/29/2021 1:02:31 PM	21073.01s	56.0100	-0.0554	ug/L	Liquid	1.0	1.0000	1.0000
Hg	018	1/29/2021 1:04:18 PM	21073.02s	81.6800	-0.0525	ug/L	Liquid	1.0	1.0000	1.0000
Hg	019	1/29/2021 1:06:05 PM	21073.03s	78.6500	-0.0529	ug/L	Liquid	1.0	1.0000	1.0000
Hg	020	1/29/2021 1:07:53 PM	21073.04s	42.9400	-0.0568	ug/L	Liquid	1.0	1.0000	1.0000
Hg	021	1/29/2021 1:09:42 PM	21073.05s	39.8900	-0.0571	ug/L	Liquid	1.0	1.0000	1.0000
Hg	022	1/29/2021 1:11:30 PM	21073.06s	53.4200	-0.0556	ug/L	Liquid	1.0	1.0000	1.0000
Hg	023	1/29/2021 1:13:20 PM	21073.06 MS-2.0	18600.0000	1.9800	ug/L	Liquid	1.0	1.0000	1.0000
Hg	024	1/29/2021 1:15:06 PM	21073.06 MSD	18470.0000	1.9670	ug/L	Liquid	1.0	1.0000	1.0000
Hg	025	1/29/2021 1:16:53 PM	21073.07s	20.7500	-0.0592	ug/L	Liquid	1.0	1.0000	1.0000
Hg	029	1/29/2021 1:24:08 PM	CCV2-2.0 ppb	19950.0000	2.1290	ug/L	Liquid	1.0	1.0000	1.0000
Hg	030	1/29/2021 1:26:00 PM	CCB2	51.6100	-0.0558	ug/L	Liquid	1.0	1.0000	1.0000
Hg	041	1/29/2021 1:45:53 PM	CCV3-2.0 ppb	20240.0000	2.1610	ug/L	Liquid	1.0	1.0000	1.0000
Hg	042	1/29/2021 1:47:44 PM	CCB3	64.6500	-0.0544	ug/L	Liquid	1.0	1.0000	1.0000
Hg	043	1/29/2021 1:53:42 PM	012921_2 LCS-2.0	19350.0000	2.0630	ug/L	Liquid	1.0	1.0000	1.0000
Hg	044	1/29/2021 1:55:33 PM	012921_2 LRB	50.3800	-0.0560	ug/L	Liquid	1.0	1.0000	1.0000
Hg	049	1/29/2021 2:06:57 PM	CCV4-2.0 ppb	21050.0000	2.2500	ug/L	Liquid	1.0	1.0000	1.0000
Hg	050	1/29/2021 2:08:48 PM	CCV4-2.0 ppb	21950.0000	2.3490	ug/L	Liquid	1.0	1.0000	1.0000
Hg	051	1/29/2021 2:10:40 PM	CCB4	63.6300	-0.0545	ug/L	Liquid	1.0	1.0000	1.0000
Hg	052	1/29/2021 2:26:45 PM	Calibration Blank	88.4100	0.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	053	1/29/2021 2:28:37 PM	Standard #1	1663.0000	0.1000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	054	1/29/2021 2:30:28 PM	Standard #2	3030.0000	0.2000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	055	1/29/2021 2:32:20 PM	Standard #3	6292.0000	0.5000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	056	1/29/2021 2:34:11 PM	Standard #4	11330.0000	1.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	057	1/29/2021 2:36:03 PM	Standard #5	20450.0000	2.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	058	1/29/2021 2:37:55 PM	Standard #6	59260.0000	6.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	059	1/29/2021 2:41:05 PM	Standard #7	80080.0000	8.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	060	1/29/2021 2:44:28 PM	Standard #8	100100.0000	10.0000	ug/L	Liquid	1.0	1.0000	1.0000
Hg	061	1/29/2021 2:46:22 PM	ICV-5.0 ppb	49160.0000	4.8870	ug/L	Liquid	1.0	1.0000	1.0000
Hg	062	1/29/2021 2:48:13 PM	ICB	1766.0000	0.0967	ug/L	Liquid	1.0	1.0000	1.0000
Hg	063	1/29/2021 2:50:05 PM	ICB	1987.0000	0.1190	ug/L	Liquid	1.0	1.0000	1.0000
Hg	064	1/29/2021 2:53:51 PM	ICB	64.7300	-0.0753	ug/L	Liquid	1.0	1.0000	1.0000
Hg	065	1/29/2021 2:55:42 PM	BS-0.10	1512.0000	0.0710	ug/L	Liquid	1.0	1.0000	1.0000
Hg	066	1/29/2021 2:57:33 PM	012921_2 LCS-2.0	18730.0000	1.8110	ug/L	Liquid	1.0	1.0000	1.0000
Hg	067	1/29/2021 2:59:24 PM	012921_2 LRB	83.5500	-0.0734	ug/L	Liquid	1.0	1.0000	1.0000
Hg	072	1/29/2021 3:08:27 PM	CCV4-2.0 ppb	20070.0000	1.9470	ug/L	Liquid	1.0	1.0000	1.0000
Hg	073	1/29/2021 3:10:19 PM	CCB4	30.3700	-0.0788	ug/L	Liquid	1.0	1.0000	1.0000

Mercury Digestion
Method # 245.1, 7471B, 7470A (OHIO VAP)

TIME START: 10:15
TIME FINISH: 12:15
PREP BATCH: HGD-012921-1
BALANCE ID: M4

Beginning
block #1 95 °C
block #2 ____ °C
block #3 ____ °C

End
block #1 95 °C ID # HB155005
block #2 ____ °C ID # ____
block #3 ____ °C ID # ____

DATE 1/29/21
ANALYST [illegible]
REVIEWED BY CCM
REVIEW DATE 2-2-21

SAMPLE#	BTL ID	SAMPLE AMOUNT GRAMS (g)	%TOT. SOLIDS	DRY SAMPLE WT.	DILUTION FACTOR	FINAL VOLUME	REMARKS
LCS012921-1	------	25	--------	----------	1	25g	
LRB012921-1	------		--------	----------		25g	
21073.01							
02							
03							
04							
05							
06							
06 MS							
06 MSD							
07							
20934.04		0.533			47		tdp
07		5.0			5		
08		5.0			5		
20		0.551			45		
21		0.538			46		
22		0.521			48		
25		0.571			44		
21036.01		5.0			5		
~~21044.01~~ OMIT		~~25~~					
21091.01	12	25			1		
02	7	25			1		
21097.02		12.5			2		

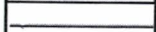
NOTES: 1) Spike values (unless otherwise stated):
2.0 ppb for LCS: 0.50 ml of HPS solution, 2.0 ppb for liquid samples: 0.50 ml of HPS solution & 0.002 ppm for solid samples: 0.50 ml of HPS solution (Date Prepared: 1/18/21 Exp 2/1/21
Centrifuge Tube Lot # 200413-060
HNO_3 Lot # 258255
H_2SO_4 Lot # 231834

Pipet Calibration:

Test #	Pipet Volume Setting mL	Wt. of water from pipet, g	Notes
1	0.500	0.501	
2		0.502	
3		0.504	

Sequence: 012921
Last Update Operator: jeff-phi

ICS-1100 A Dionex IC / Meth 300.0

ECD_1	Name	Type	Level	Position	Volume	Instrument Method	Processing Method	Status
	water blank	Unknown		1	5000	New Instrument Method	Anion	Finished
	1132Cal1	Calibration Standard	01	2	5000	New Instrument Method	Anion	Finished
	1132Cal2	Calibration Standard	02	3	5000	New Instrument Method	Anion	Finished
	1132Cal3	Calibration Standard	03	4	5000	New Instrument Method	Anion	Finished
	1132Cal4	Calibration Standard	04	5	5000	New Instrument Method	Anion	Finished
	1132Cal5	Calibration Standard	05	6	5000	New Instrument Method	Anion	Finished
	Blank	Unknown		1	5000	New Instrument Method	Anion	Finished
	BSpike 11785BS1	Check Standard		2	5000	New Instrument Method	Anion	Finished
	LCS 11785LCS1	Check Standard		3	5000	New Instrument Method	Anion	Finished
	21073.01	Unknown		4	5000	New Instrument Method	Anion	Finished
	21073.02	Unknown		5	5000	New Instrument Method	Anion	Finished
	21073.03	Unknown		6	5000	New Instrument Method	Anion	Finished
	21073.04	Unknown		7	5000	New Instrument Method	Anion	Finished
	21073.05	Unknown		8	5000	New Instrument Method	Anion	Finished
	21073.06	Unknown		9	5000	New Instrument Method	Anion	Finished
	21073.07	Unknown		10	5000	New Instrument Method	Anion	Finished
	21073.01 dup	Unknown		11	5000	New Instrument Method	Anion	Finished
	21073.01 MS 13187M	Unknown		12	5000	New Instrument Method	Anion	Finished
	21073.01 MSD 13187	Unknown		13	5000	New Instrument Method	Anion	Finished
	21073.02	Unknown		14	5000	New Instrument Method	Anion	Finished
	21073.04	Unknown		15	5000	New Instrument Method	Anion	Finished
	BSpike 11785BS1	Check Standard		16	5000	New Instrument Method	Anion	Finished
	Blank	Unknown		17	5000	New Instrument Method	Anion	Finished

CAL ID# ICSA120320CAL

ST210129-WL-A
CL210129-WL-A

ECD_1	Name	Type	Level	Position	Volume	Instrument Method	Processing Method	Status

ECD_1	Name	Inject Time	Lock Status	Weight	Dilution	IntStd	Replicate ID	Comment	ECD_1
	water blank	12/3/2020 9:34:20 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal1	12/3/2020 9:46:36 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal2	12/3/2020 9:56:40 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal3	12/3/2020 10:06:43 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal4	12/3/2020 10:16:46 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal5	12/3/2020 10:26:48 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	Blank	1/29/2021 7:54:25 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	BSpike 11785BS1	1/29/2021 8:06:41 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	LCS 11785LCS1	1/29/2021 8:16:44 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	21073.01	1/29/2021 8:26:47 AM -0		1.0000	10.0000	1.0000		Jeff Phifer	
	21073.02	1/29/2021 8:36:51 AM -0		1.0000	10.0000	1.0000		Jeff Phifer	
	21073.03	1/29/2021 8:46:54 AM -0		1.0000	10.0000	1.0000		Jeff Phifer	
	21073.04	1/29/2021 8:56:57 AM -0		1.0000	10.0000	1.0000		Jeff Phifer	
	21073.05	1/29/2021 9:07:01 AM -0		1.0000	20.0000	1.0000		Jeff Phifer	
	21073.06	1/29/2021 9:17:05 AM -0		1.0000	10.0000	1.0000		Jeff Phifer	
	21073.07	1/29/2021 9:27:08 AM -0		1.0000	2.5000	1.0000		Jeff Phifer	
	21073.01 dup	1/29/2021 9:37:11 AM -0		1.0000	10.0000	1.0000		Jeff Phifer	
	21073.01 MS 13187MS	1/29/2021 9:47:14 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	21073.01 MSD 13187M	1/29/2021 9:57:17 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	21073.02	1/29/2021 10:07:20 AM		1.0000	50.0000	1.0000		Jeff Phifer	
	21073.04	1/29/2021 10:17:24 AM		1.0000	50.0000	1.0000		Jeff Phifer	
	BSpike 11785BS1	1/29/2021 10:27:28 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	Blank	1/29/2021 10:37:31 AM		1.0000	1.0000	1.0000		Jeff Phifer	

ECD_1	Name	Inject Time	Lock Status	Weight	Dilution	IntStd	Replicate ID	Comment	ECD_1

Name	Re-injections	Spike Group
water blank	0	
1132Cal1	0	
1132Cal2	0	
1132Cal3	0	
1132Cal4	0	
1132Cal5	0	
Blank	0	
BSpike 11785BS1	0	
LCS 11785LCS1	0	
21073.01	0	
21073.02	0	
21073.03	0	
21073.04	0	
21073.05	0	
21073.06	0	
21073.07	0	
21073.01 dup	0	
21073.01 MS 13187M	0	
21073.01 MSD 13187	0	
21073.02	0	
21073.04	0	
BSpike 11785BS1	0	
Blank	0	

Name	Re-injections	Spike Group

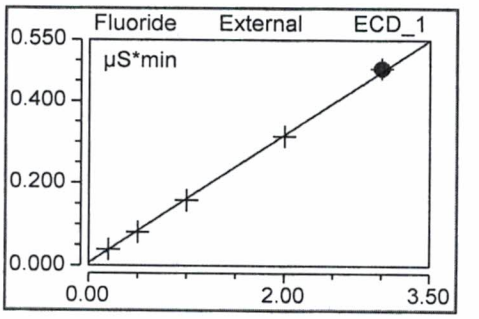
Calibration Batch Report
CAL ID# ICSA120320CAL

Sequence:	**012921**	*Injection Volume:*	**5,000.00**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 10:26**	*Column:*	**AS4A-SC 038777**

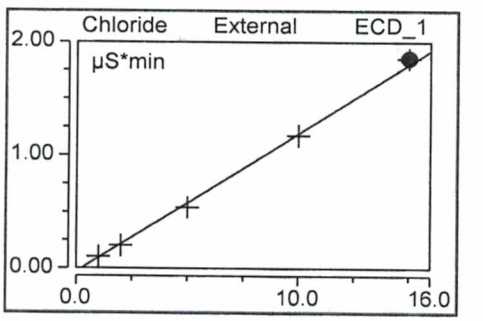
Calibration Summary

Peak Name	Eval.Type	Cal.Type	Points	Offset (C0)	Slope (C1)	Curve (C2)	Coeff.Det. %
Fluoride	Area	WithOffset,	5.000	0.007	0.155	0.000	99.9252
Chloride	Area	WithOffset,	5.000	-0.031	0.122	0.000	99.7568
Nitrite	Area	WithOffset,	5.000	-0.003	0.229	0.000	99.9133
Bromide	Area	WithOffset,	5.000	-0.001	0.044	0.000	99.9712
Nitrate	Area	WithOffset,	5.000	0.001	0.258	0.000	99.9341
Sulfate	Area	WithOffset,	5.000	0.000	0.081	0.000	99.8845
		AVERAGE:		-0.0045	0.1482	0.0000	99.8975

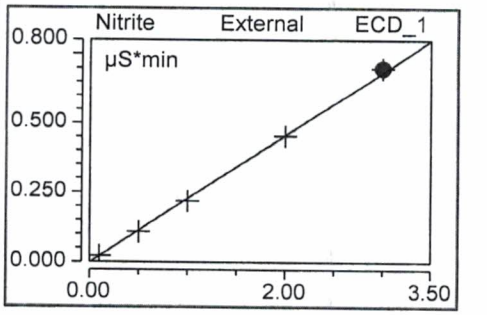
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Fluoride	Fluoride	Fluoride	Fluoride
1132Cal1	1.110	0.0393	0.542	0.211
1132Cal2	1.110	0.0813	1.238	0.481
1132Cal3	1.110	0.1585	2.515	0.978
1132Cal4	1.110	0.3139	5.172	1.978
1132Cal5	1.107	0.4807	7.992	3.052
Average	1.110			
Rel. Std. Dev.	0.136 %			



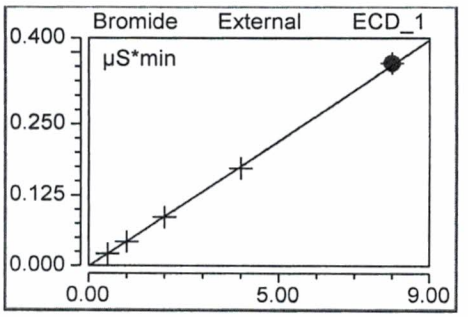
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Chloride	Chloride	Chloride	Chloride
1132Cal1	1.624	0.1031	1.709	1.096
1132Cal2	1.620	0.2008	3.339	1.897
1132Cal3	1.627	0.5421	9.147	4.694
1132Cal4	1.630	1.1742	19.854	9.874
1132Cal5	1.637	1.8531	30.972	15.439
Average	1.628			
Rel. Std. Dev.	0.392 %			



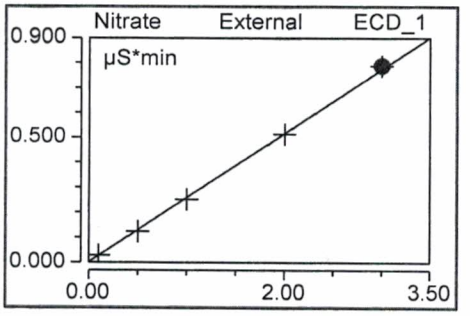
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Nitrite	Nitrite	Nitrite	Nitrite
1132Cal1	1.904	0.0218	0.300	0.106
1132Cal2	1.904	0.1075	1.532	0.480
1132Cal3	1.904	0.2176	3.154	0.961
1132Cal4	1.907	0.4531	6.640	1.988
1132Cal5	1.910	0.6997	10.351	3.064
Average	1.906			
Rel. Std. Dev.	0.155 %			



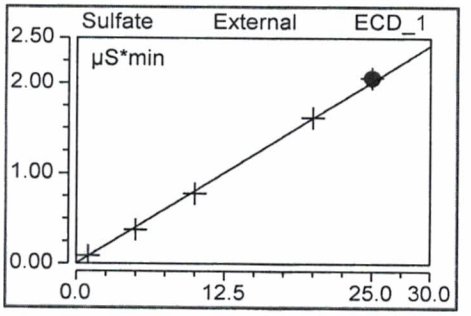
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Bromide	Bromide	Bromide	Bromide
1132Cal1	2.784	0.0213	0.253	0.511
1132Cal2	2.774	0.0428	0.502	0.997
1132Cal3	2.777	0.0860	0.996	1.976
1132Cal4	2.780	0.1724	2.034	3.932
1132Cal5	2.777	0.3559	4.227	8.085
Average	2.778			
Rel. Std. Dev.	0.139 %			



Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Nitrate	Nitrate	Nitrate	Nitrate
1132Cal1	3.140	0.0282	0.292	0.106
1132Cal2	3.124	0.1240	1.269	0.478
1132Cal3	3.124	0.2513	2.537	0.972
1132Cal4	3.120	0.5141	5.169	1.991
1132Cal5	3.107	0.7881	7.936	3.054
Average	3.123			
Rel. Std. Dev.	0.382 %			

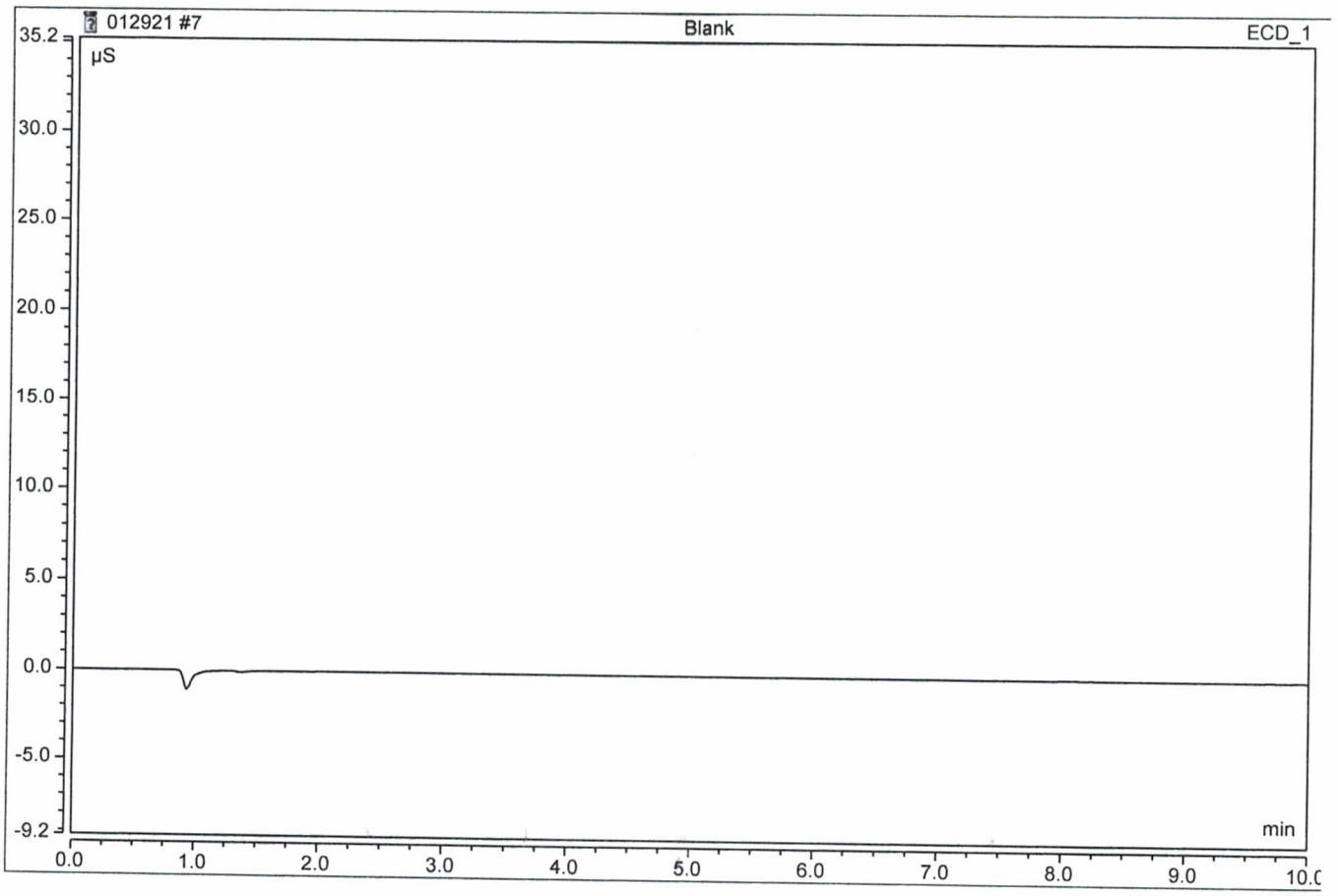


Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Sulfate	Sulfate	Sulfate	Sulfate
1132Cal1	6.510	0.0866	0.394	1.074
1132Cal2	6.504	0.3774	1.750	4.680
1132Cal3	6.490	0.7785	3.633	9.654
1132Cal4	6.460	1.6169	7.566	20.051
1132Cal5	6.447	2.0595	9.609	25.540
Average	6.482			
Rel. Std. Dev.	0.426 %			



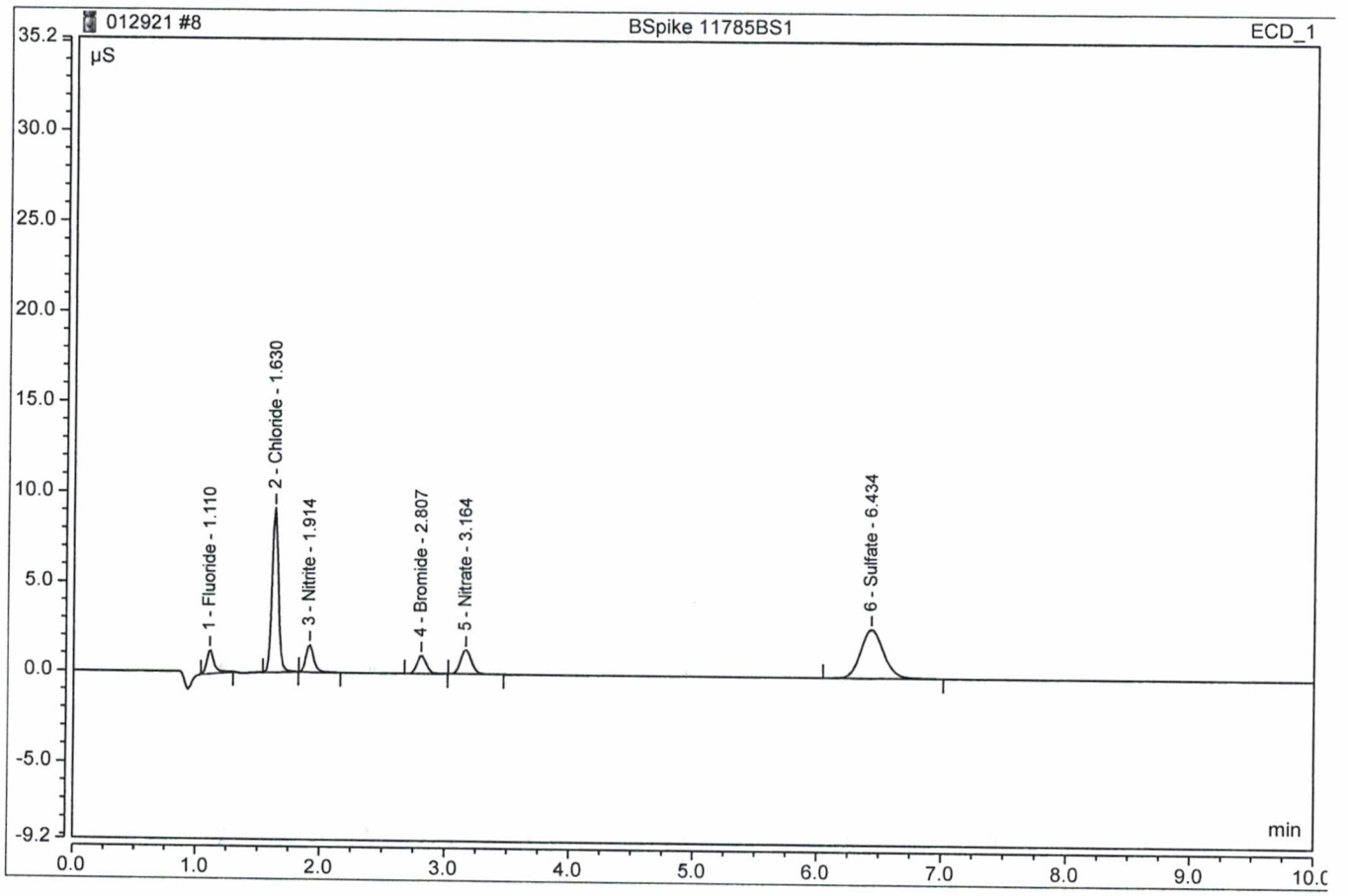
Sample Name:	**Blank**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 07:54**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount n.a.
TOTAL:				0.00	0.00	0.00



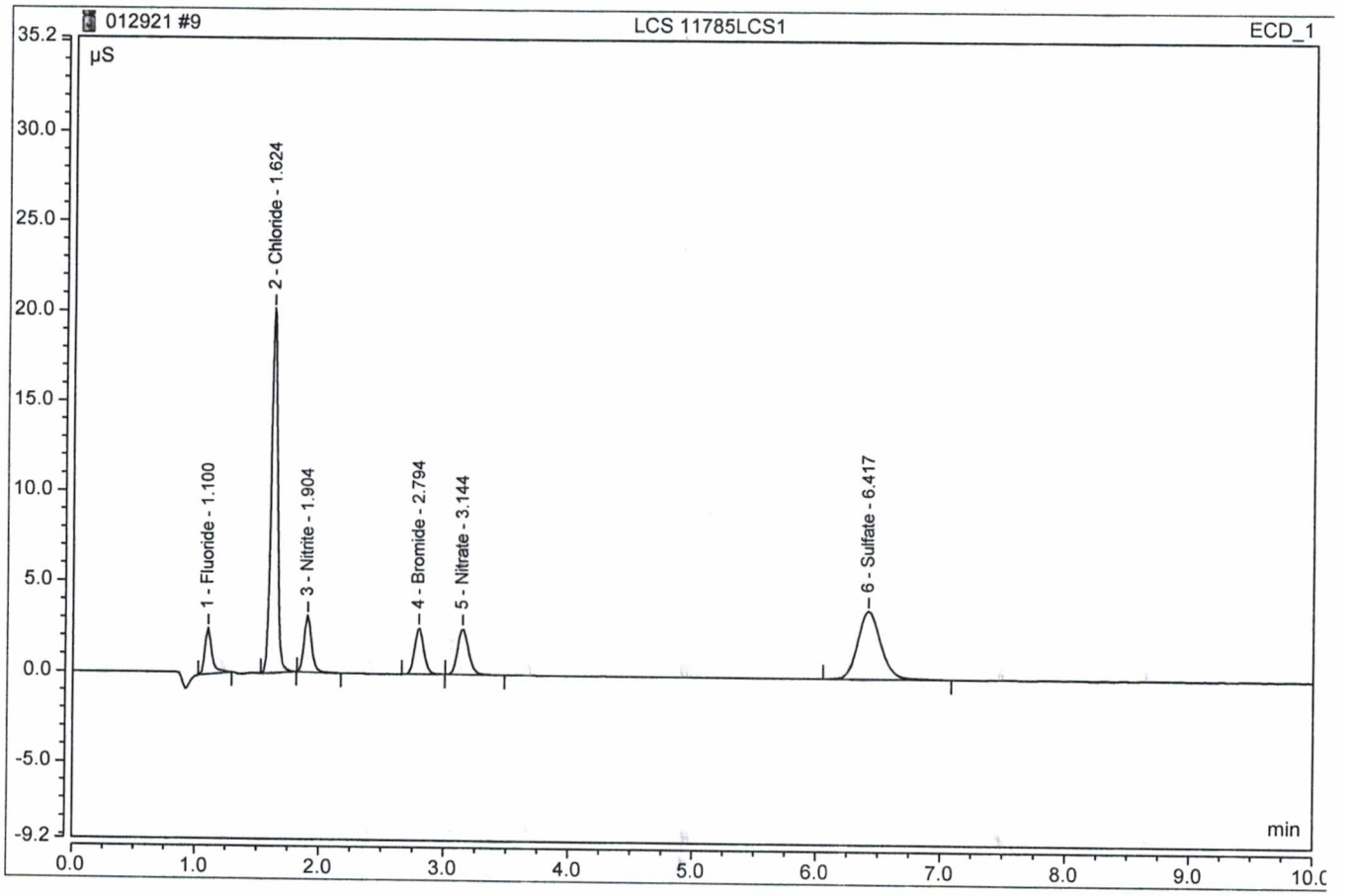
Sample Name:	**BSpike 11785BS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Check Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 08:06**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount	
1	1.11	Fluoride	M	0.087	1.317	0.5147	
2	1.63	Chloride	M	0.547	9.173	5 4.7355	94%
3	1.91	Nitrite	M	0.107	1.516	0.4779	
4	2.81	Bromide	M	0.087	0.997	1.9997	
5	3.16	Nitrate	M	0.132	1.336	0.5090	
6	6.43	Sulfate	M	0.583	2.726	7.5 7.2348	96%
TOTAL:				1.54	17.06	15.47	



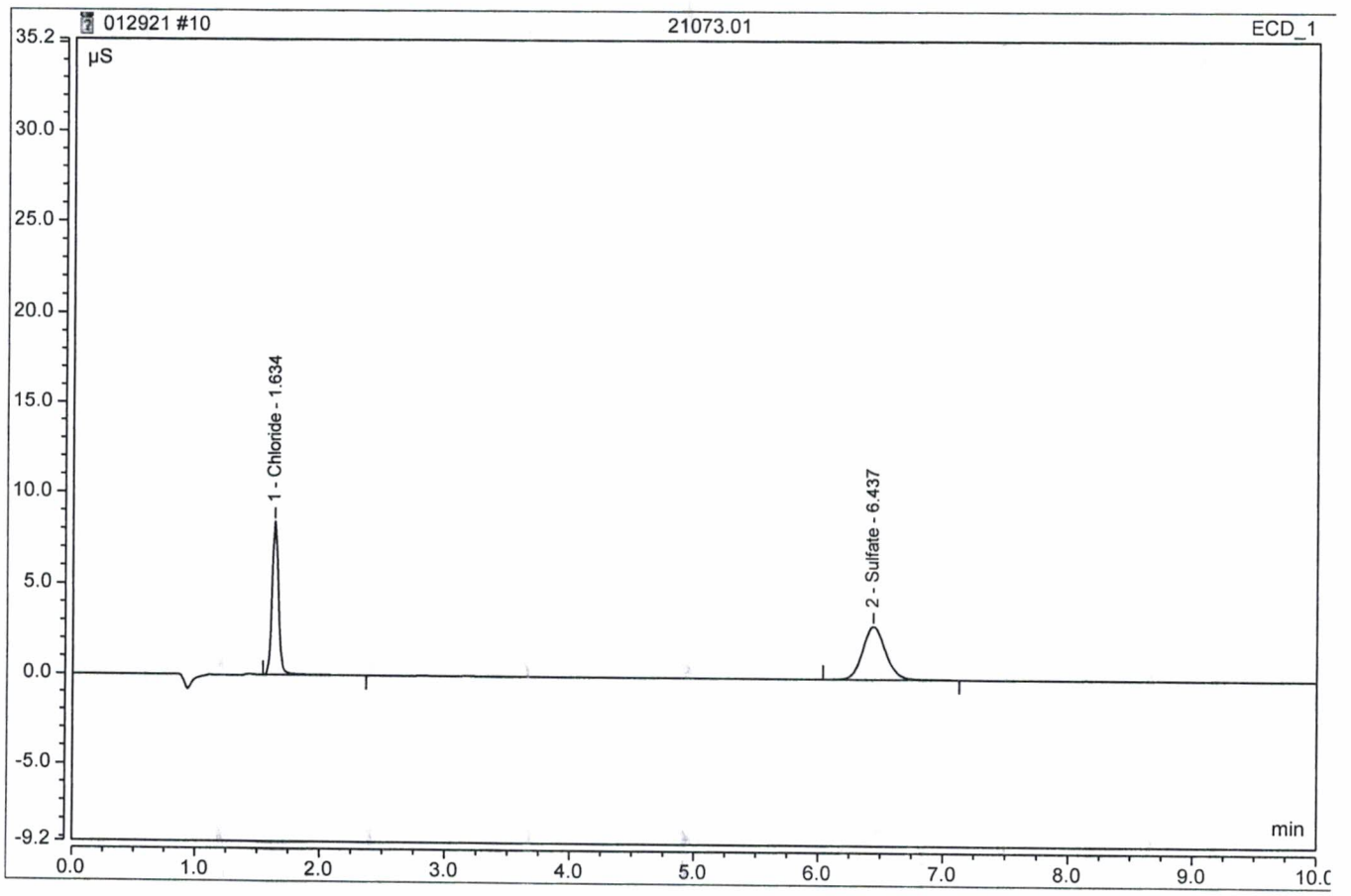
Sample Name:	**LCS 11785LCS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Check Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 08:16**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount		
1	1.10	Fluoride	M	0.163	2.517	1.0083		
2	1.62	Chloride	M	1.196	20.173	10 10.0553		100 %
3	1.90	Nitrite	M	0.216	3.103	0.9522		
4	2.79	Bromide	M	0.219	2.536	4.9863		
5	3.14	Nitrate	M	0.250	2.511	0.9659		
6	6.42	Sulfate	M	0.796	3.717	10 9.8691		99 %
TOTAL:				2.84	34.56	27.84		



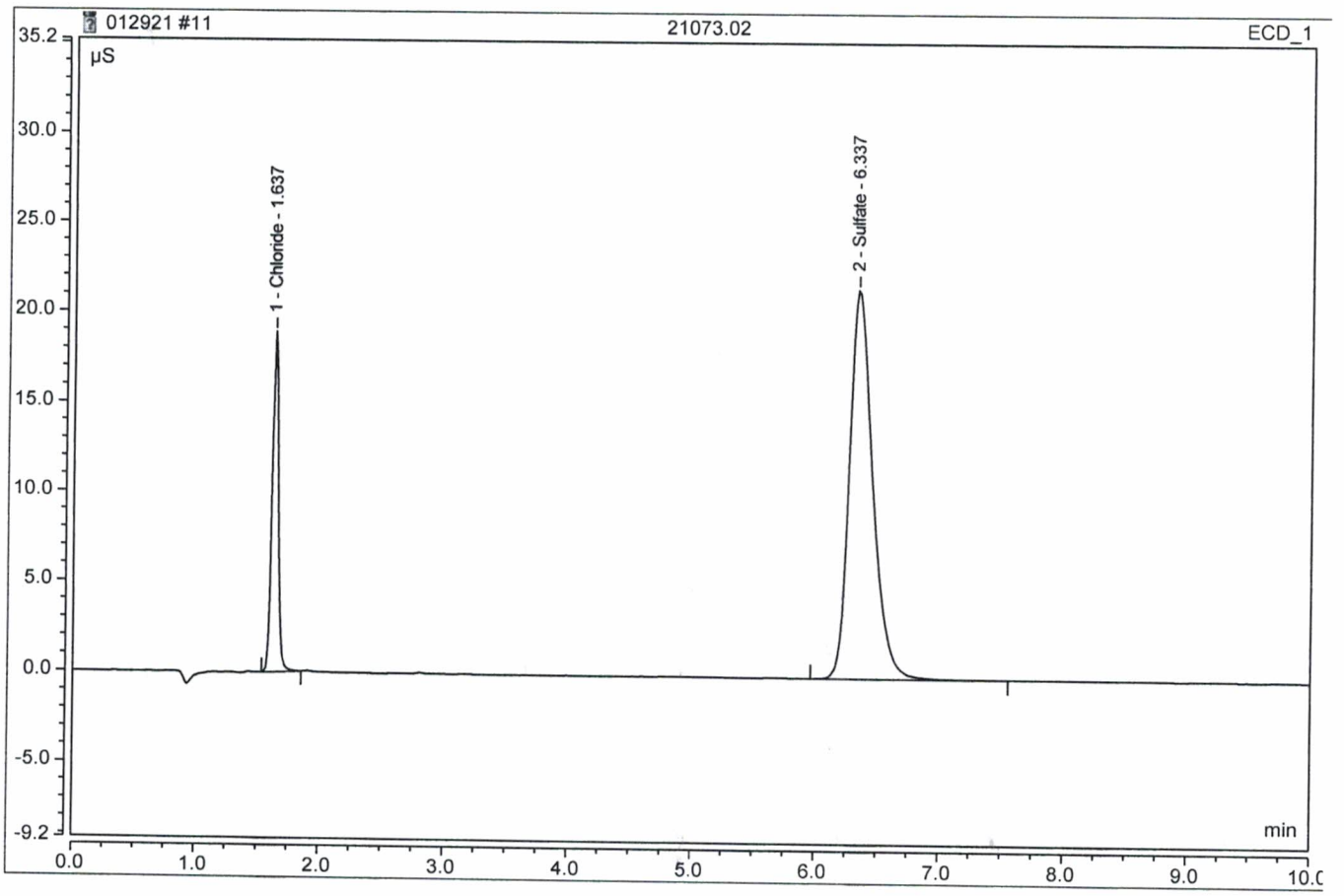
Sample Name:	**21073.01**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**10.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 08:26**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	**Chloride**	M	0.509	8.411	44.2314
2	6.44	**Sulfate**	M	0.626	2.930	77.6853
TOTAL:				1.14	11.34	121.92



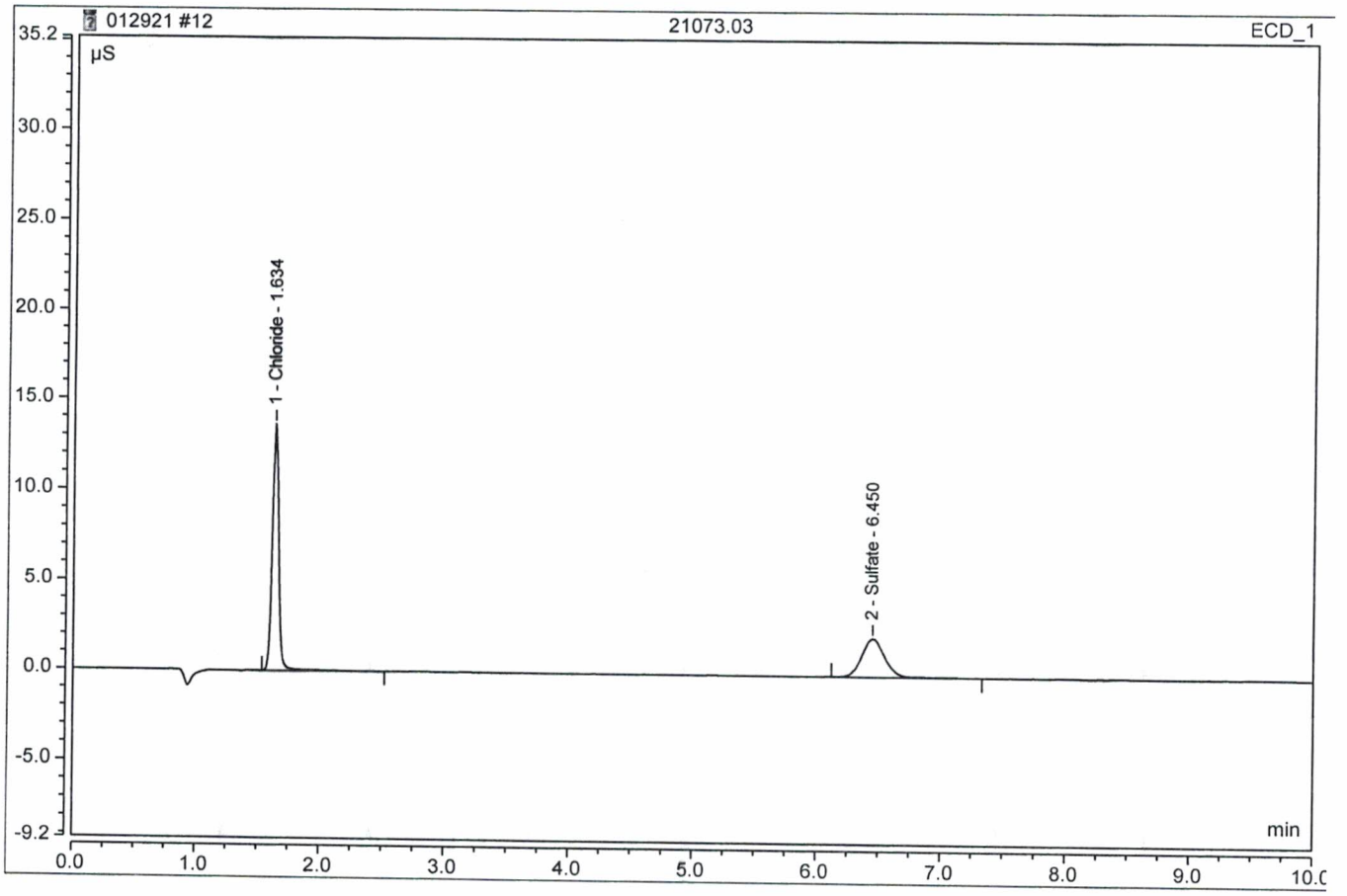
Sample Name:	**21073.02**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**10.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 08:36**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.64	**Chloride**	M	1.120	18.896	94.3064
2	6.34	**Sulfate**	M	4.704	21.566	583.3676
TOTAL:				5.82	40.46	677.67



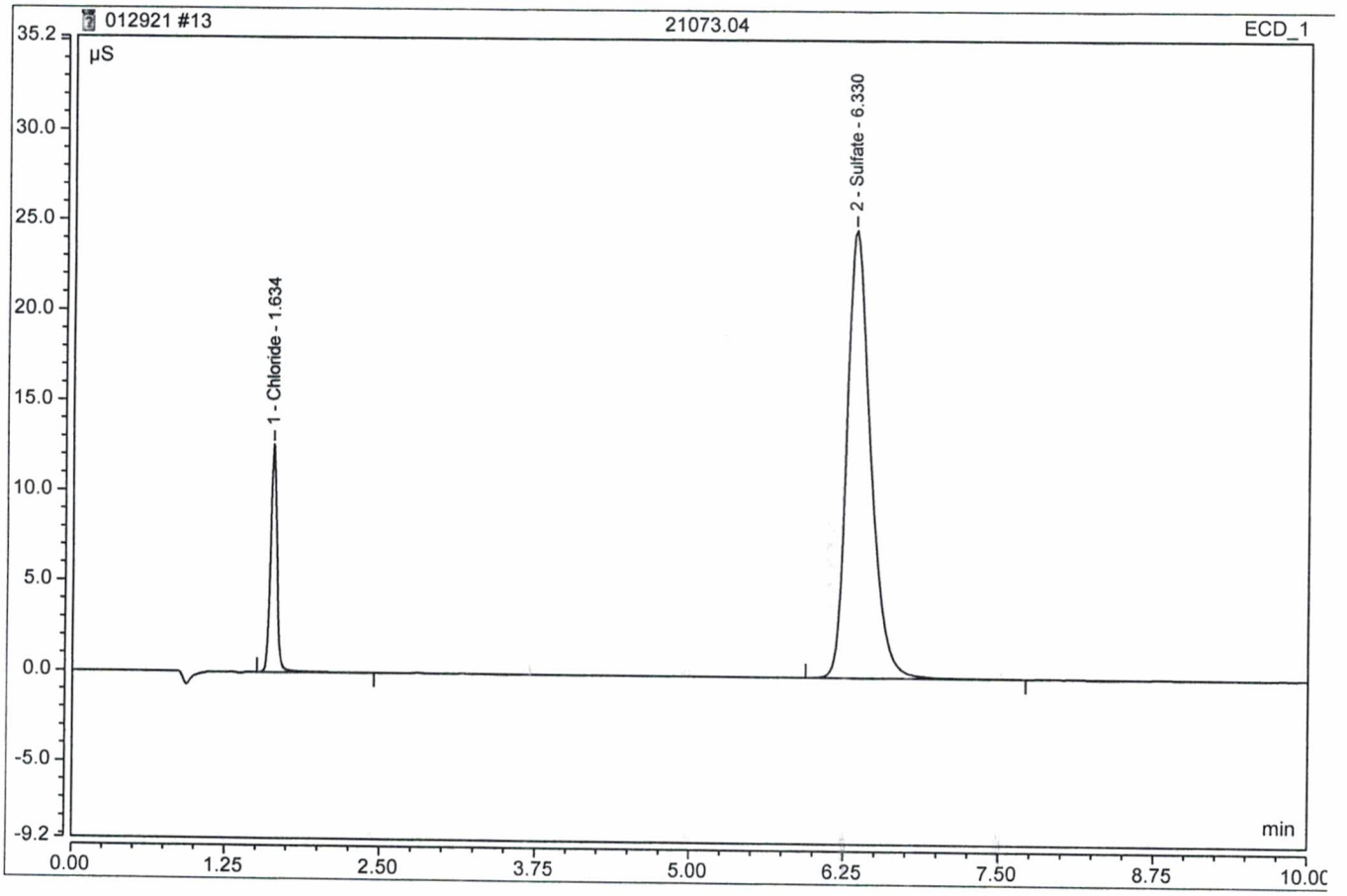
Sample Name:	**21073.03**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**10.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 08:46**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	Chloride	M	0.827	13.646	70.3231
2	6.45	Sulfate	M	0.457	2.139	56.6726
TOTAL:				1.28	15.79	127.00



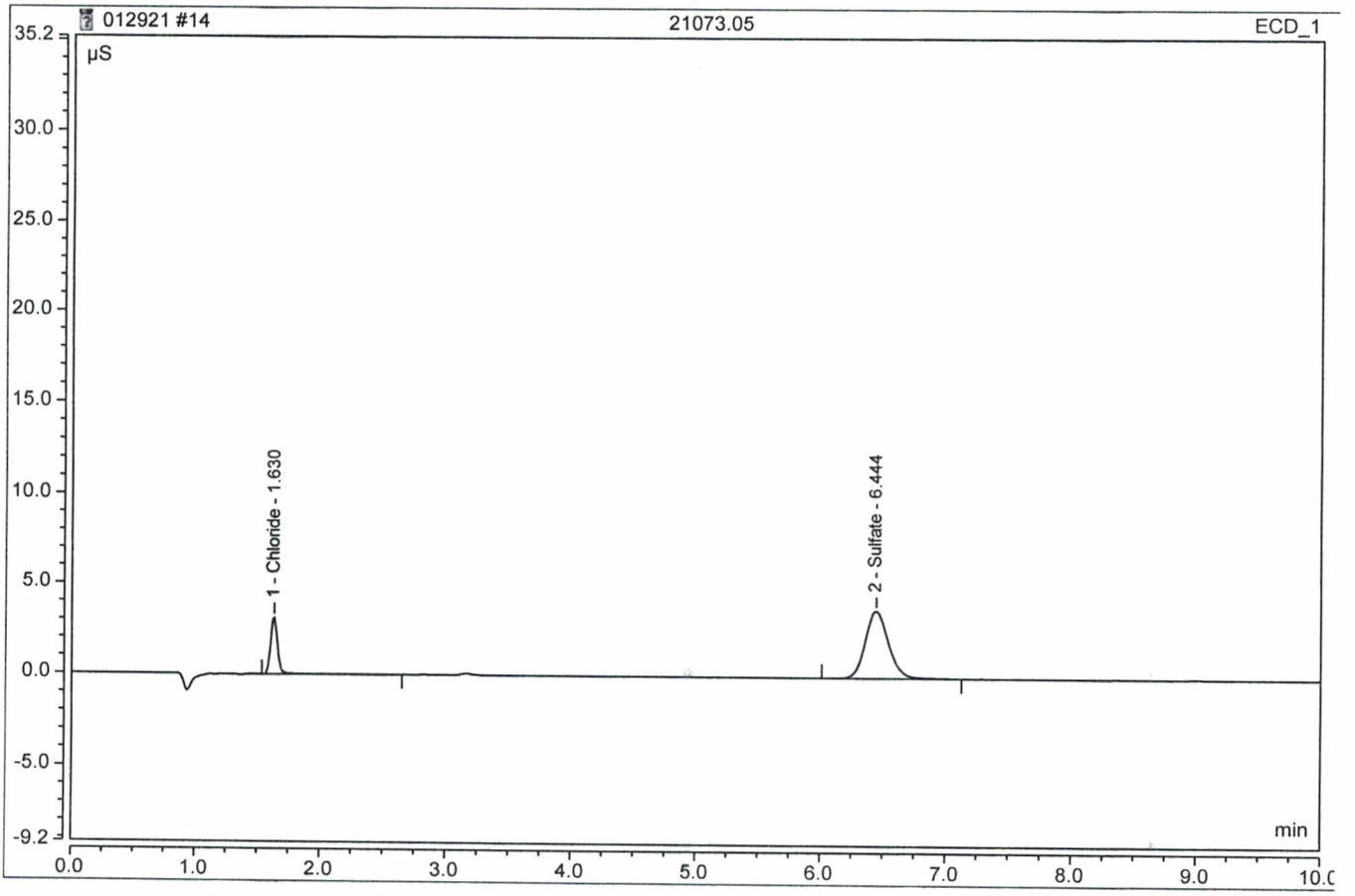
Sample Name:	**21073.04**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**10.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 08:56**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	Chloride	M	0.769	12.619	65.5049
2	6.33	Sulfate	M	5.470	24.754	678.3326
TOTAL:				6.24	37.37	743.84



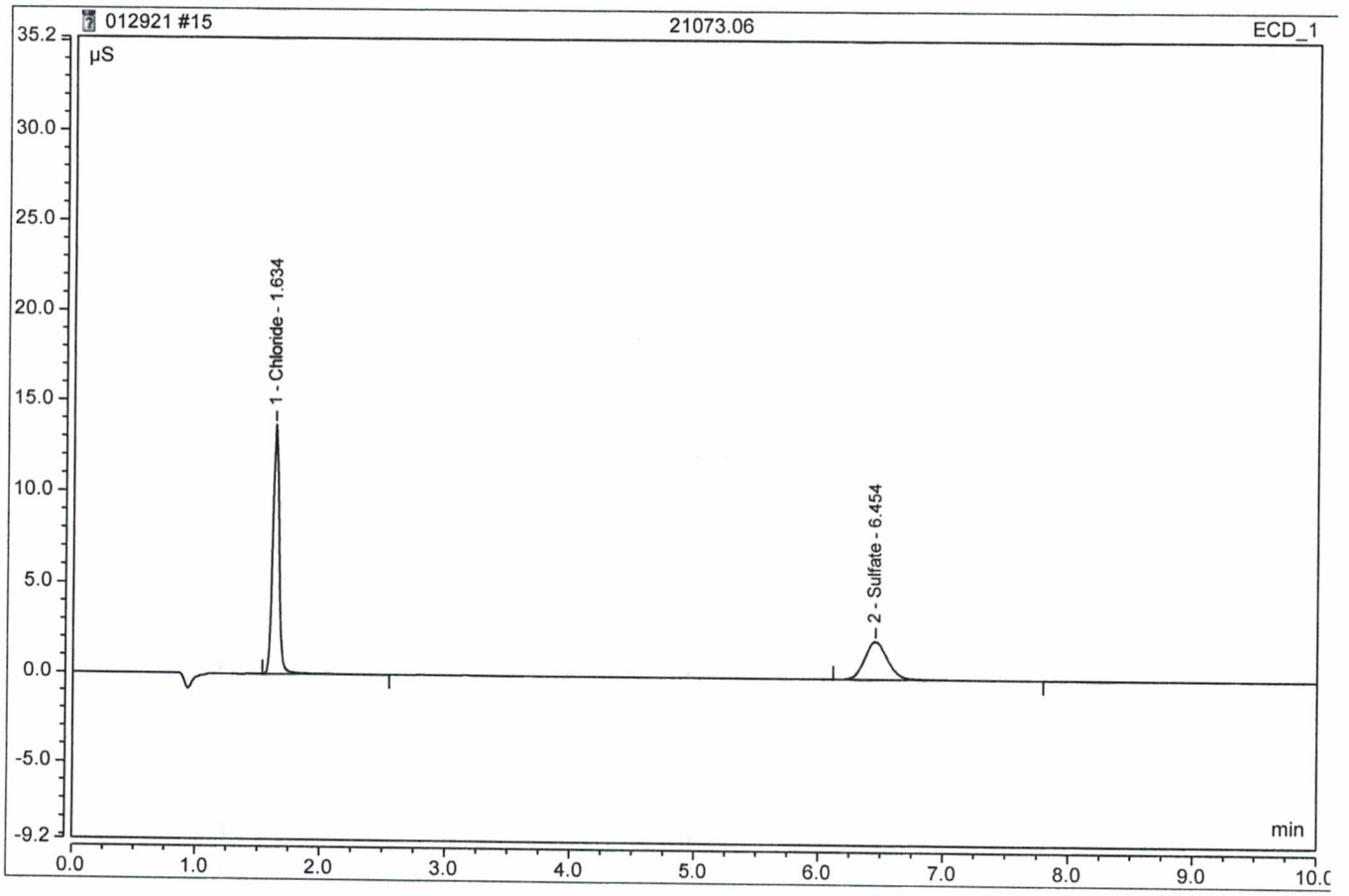
Sample Name:	**21073.05**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**20.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 09:07**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	Chloride	M	0.203	3.165	38.3671
2	6.44	Sulfate	M	0.798	3.730	197.8001
TOTAL:				1.00	6.89	236.17



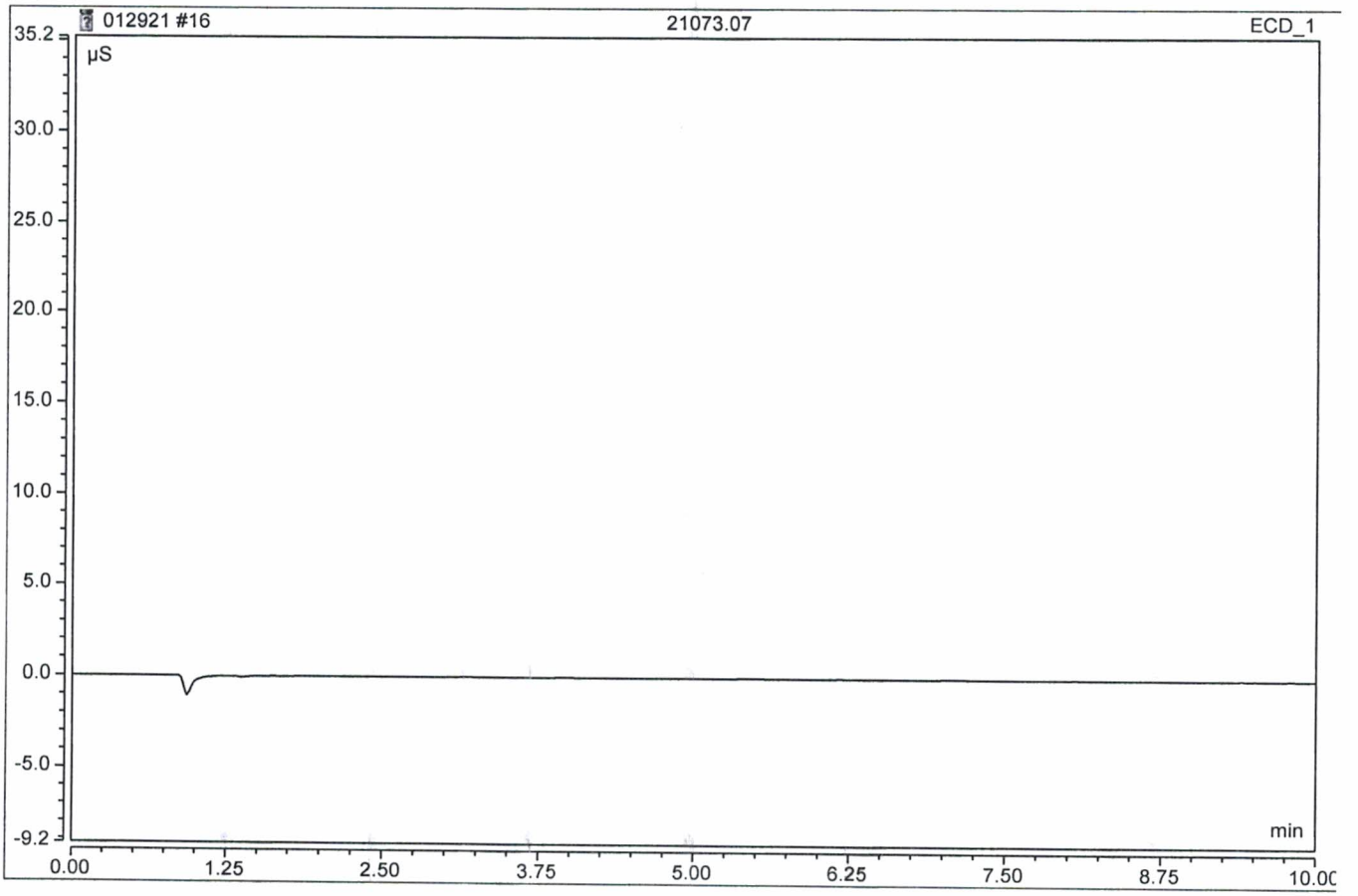
Sample Name:	**21073.06**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**10.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 09:17**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	Chloride	M	0.829	13.705	70.4419
2	6.45	Sulfate	M	0.461	2.122	57.1244
TOTAL:				1.29	15.83	127.57



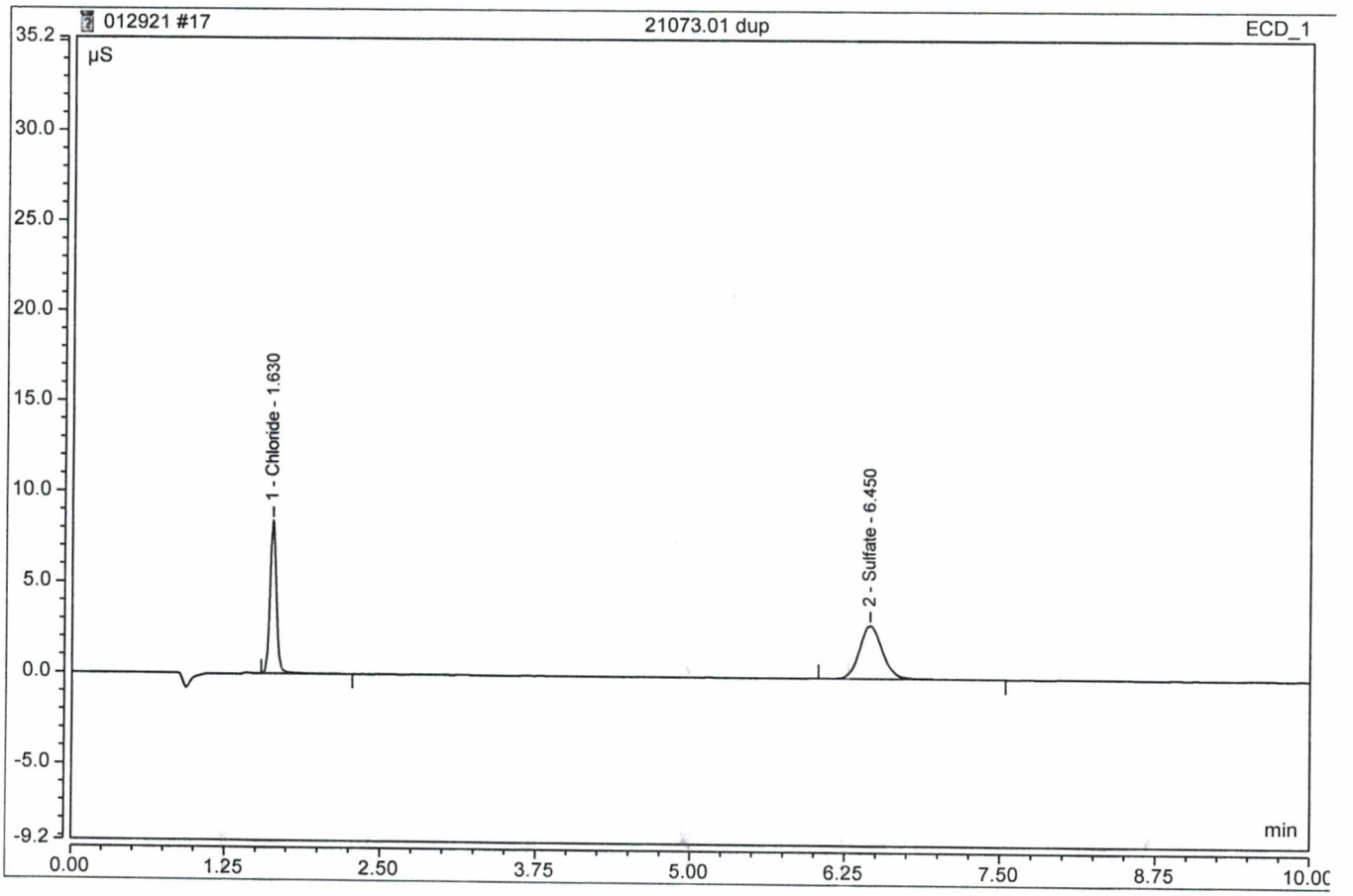
Sample Name:	**21073.07**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**2.5000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 09:27**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount n.a.
TOTAL:				0.00	0.00	0.00



Sample Name:	**21073.01 dup**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**10.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 09:37**	*Column:*	**AS4A-SC 038777**

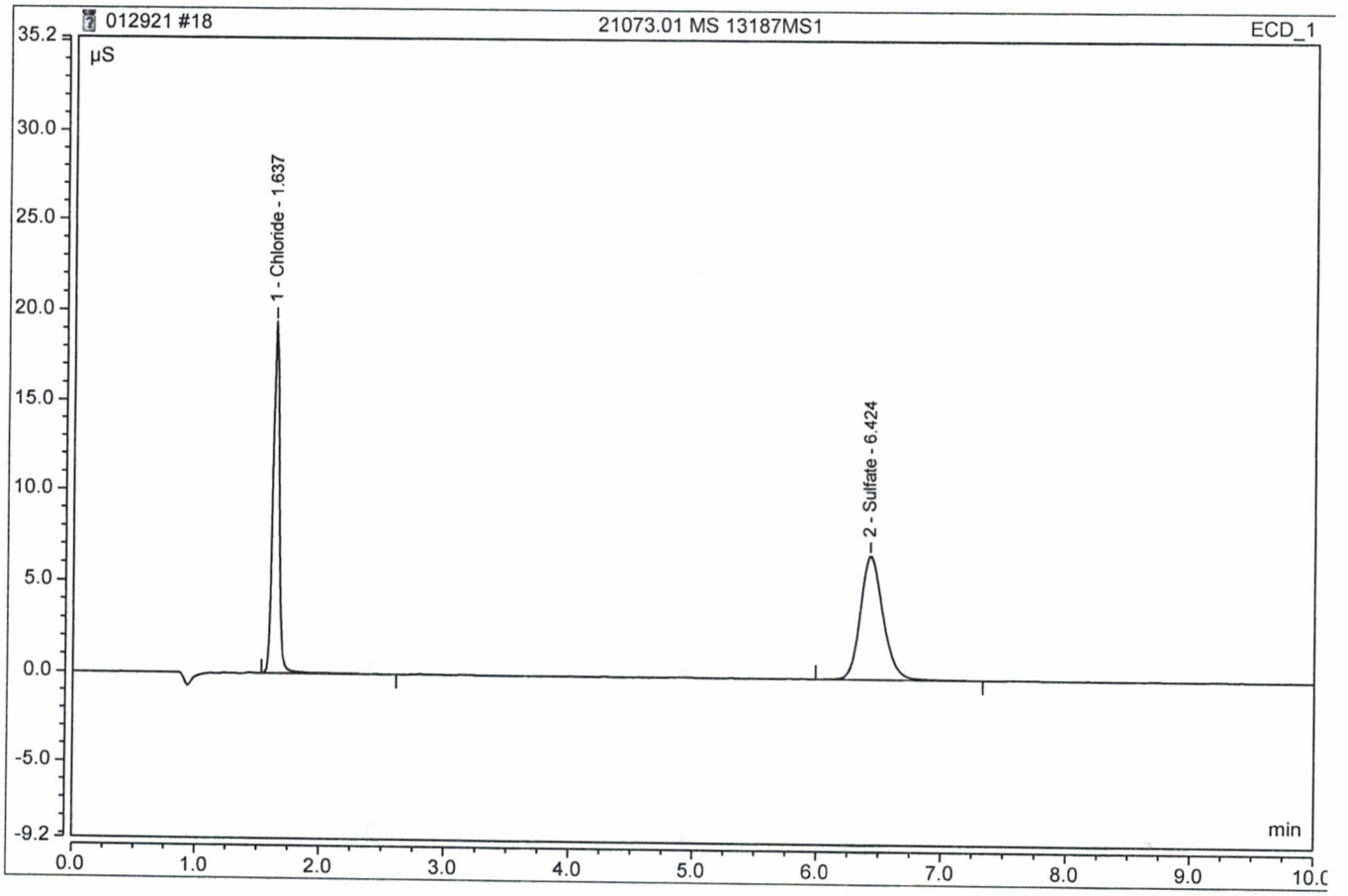
No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	Chloride	M	0.510	8.430	44.3286
2	6.45	Sulfate	M	0.631	2.938	78.2978
TOTAL:				1.14	11.37	122.63



Sample Name:	**21073.01 MS 13187MS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 09:47**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.64	Chloride	M	1.169	19.436	9.8329
2	6.42	Sulfate	M	1.429	6.737	17.7225
TOTAL:				2.60	26.17	27.56

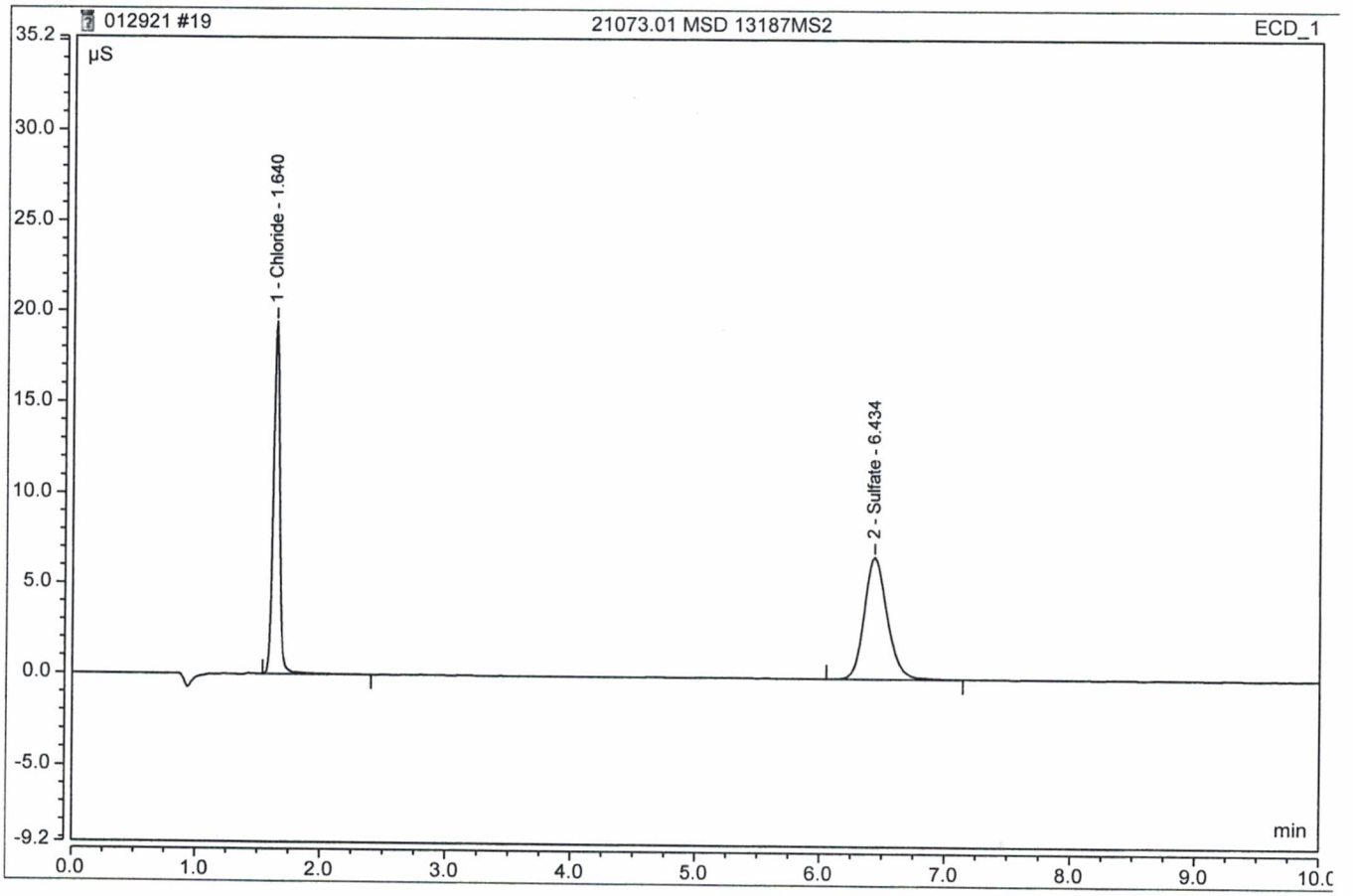
5 9.8329 − 4.4 = 1084
10 17.7225 − 7.8 = 992



Sample Name:	**21073.01 MSD 13187MS2**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 09:57**	*Column:*	**AS4A-SC 038777**

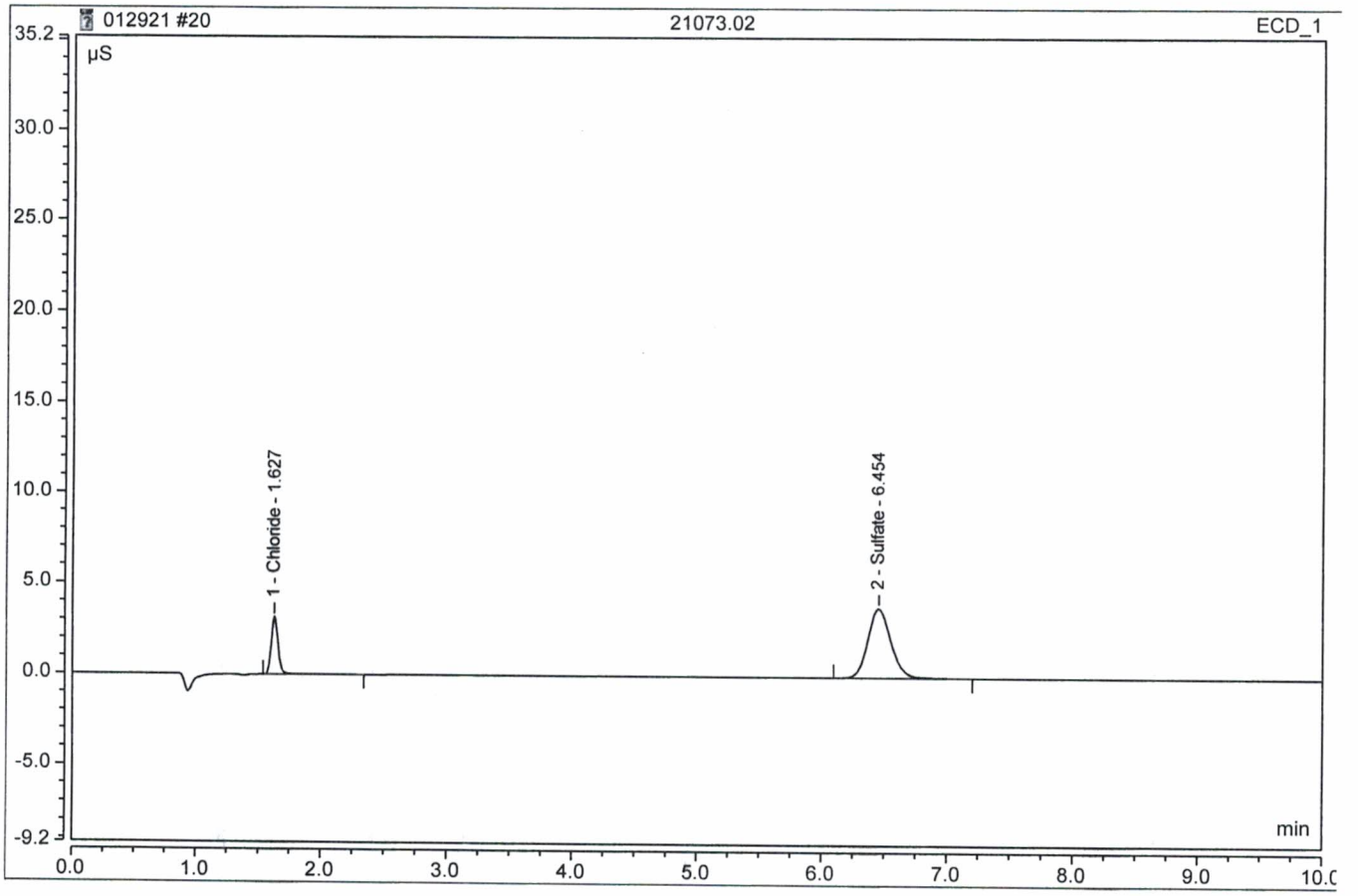
No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.64	Chloride	M	1.170	19.440	9.8385
2	6.43	Sulfate	M	1.429	6.742	17.7258
TOTAL:				2.60	26.18	27.56

5 9.8385 −4.4 = 108 %
10 17.7258 −7.8 = 99 %



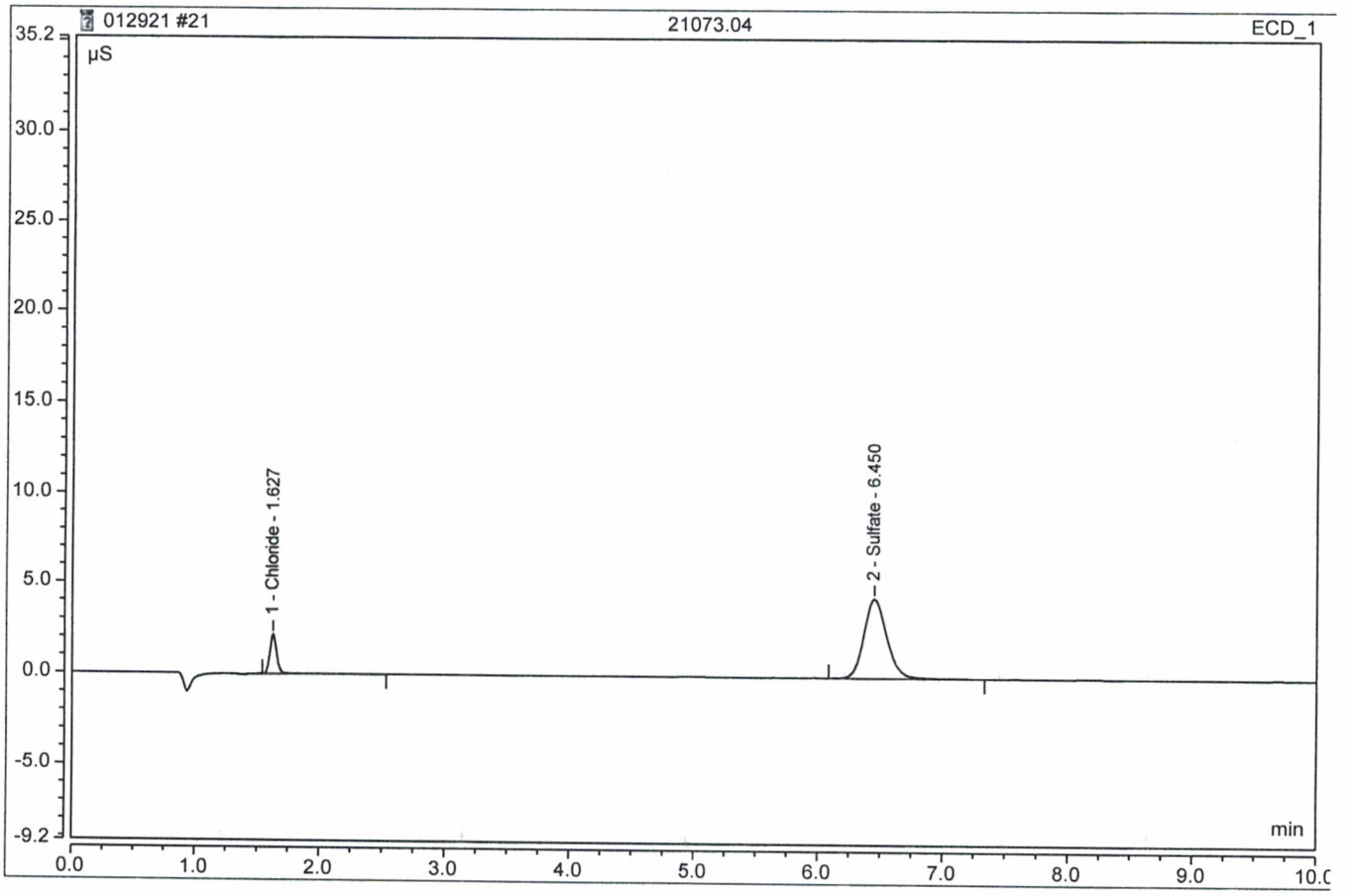
Sample Name:	**21073.02**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**50.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 10:07**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	Chloride	M	0.201	3.152	94.8587
2	6.45	Sulfate	M	0.815	3.820	505.5537
TOTAL:				1.02	6.97	600.41



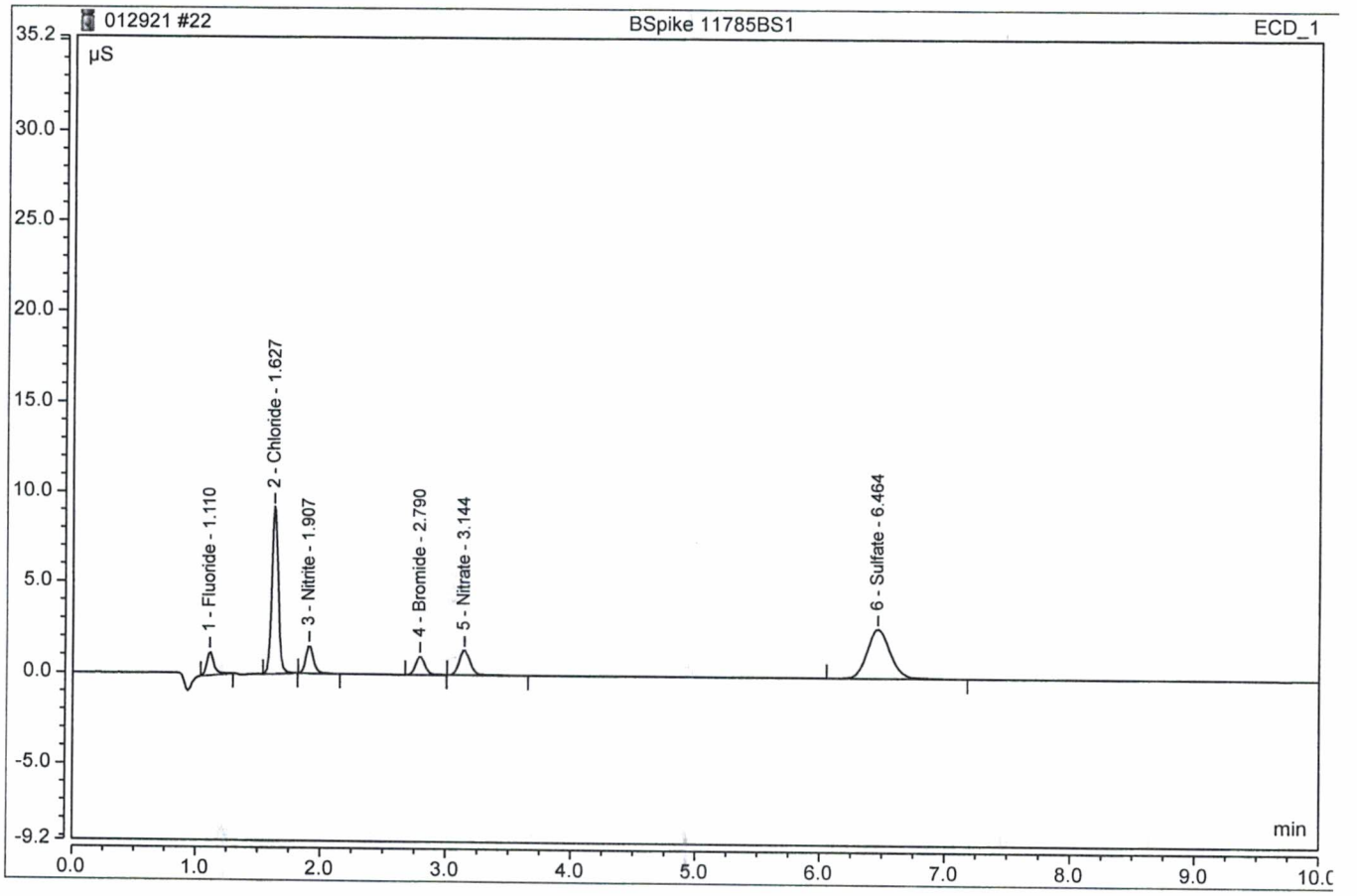
Sample Name:	**21073.04**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**50.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 10:17**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.63	Chloride	M	0.142	2.160	70.7024
2	6.45	Sulfate	M	0.932	4.365	578.0235
TOTAL:				1.07	6.52	648.73



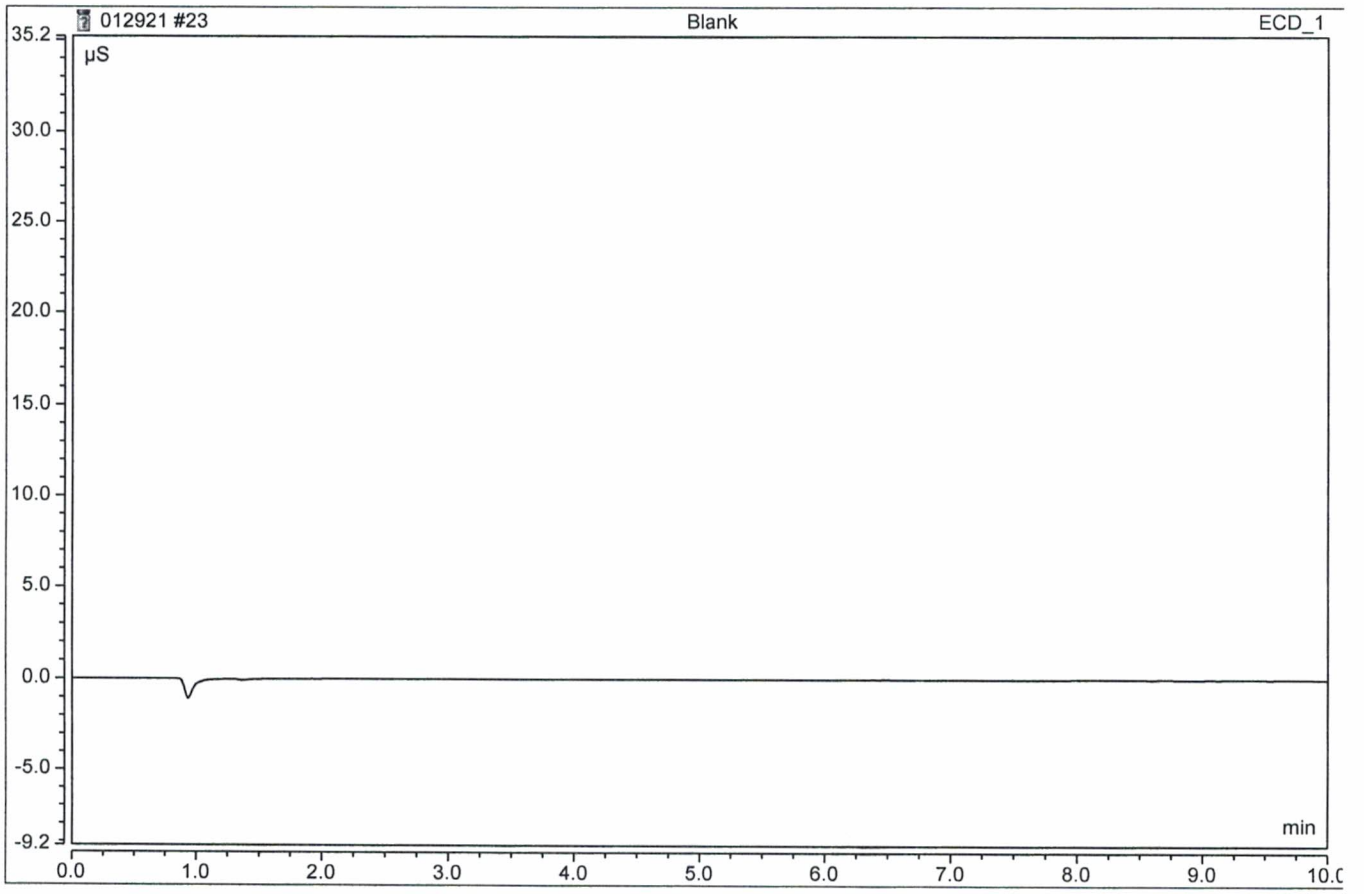
Sample Name:	**BSpike 11785BS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Check Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 10:27**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount		
1	1.11	**Fluoride**	M	0.083	1.286		0.4943	
2	1.63	**Chloride**	M	0.549	9.212	5	4.7527	96%
3	1.91	**Nitrite**	M	0.107	1.520		0.4795	
4	2.79	**Bromide**	M	0.087	1.005		1.9921	
5	3.14	**Nitrate**	M	0.136	1.356		0.5231	
6	6.46	**Sulfate**	M	0.579	2.686	7.5	7.1778	96%
TOTAL:				1.54	17.07		15.42	



Sample Name:	**Blank**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 10:37**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount n.a.
TOTAL:				0.00	0.00	0.00



Sequence: 0129212
Last Update Operator: jeff-phi

ICS-1100 A Dionex IC / Meth 300.0

ECD_1	Name	Type	Level	Position	Volume	Instrument Method	Processing Method	Status
	water blank	Unknown		1	5000	New Instrument Method	Anion	Finished
	1132Cal1	Calibration Standard	01	2	5000	New Instrument Method	Anion	Finished
	1132Cal2	Calibration Standard	02	3	5000	New Instrument Method	Anion	Finished
	1132Cal3	Calibration Standard	03	4	5000	New Instrument Method	Anion	Finished
	1132Cal4	Calibration Standard	04	5	5000	New Instrument Method	Anion	Finished
	1132Cal5	Calibration Standard	05	6	5000	New Instrument Method	Anion	Finished
	Blank	Unknown		1	5000	New Instrument Method	Anion	Finished
	BSpike 11785BS1	Check Standard		2	5000	New Instrument Method	Anion	Finished
	LCS 11785LCS1	Check Standard		3	5000	New Instrument Method	Anion	Finished
	21073.01	Unknown		4	5000	New Instrument Method	Anion	Finished
	21073.02	Unknown		5	5000	New Instrument Method	Anion	Finished
	21073.03	Unknown		6	5000	New Instrument Method	Anion	Finished
	21073.04	Unknown		7	5000	New Instrument Method	Anion	Finished
	21073.05	Unknown		8	5000	New Instrument Method	Anion	Finished
	21073.06	Unknown		9	5000	New Instrument Method	Anion	Finished
	21073.07	Unknown		10	5000	New Instrument Method	Anion	Finished
	21073.01 dup	Unknown		11	5000	New Instrument Method	Anion	Finished
	21073.01 MS 13190MS	Unknown		12	5000	New Instrument Method	Anion	Finished
	21073.01 MSD 13190I	Unknown		13	5000	New Instrument Method	Anion	Finished
	BSpike 11785BS1	Check Standard		14	5000	New Instrument Method	Anion	Finished
	Blank	Unknown		15	5000	New Instrument Method	Anion	Finished

CAL ID# ICSA120320CAL

FL210129-WL-A

ECD_1	Name	Inject Time	Lock Status	Weight	Dilution	IntStd	Replicate ID	Comment	ECD_1
	water blank	12/3/2020 9:34:20 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal1	12/3/2020 9:46:36 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal2	12/3/2020 9:56:40 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal3	12/3/2020 10:06:43 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal4	12/3/2020 10:16:46 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal5	12/3/2020 10:26:48 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	Blank	1/29/2021 1:02:40 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	BSpike 11785BS1	1/29/2021 1:14:56 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	LCS 11785LCS1	1/29/2021 1:24:59 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	21073.01	1/29/2021 1:35:03 PM -0		1.0000	5.0000	1.0000		Jeff Phifer	
	21073.02	1/29/2021 1:45:06 PM -0		1.0000	5.0000	1.0000		Jeff Phifer	
	21073.03	1/29/2021 1:55:08 PM -0		1.0000	5.0000	1.0000		Jeff Phifer	
	21073.04	1/29/2021 2:05:11 PM -0		1.0000	5.0000	1.0000		Jeff Phifer	
	21073.05	1/29/2021 2:15:14 PM -0		1.0000	5.0000	1.0000		Jeff Phifer	
	21073.06	1/29/2021 2:25:17 PM -0		1.0000	5.0000	1.0000		Jeff Phifer	
	21073.07	1/29/2021 2:35:19 PM -0		1.0000	2.5000	1.0000		Jeff Phifer	
	21073.01 dup	1/29/2021 2:45:23 PM -0		1.0000	5.0000	1.0000		Jeff Phifer	
	21073.01 MS 13190M	1/29/2021 2:55:26 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	21073.01 MSD 13190	1/29/2021 3:05:29 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	BSpike 11785BS1	1/29/2021 3:15:32 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	Blank	1/29/2021 3:25:35 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	

Sequence: 0129212
Last Update Operator: jeff-phi

Name	Re-injections	Spike Group
water blank	0	
1132Cal1	0	
1132Cal2	0	
1132Cal3	0	
1132Cal4	0	
1132Cal5	0	
Blank	0	
BSpike 11785BS1	0	
LCS 11785LCS1	0	
21073.01	0	
21073.02	0	
21073.03	0	
21073.04	0	
21073.05	0	
21073.06	0	
21073.07	0	
21073.01 dup	0	
21073.01 MS 13190M	0	
21073.01 MSD 13190	0	
BSpike 11785BS1	0	
Blank	0	

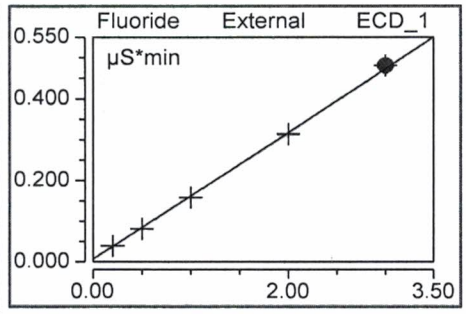
Calibration Batch Report
CAL ID# ICSA120320CAL

Sequence:	**0129212**	*Injection Volume:*	**5,000.00**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 10:26**	*Column:*	**AS4A-SC 038777**

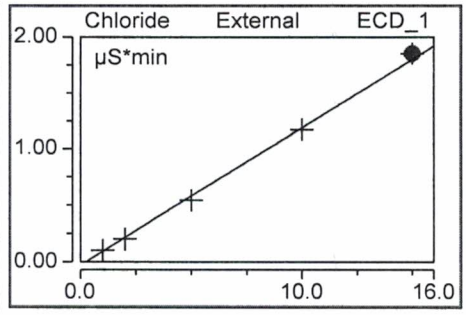
Calibration Summary

Peak Name	Eval.Type	Cal.Type	Points	Offset (C0)	Slope (C1)	Curve (C2)	Coeff.Det. %
Fluoride	Area	WithOffset,	5.000	0.007	0.155	0.000	99.9252
Chloride	Area	WithOffset,	5.000	-0.031	0.122	0.000	99.7568
Nitrite	Area	WithOffset,	5.000	-0.003	0.229	0.000	99.9133
Bromide	Area	WithOffset,	5.000	-0.001	0.044	0.000	99.9712
Nitrate	Area	WithOffset,	5.000	0.001	0.258	0.000	99.9341
Sulfate	Area	WithOffset,	5.000	0.000	0.081	0.000	99.8845
		AVERAGE:		-0.0045	0.1482	0.0000	99.8975

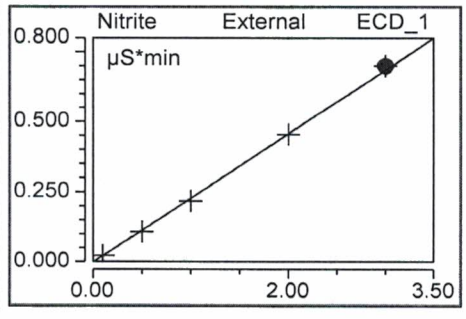
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Fluoride	Fluoride	Fluoride	Fluoride
1132Cal1	1.110	0.0393	0.542	0.211
1132Cal2	1.110	0.0813	1.238	0.481
1132Cal3	1.110	0.1585	2.515	0.978
1132Cal4	1.110	0.3139	5.172	1.978
1132Cal5	1.107	0.4807	7.992	3.052
Average	1.110			
Rel. Std. Dev.	0.136 %			



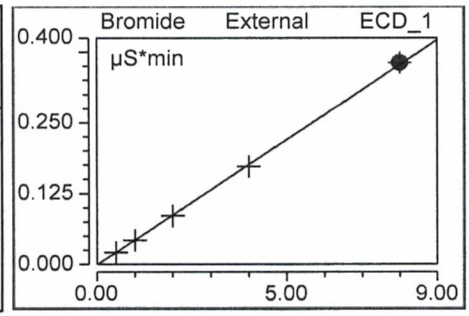
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Chloride	Chloride	Chloride	Chloride
1132Cal1	1.624	0.1031	1.709	1.096
1132Cal2	1.620	0.2008	3.339	1.897
1132Cal3	1.627	0.5421	9.147	4.694
1132Cal4	1.630	1.1742	19.854	9.874
1132Cal5	1.637	1.8531	30.972	15.439
Average	1.628			
Rel. Std. Dev.	0.392 %			



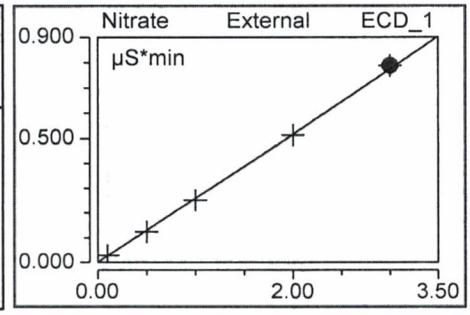
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Nitrite	Nitrite	Nitrite	Nitrite
1132Cal1	1.904	0.0218	0.300	0.106
1132Cal2	1.904	0.1075	1.532	0.480
1132Cal3	1.904	0.2176	3.154	0.961
1132Cal4	1.907	0.4531	6.640	1.988
1132Cal5	1.910	0.6997	10.351	3.064
Average	1.906			
Rel. Std. Dev.	0.155 %			



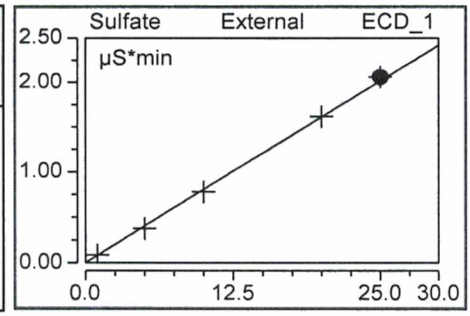
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Bromide	Bromide	Bromide	Bromide
1132Cal1	2.784	0.0213	0.253	0.511
1132Cal2	2.774	0.0428	0.502	0.997
1132Cal3	2.777	0.0860	0.996	1.976
1132Cal4	2.780	0.1724	2.034	3.932
1132Cal5	2.777	0.3559	4.227	8.085
Average	2.778			
Rel. Std. Dev.	0.139 %			



Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Nitrate	Nitrate	Nitrate	Nitrate
1132Cal1	3.140	0.0282	0.292	0.106
1132Cal2	3.124	0.1240	1.269	0.478
1132Cal3	3.124	0.2513	2.537	0.972
1132Cal4	3.120	0.5141	5.169	1.991
1132Cal5	3.107	0.7881	7.936	3.054
Average	3.123			
Rel. Std. Dev.	0.382 %			

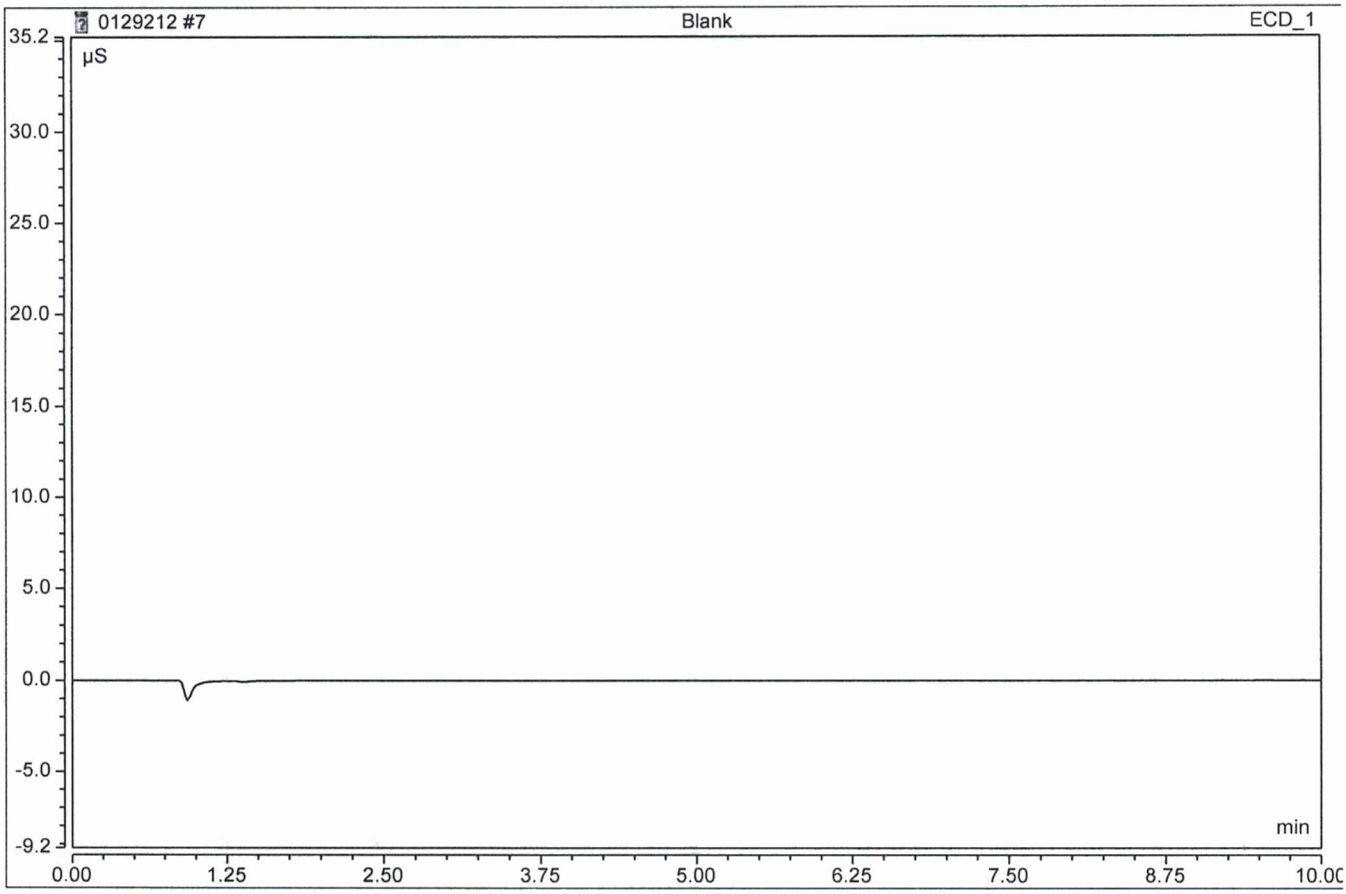


Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Sulfate	Sulfate	Sulfate	Sulfate
1132Cal1	6.510	0.0866	0.394	1.074
1132Cal2	6.504	0.3774	1.750	4.680
1132Cal3	6.490	0.7785	3.633	9.654
1132Cal4	6.460	1.6169	7.566	20.051
1132Cal5	6.447	2.0595	9.609	25.540
Average	6.482			
Rel. Std. Dev.	0.426 %			



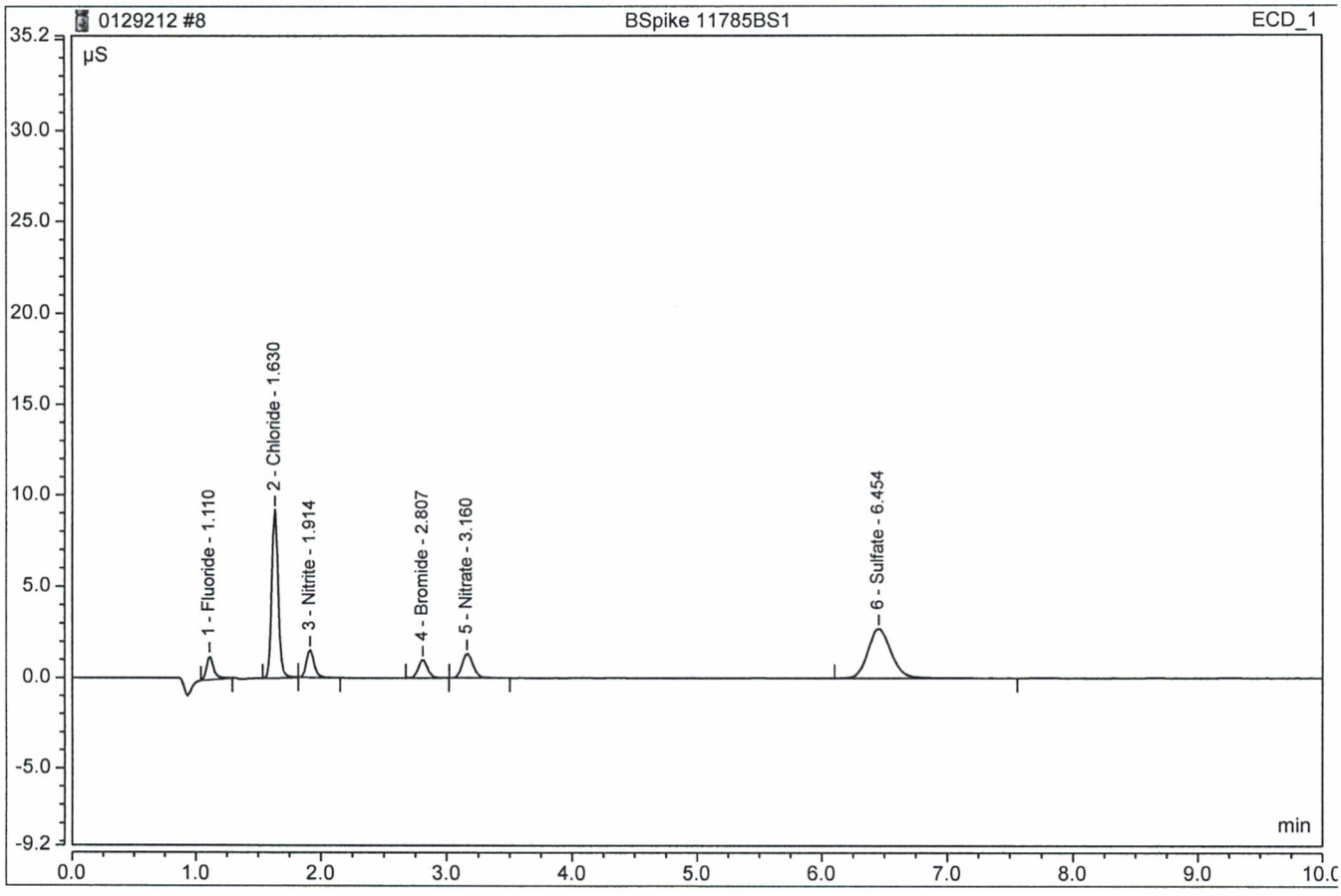
Sample Name:	**Blank**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 13:02**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount n.a.
TOTAL:				0.00	0.00	0.00



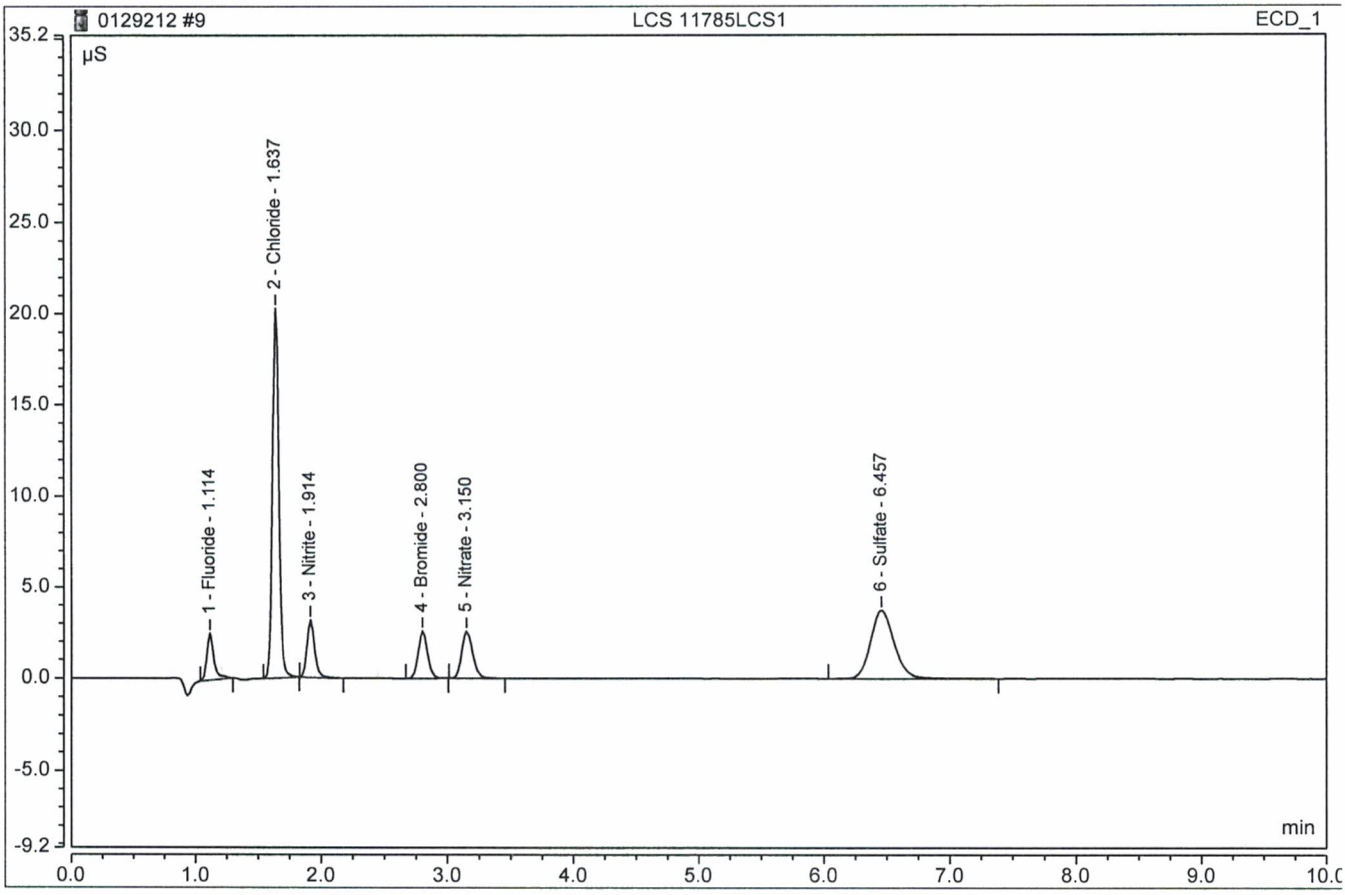
Sample Name:	**BSpike 11785BS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Check Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 13:14**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount		
1	1.11	**Fluoride**	M	0.085	1.304	0.5	0.5022	100 %
2	1.63	**Chloride**	M	0.548	9.187		4.7412	
3	1.91	**Nitrite**	M	0.107	1.517		0.4776	
4	2.81	**Bromide**	M	0.087	0.998		1.9909	
5	3.16	**Nitrate**	M	0.134	1.343		0.5172	
6	6.45	**Sulfate**	M	0.588	2.723		7.2976	
TOTAL:				1.55	17.07		15.53	



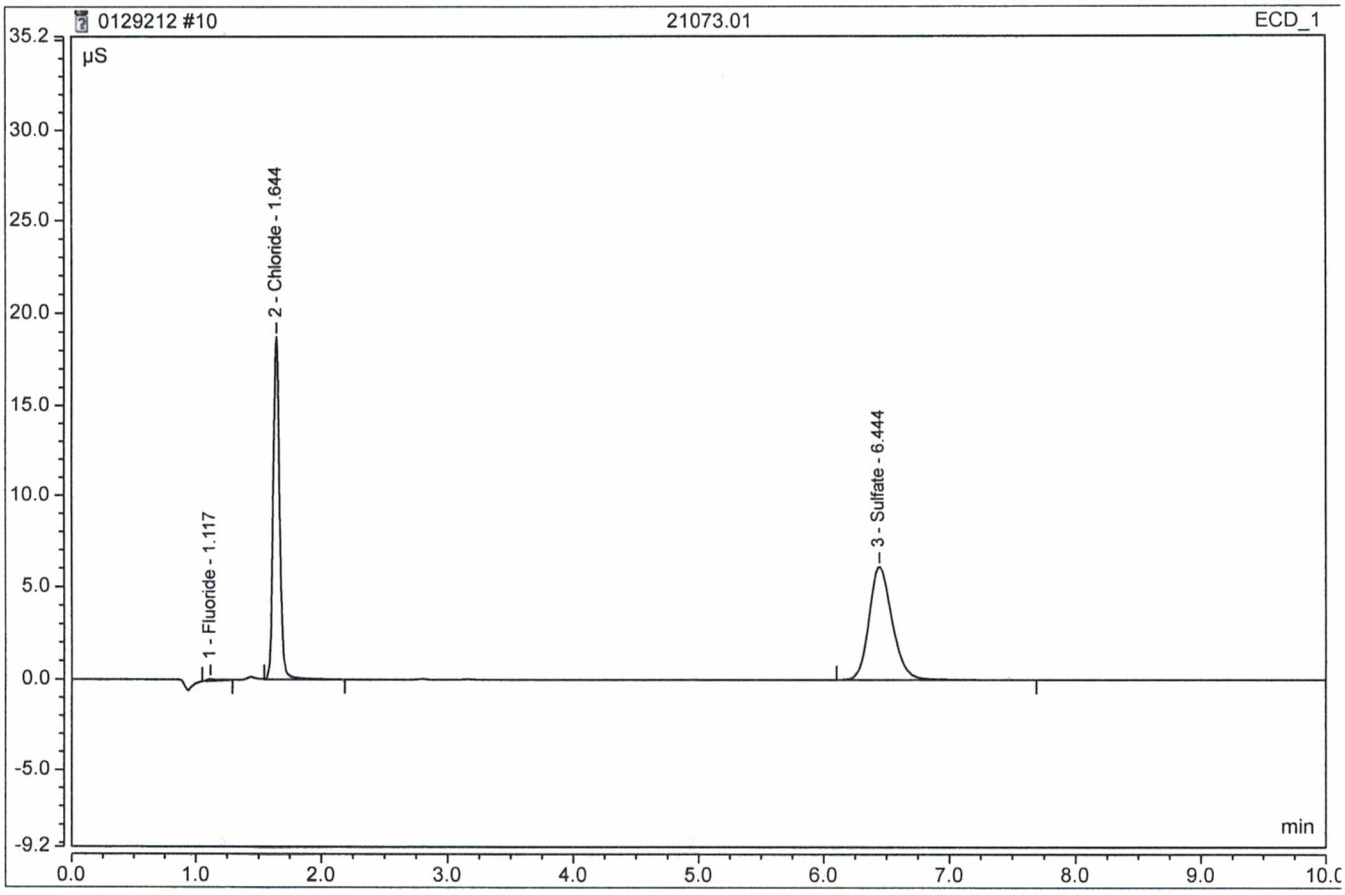
Sample Name:	**LCS 11785LCS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Check Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 13:24**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount	
1	1.11	**Fluoride**	M	0.162	2.527	1.0036	1003
2	1.64	**Chloride**	M	1.206	20.280	10.1322	
3	1.91	**Nitrite**	M	0.216	3.121	0.9547	
4	2.80	**Bromide**	M	0.220	2.558	5.0085	
5	3.15	**Nitrate**	M	0.250	2.537	0.9676	
6	6.46	**Sulfate**	M	0.804	3.728	9.9656	
TOTAL:				2.86	34.75	28.03	



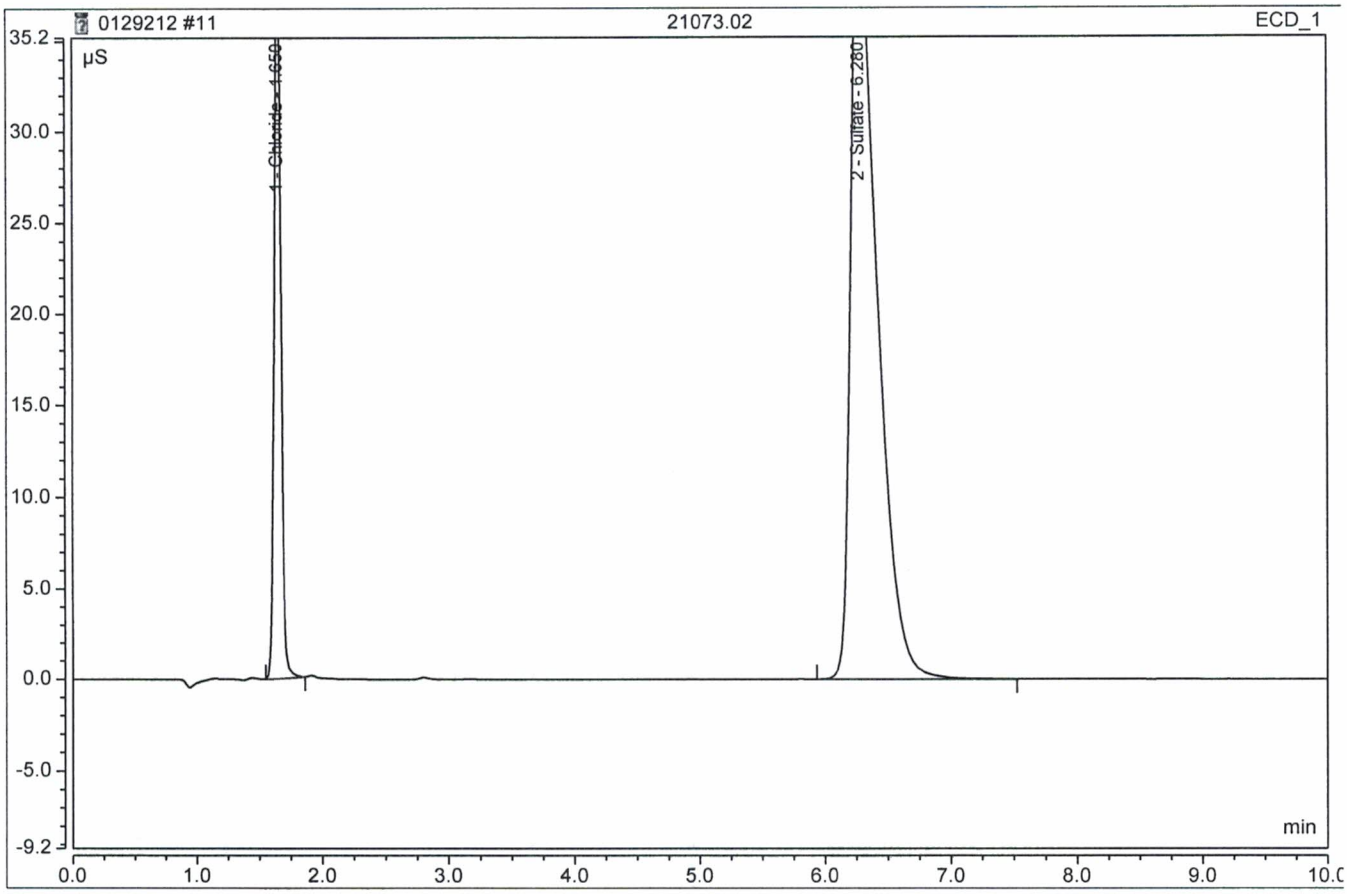
Sample Name:	**21073.01**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**5.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 13:35**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.12	**Fluoride**	M	0.011	0.111	0.1470
2	1.64	**Chloride**	M	1.105	18.722	46.5421
3	6.44	**Sulfate**	M	1.302	6.118	80.7126
TOTAL:				2.42	24.95	127.40



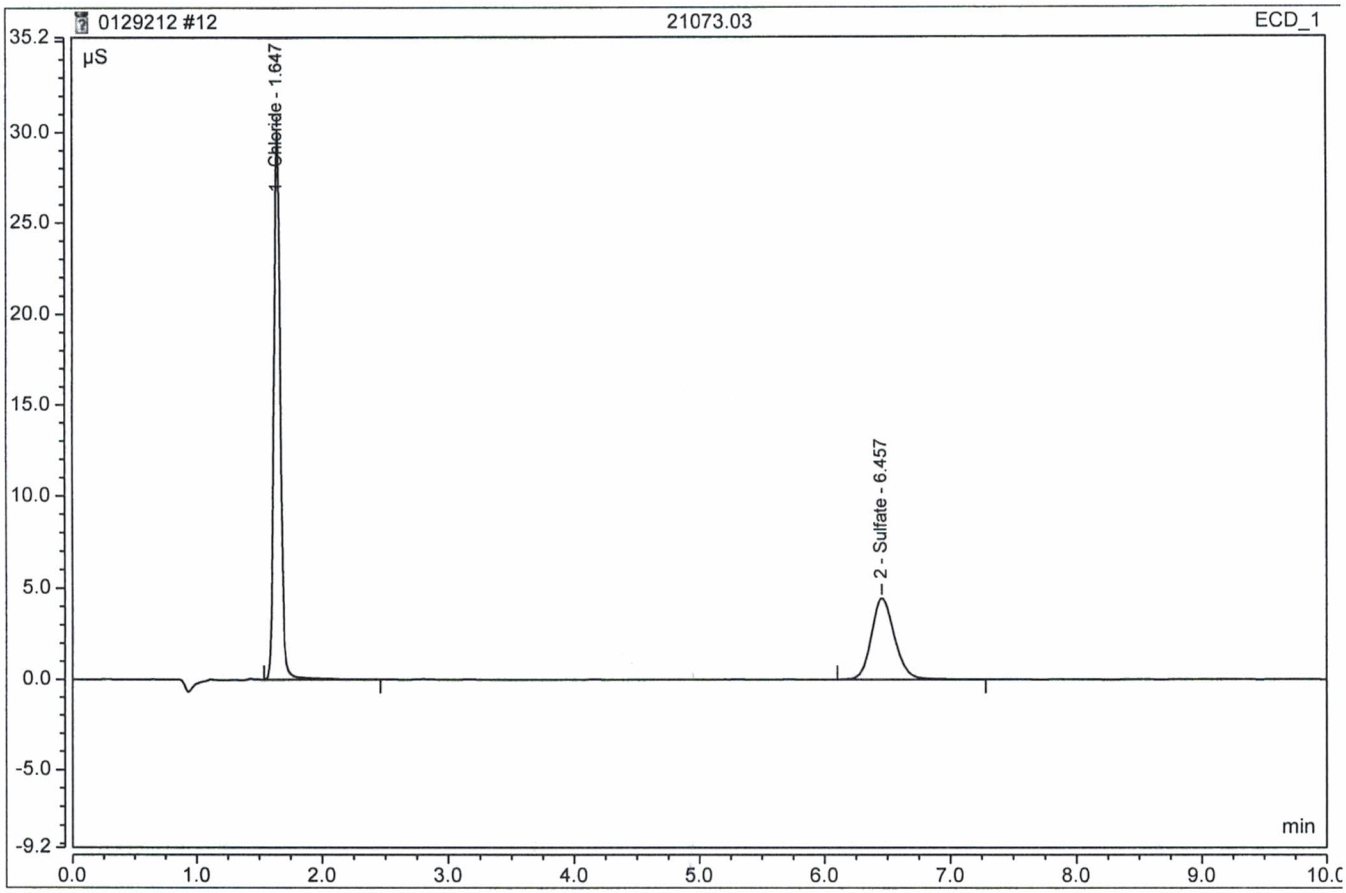
Sample Name:	**21073.02**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**5.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 13:45**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.65	**Chloride**	M	2.458	40.285	101.9690
2	6.28	**Sulfate**	M	10.154	42.336	629.5681
TOTAL:				12.61	82.62	731.54



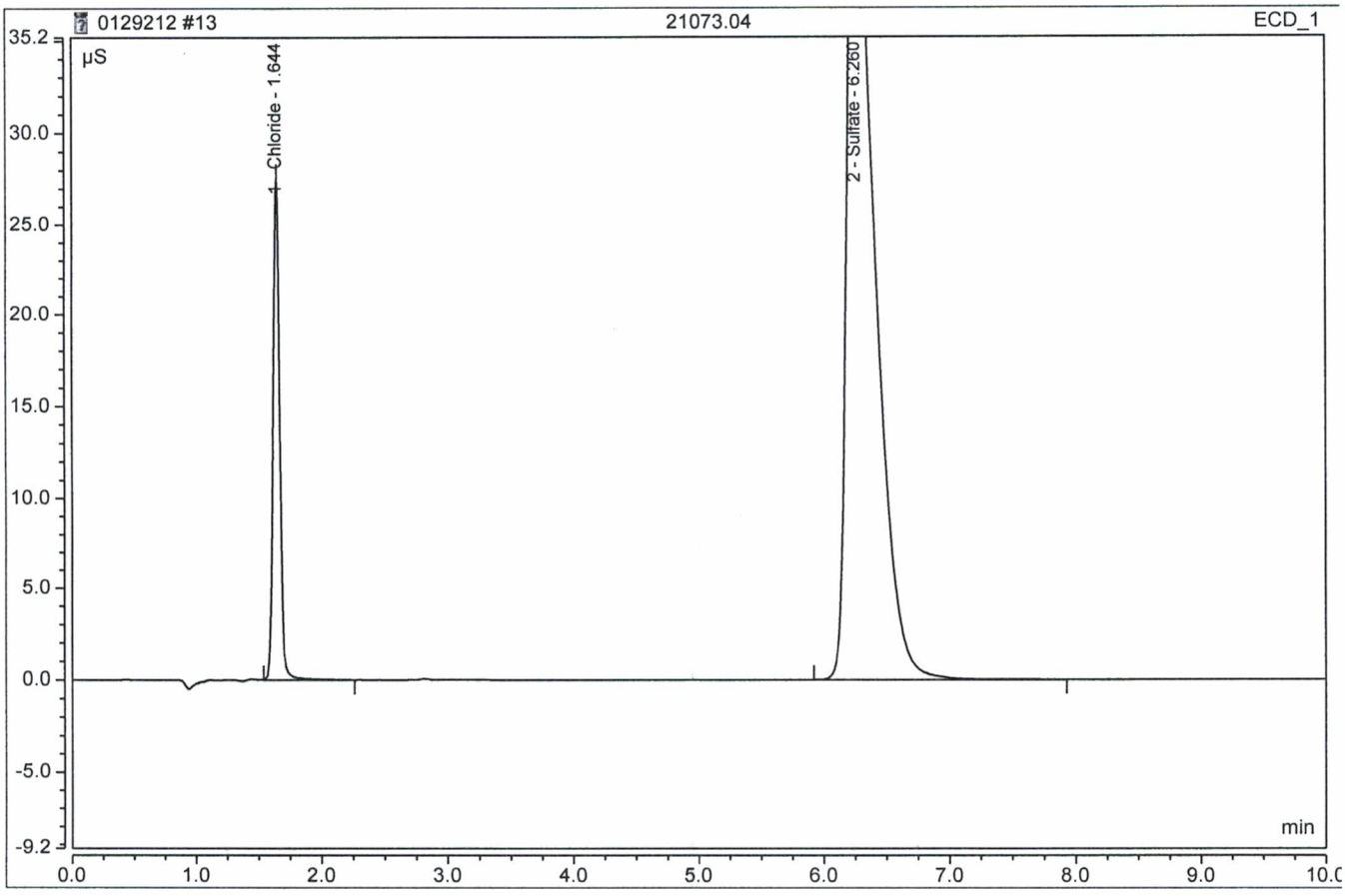
Sample Name:	**21073.03**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**5.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 13:55**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.65	**Chloride**	M	1.824	30.103	76.0055
2	6.46	**Sulfate**	M	0.947	4.440	58.7384
TOTAL:				2.77	34.54	134.74



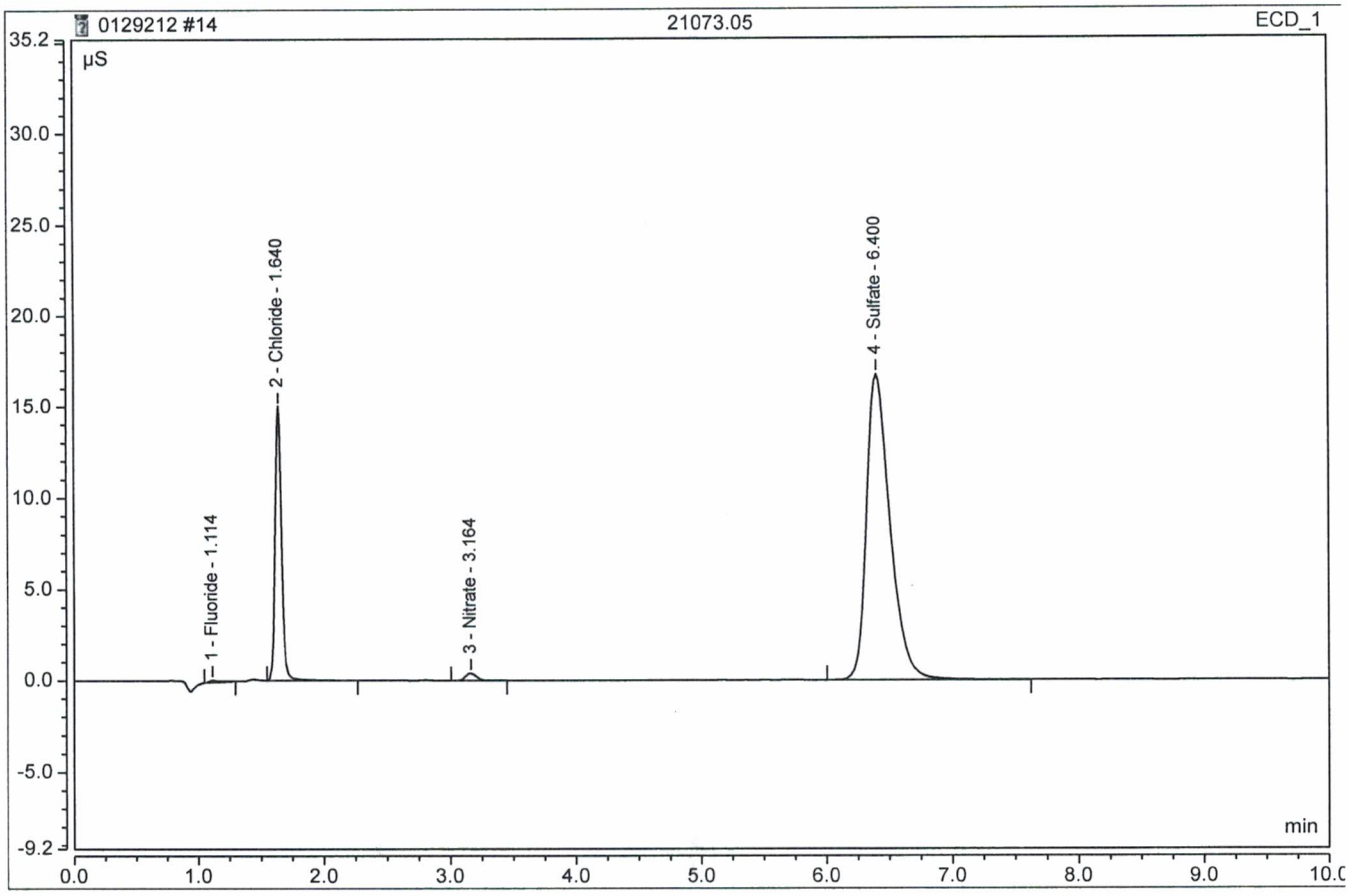
Sample Name:	**21073.04**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**5.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 14:05**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.64	**Chloride**	M	1.679	27.565	70.0591
2	6.26	**Sulfate**	M	11.840	47.891	734.1263
TOTAL:				13.52	75.46	804.19



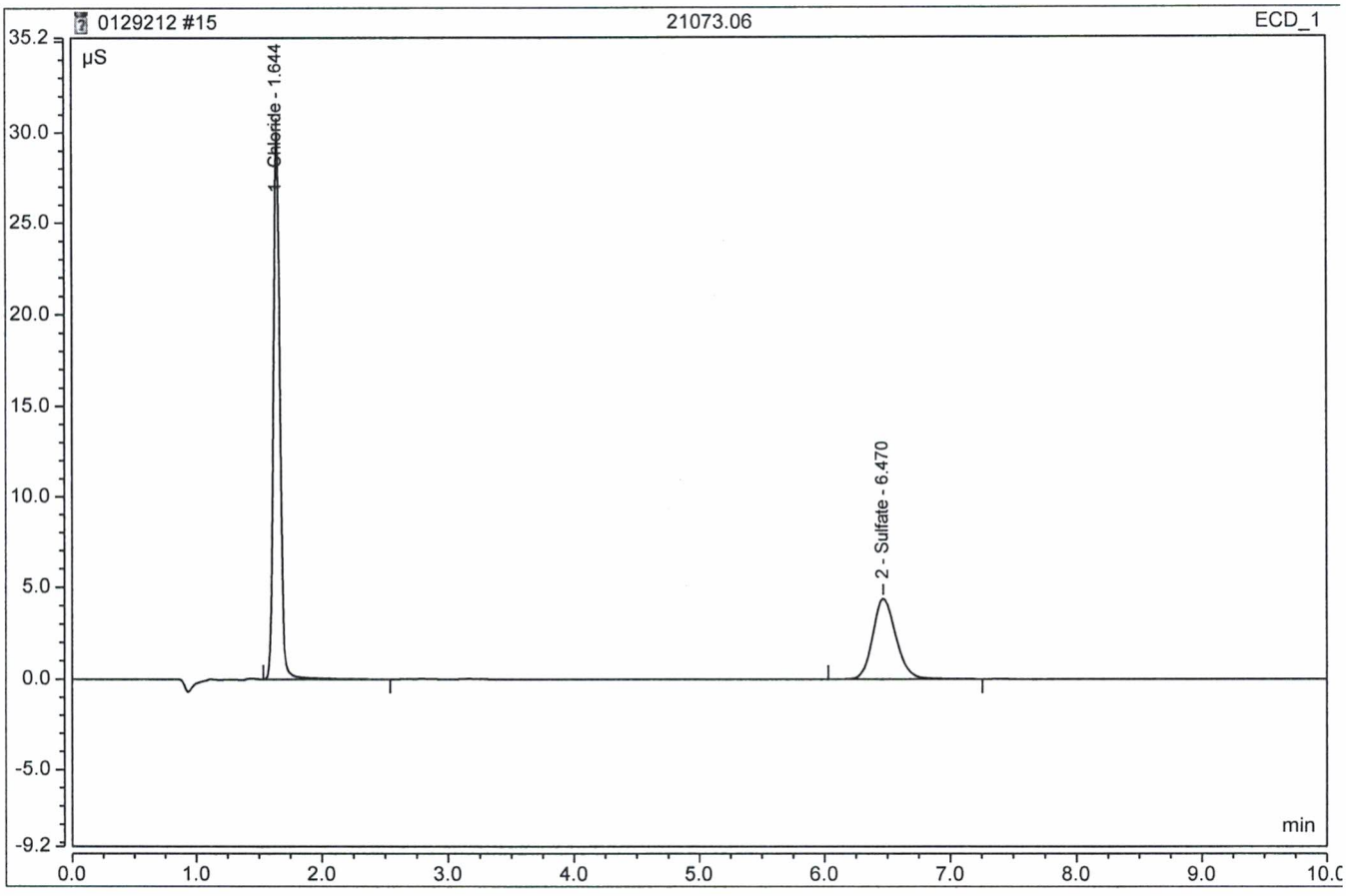
Sample Name:	**21073.05**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**5.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 14:15**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.11	**Fluoride**	M	0.011	0.125	0.1429
2	1.64	**Chloride**	M	0.896	15.003	37.9853
3	3.16	**Nitrate**	M	0.040	0.403	0.7660
4	6.40	**Sulfate**	M	3.613	16.734	224.0262
TOTAL:				4.56	32.26	262.92



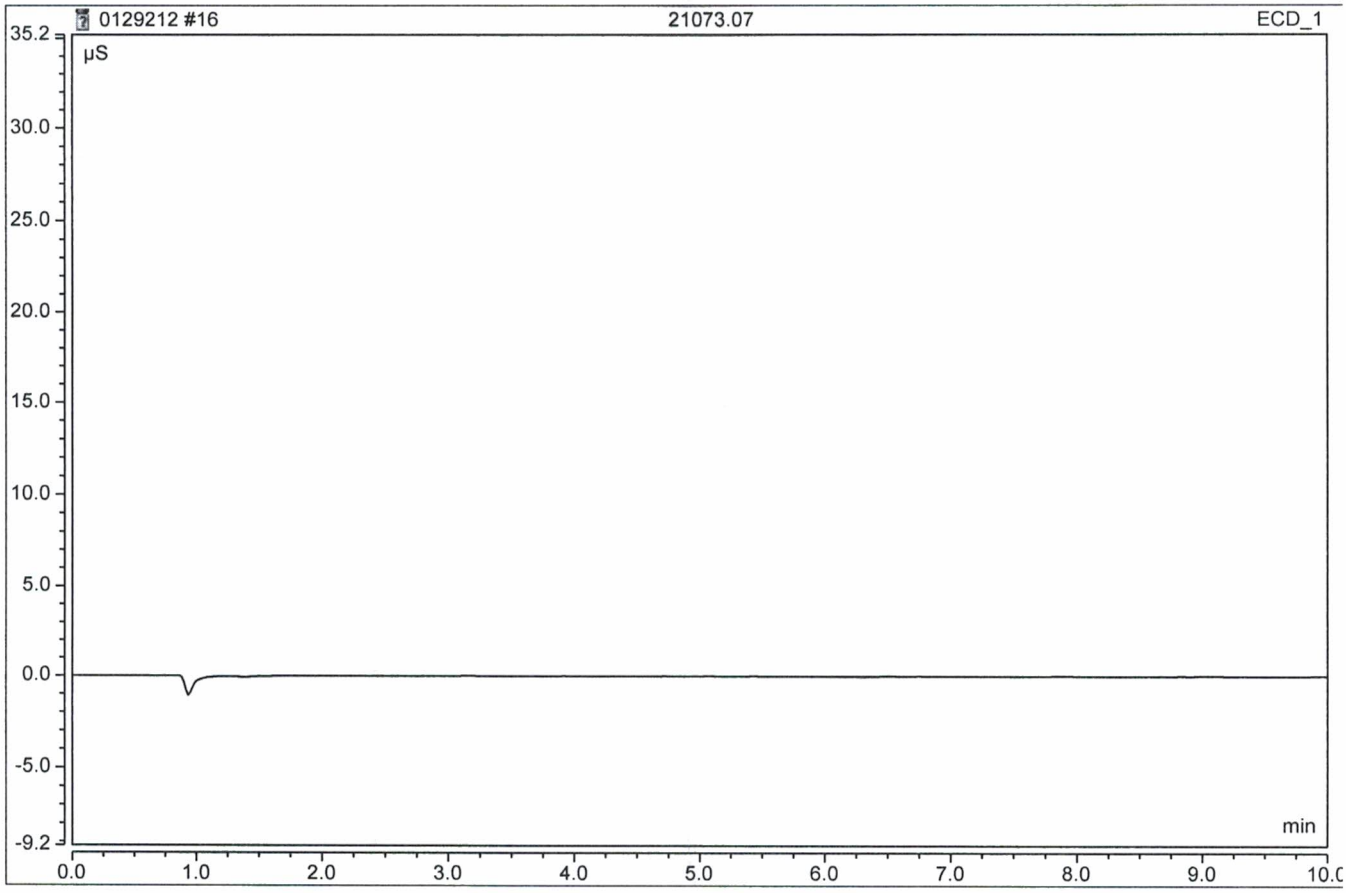
Sample Name:	**21073.06**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**5.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 14:25**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.64	**Chloride**	M	1.822	30.032	75.9375
2	6.47	**Sulfate**	M	0.933	4.380	57.8418
TOTAL:				2.76	34.41	133.78



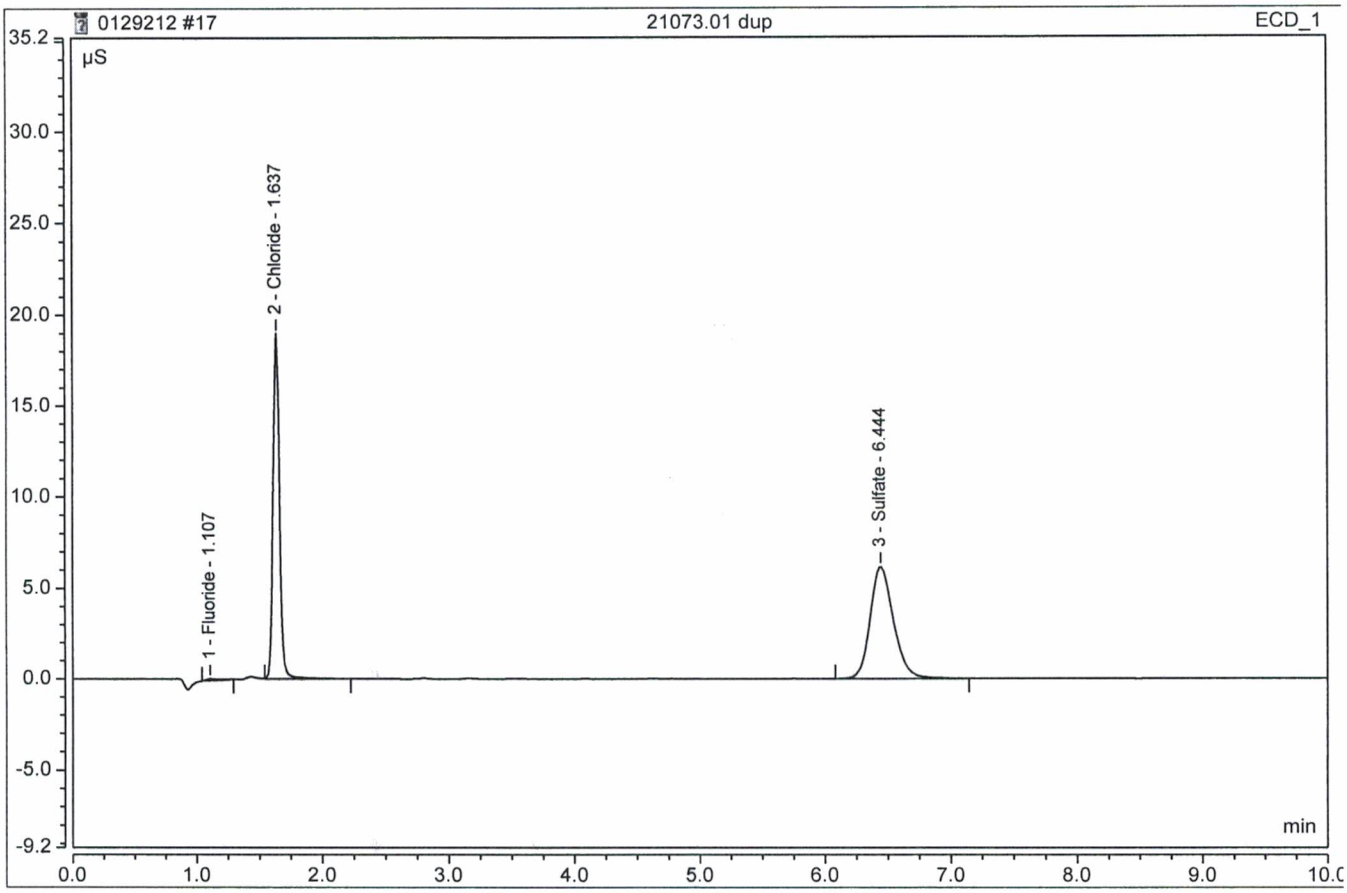
Sample Name:	**21073.07**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**2.5000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 14:35**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount n.a.
TOTAL:				0.00	0.00	0.00



Sample Name:	**21073.01 dup**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**5.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 14:45**	*Column:*	**AS4A-SC 038777**

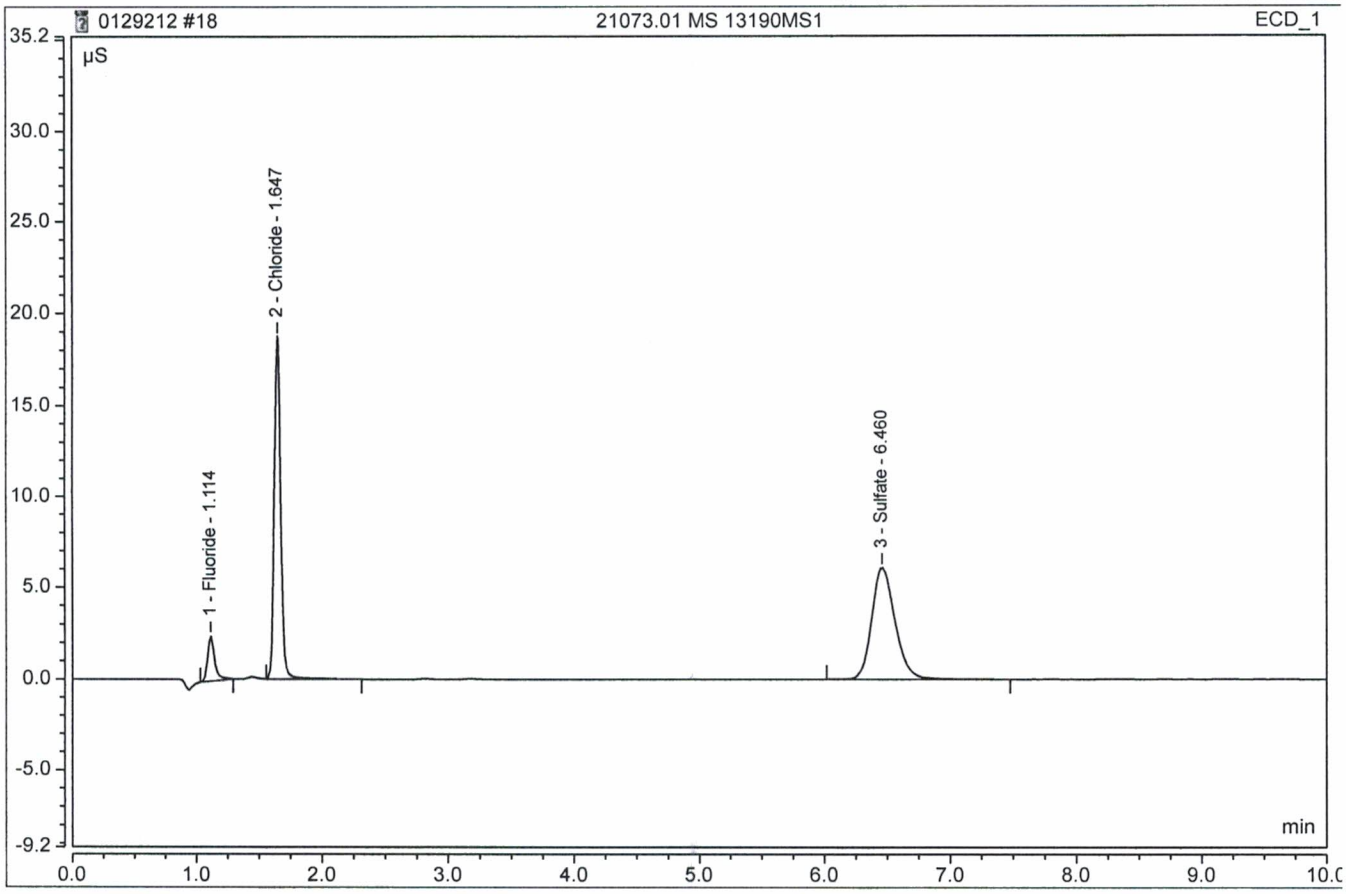
No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.11	**Fluoride**	M	0.011	0.101	0.1376
2	1.64	**Chloride**	M	1.127	18.972	47.4313
3	6.44	**Sulfate**	M	1.317	6.183	81.6511
TOTAL:				2.45	25.26	129.22



Sample Name:	**21073.01 MS 13190MS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 14:55**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.11	**Fluoride**	M	0.157	2.449	0.9656
2	1.65	**Chloride**	M	1.111	18.728	9.3564
3	6.46	**Sulfate**	M	1.301	6.098	16.1394
TOTAL:				2.57	27.27	26.46

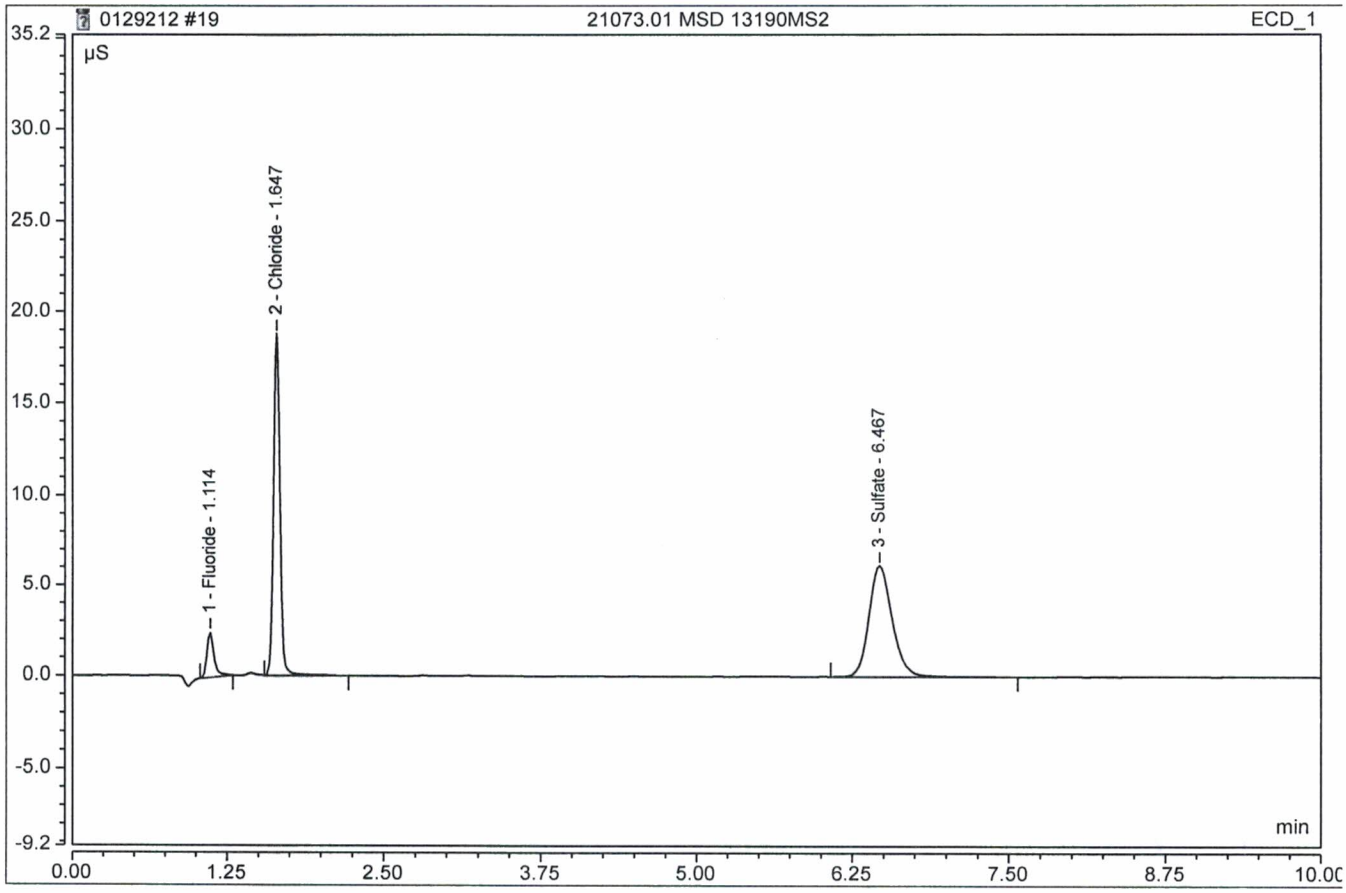
1 0.9656 −0.03 = 93 %



Sample Name:	**21073.01 MSD 13190MS2**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 15:05**	*Column:*	**AS4A-SC 038777**

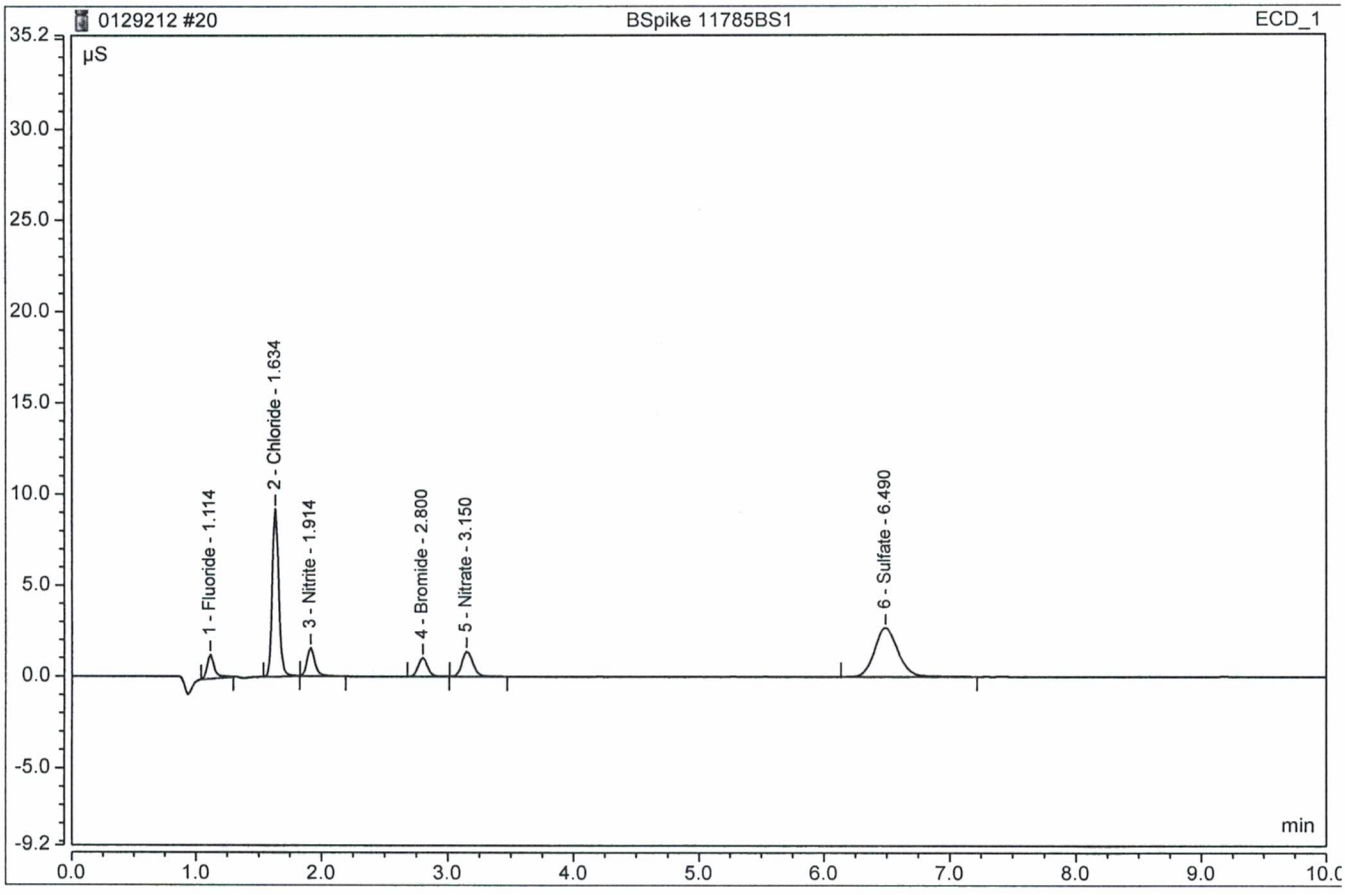
No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.11	**Fluoride**	M	0.156	2.447	0.9640
2	1.65	**Chloride**	M	1.114	18.753	9.3787
3	6.47	**Sulfate**	M	1.310	6.107	16.2401
TOTAL:				2.58	27.31	26.58

1 0.9640 − 0.03 = 93 %



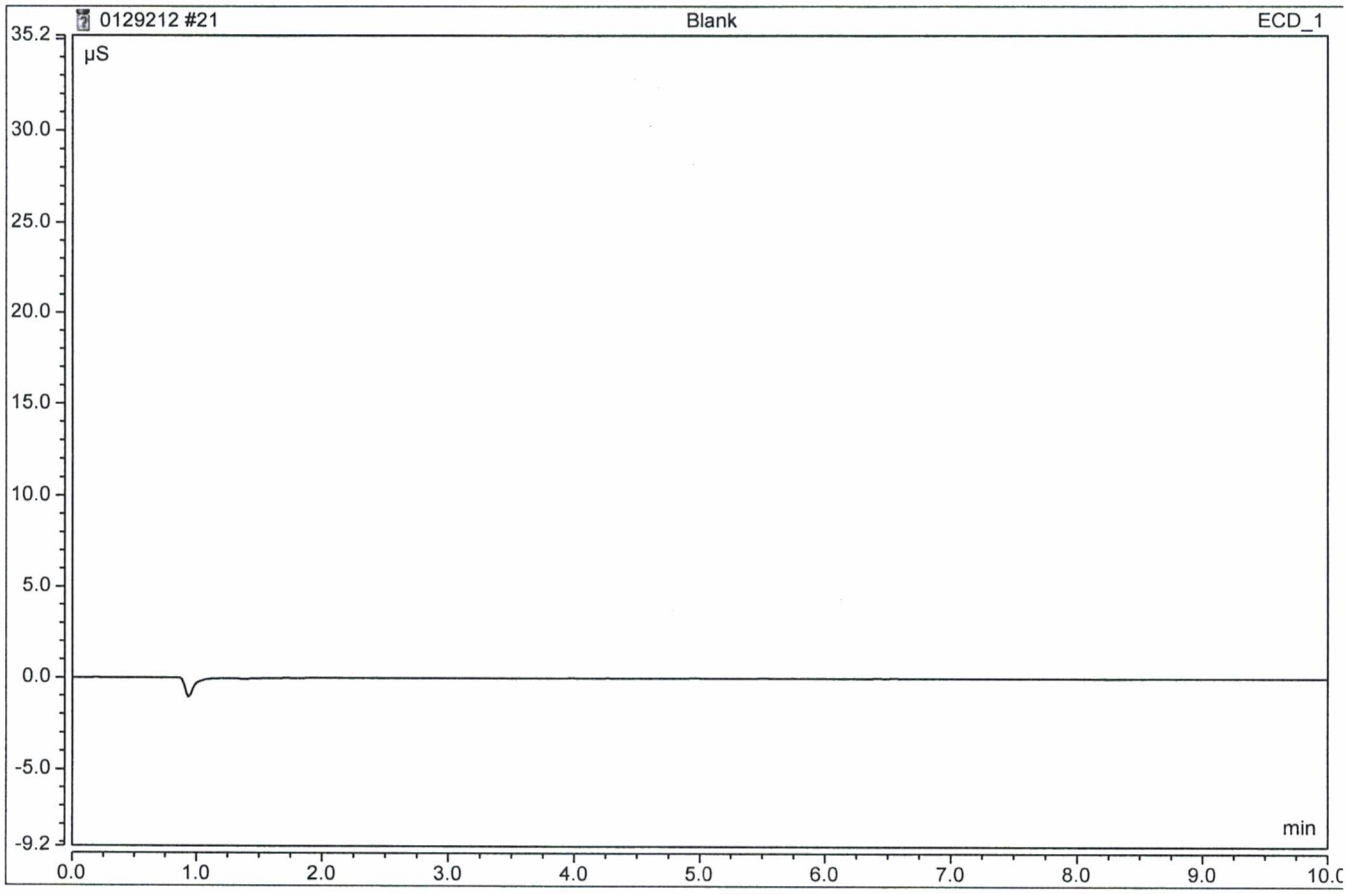
Sample Name:	**BSpike 11785BS1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Check Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 15:15**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount		
1	1.11	**Fluoride**	M	0.084	1.293	0.5	0.4980	100 %
2	1.63	**Chloride**	M	0.550	9.209		4.7607	
3	1.91	**Nitrite**	M	0.108	1.526		0.4829	
4	2.80	**Bromide**	M	0.087	1.006		1.9986	
5	3.15	**Nitrate**	M	0.134	1.355		0.5170	
6	6.49	**Sulfate**	M	0.575	2.679		7.1288	
TOTAL:				1.54	17.07		15.39	



Sample Name:	**Blank**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**29-Jan-2021 / 15:25**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount n.a.
		TOTAL:		0.00	0.00	0.00

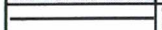


Sequence: Cal 120320
Last Update Operator: jeff-phi

ICS-1100 A Dionex IC / Meth 300.0 all ions (new software)

ECD_1	Name	Type	Level	Position	Volume	Instrument Method	Processing Method	Status
	water blank	Unknown		1	5000	New Instrument Method	Anion	Finished
	1132Cal1	Calibration Standard	01	2	5000	New Instrument Method	Anion	Finished
	1132Cal2	Calibration Standard	02	3	5000	New Instrument Method	Anion	Finished
	1132Cal3	Calibration Standard	03	4	5000	New Instrument Method	Anion	Finished
	1132Cal4	Calibration Standard	04	5	5000	New Instrument Method	Anion	Finished
	1132Cal5	Calibration Standard	05	6	5000	New Instrument Method	Anion	Finished

CAL ~~ID~~ ICSA120320CAL

ECD_1	Name	Inject Time	Lock Status	Weight	Dilution	IntStd	Replicate ID	Comment	ECD_1
	water blank	12/3/2020 9:34:20 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal1	12/3/2020 9:46:36 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal2	12/3/2020 9:56:40 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal3	12/3/2020 10:06:43 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal4	12/3/2020 10:16:46 AM		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal5	12/3/2020 10:26:48 AM		1.0000	1.0000	1.0000		Jeff Phifer	

Name	Re-injections	Spike Group
water blank	0	
1132Cal1	0	
1132Cal2	0	
1132Cal3	0	
1132Cal4	0	
1132Cal5	0	

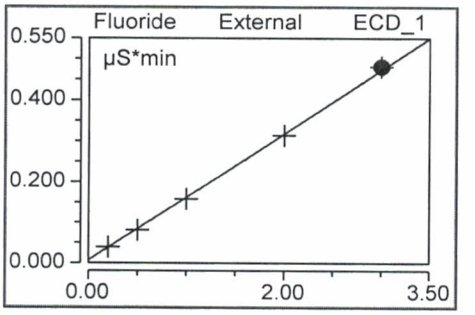
Calibration Batch Report
CAL ID# ICSA120320CAL

Sequence:	**Cal 120320**	*Injection Volume:*	**5,000.00**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 10:26**	*Column:*	**AS4A-SC 038777**

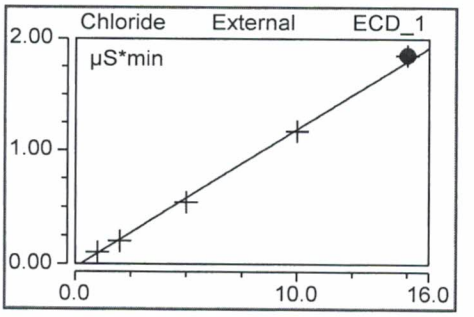
Calibration Summary

Peak Name	Eval.Type	Cal.Type	Points	Offset (C0)	Slope (C1)	Curve (C2)	Coeff.Det. %
Fluoride	Area	WithOffset,	5.000	0.007	0.155	0.000	99.9252
Chloride	Area	WithOffset,	5.000	-0.031	0.122	0.000	99.7568
Nitrite	Area	WithOffset,	5.000	-0.003	0.229	0.000	99.9133
Bromide	Area	WithOffset,	5.000	-0.001	0.044	0.000	99.9712
Nitrate	Area	WithOffset,	5.000	0.001	0.258	0.000	99.9341
Sulfate	Area	WithOffset,	5.000	0.000	0.081	0.000	99.8845
		AVERAGE:		-0.0045	0.1482	0.0000	99.8975

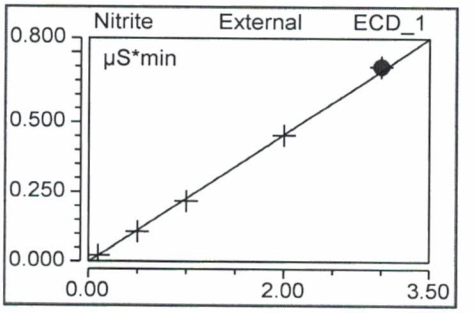
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Fluoride	Fluoride	Fluoride	Fluoride
1132Cal1	1.110	0.0393	0.542	0.211
1132Cal2	1.110	0.0813	1.238	0.481
1132Cal3	1.110	0.1585	2.515	0.978
1132Cal4	1.110	0.3139	5.172	1.978
1132Cal5	1.107	0.4807	7.992	3.052
Average	1.110			
Rel. Std. Dev.	0.136 %			



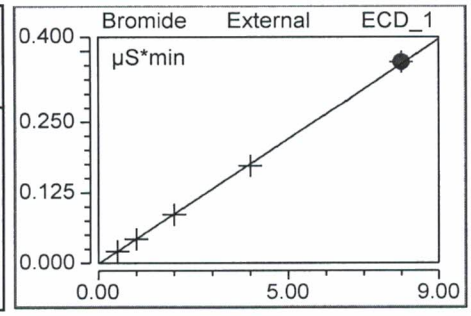
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Chloride	Chloride	Chloride	Chloride
1132Cal1	1.624	0.1031	1.709	1.096
1132Cal2	1.620	0.2008	3.339	1.897
1132Cal3	1.627	0.5421	9.147	4.694
1132Cal4	1.630	1.1742	19.854	9.874
1132Cal5	1.637	1.8531	30.972	15.439
Average	1.628			
Rel. Std. Dev.	0.392 %			



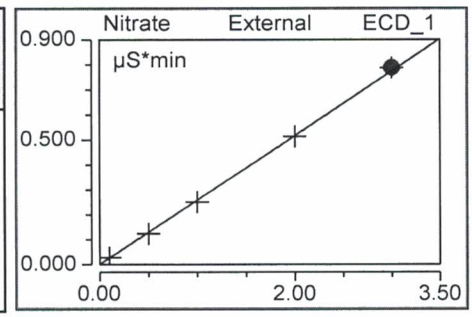
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Nitrite	Nitrite	Nitrite	Nitrite
1132Cal1	1.904	0.0218	0.300	0.106
1132Cal2	1.904	0.1075	1.532	0.480
1132Cal3	1.904	0.2176	3.154	0.961
1132Cal4	1.907	0.4531	6.640	1.988
1132Cal5	1.910	0.6997	10.351	3.064
Average	1.906			
Rel. Std. Dev.	0.155 %			



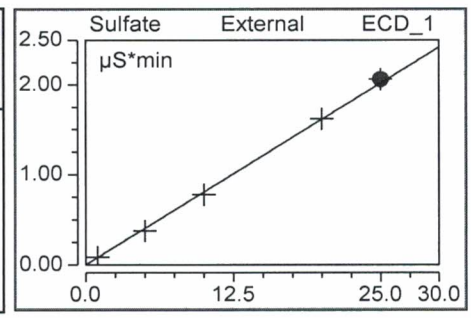
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Bromide	Bromide	Bromide	Bromide
1132Cal1	2.784	0.0213	0.253	0.511
1132Cal2	2.774	0.0428	0.502	0.997
1132Cal3	2.777	0.0860	0.996	1.976
1132Cal4	2.780	0.1724	2.034	3.932
1132Cal5	2.777	0.3559	4.227	8.085
Average	2.778			
Rel. Std. Dev.	0.139 %			



Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Nitrate	Nitrate	Nitrate	Nitrate
1132Cal1	3.140	0.0282	0.292	0.106
1132Cal2	3.124	0.1240	1.269	0.478
1132Cal3	3.124	0.2513	2.537	0.972
1132Cal4	3.120	0.5141	5.169	1.991
1132Cal5	3.107	0.7881	7.936	3.054
Average	3.123			
Rel. Std. Dev.	0.382 %			

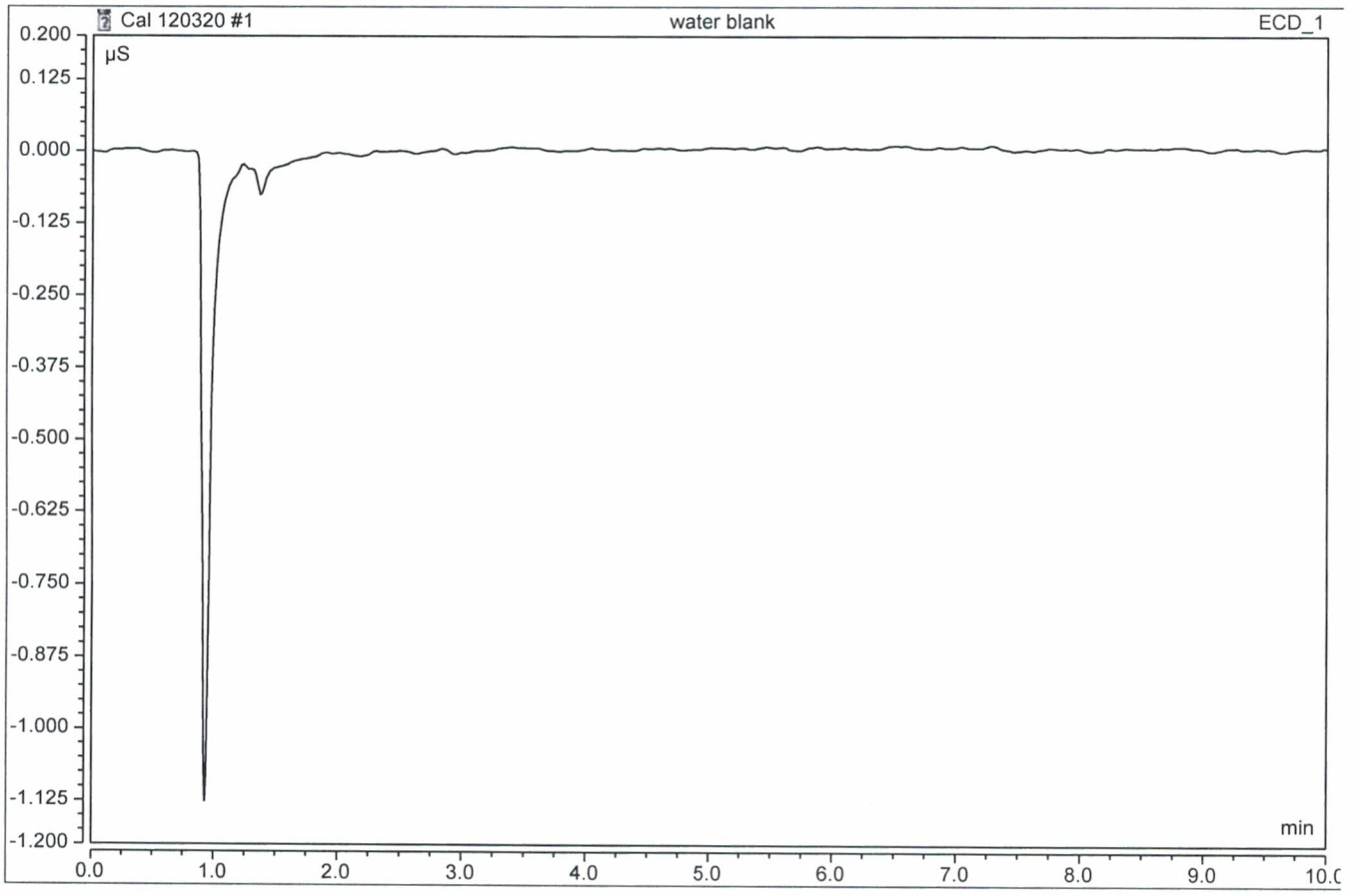


Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount ECD_1
	Sulfate	Sulfate	Sulfate	Sulfate
1132Cal1	6.510	0.0866	0.394	1.074
1132Cal2	6.504	0.3774	1.750	4.680
1132Cal3	6.490	0.7785	3.633	9.654
1132Cal4	6.460	1.6169	7.566	20.051
1132Cal5	6.447	2.0595	9.609	25.540
Average	6.482			
Rel. Std. Dev.	0.426 %			



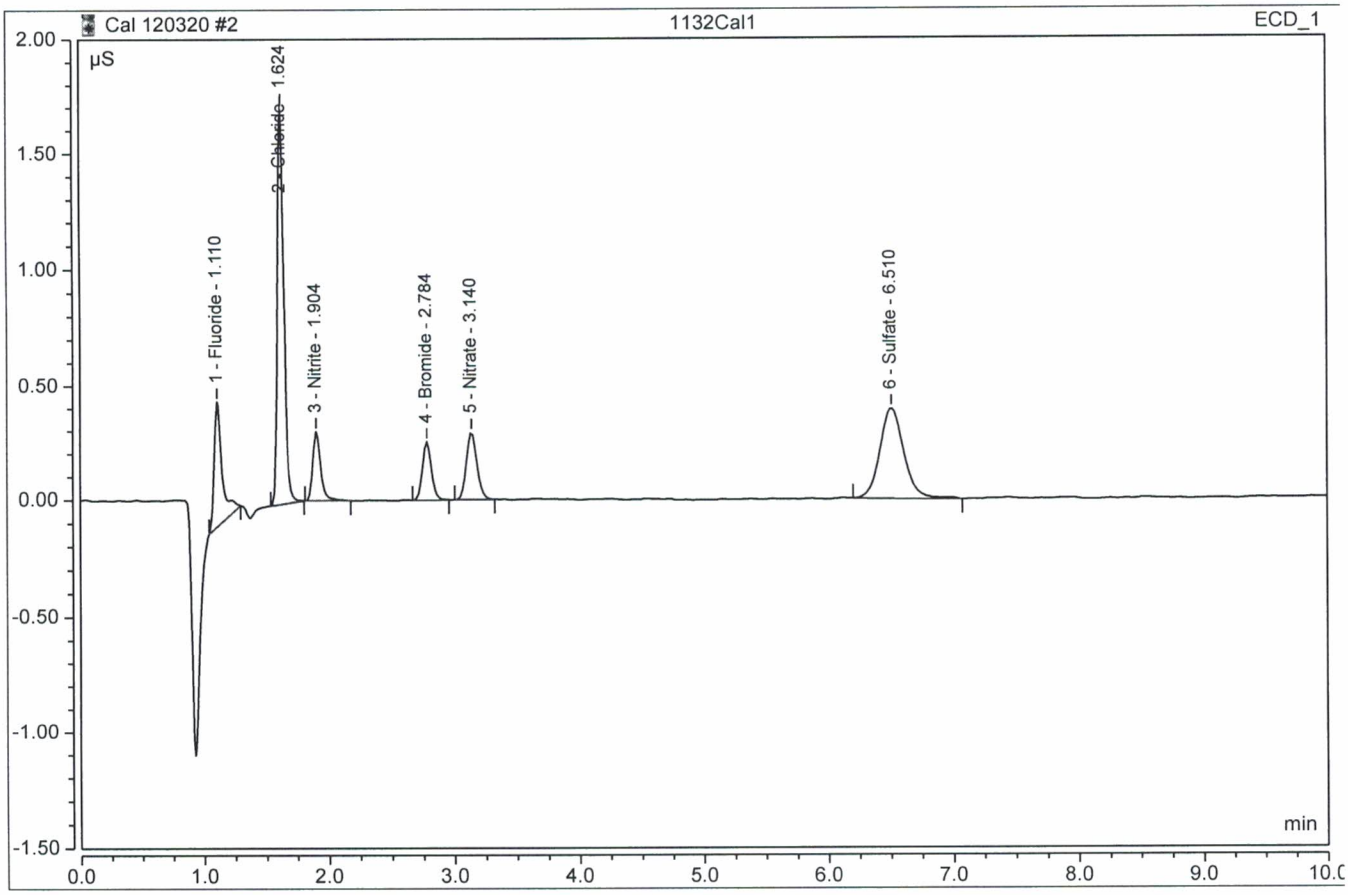
Sample Name:	**water blank**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 09:34**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount n.a.
TOTAL:				0.00	0.00	0.00



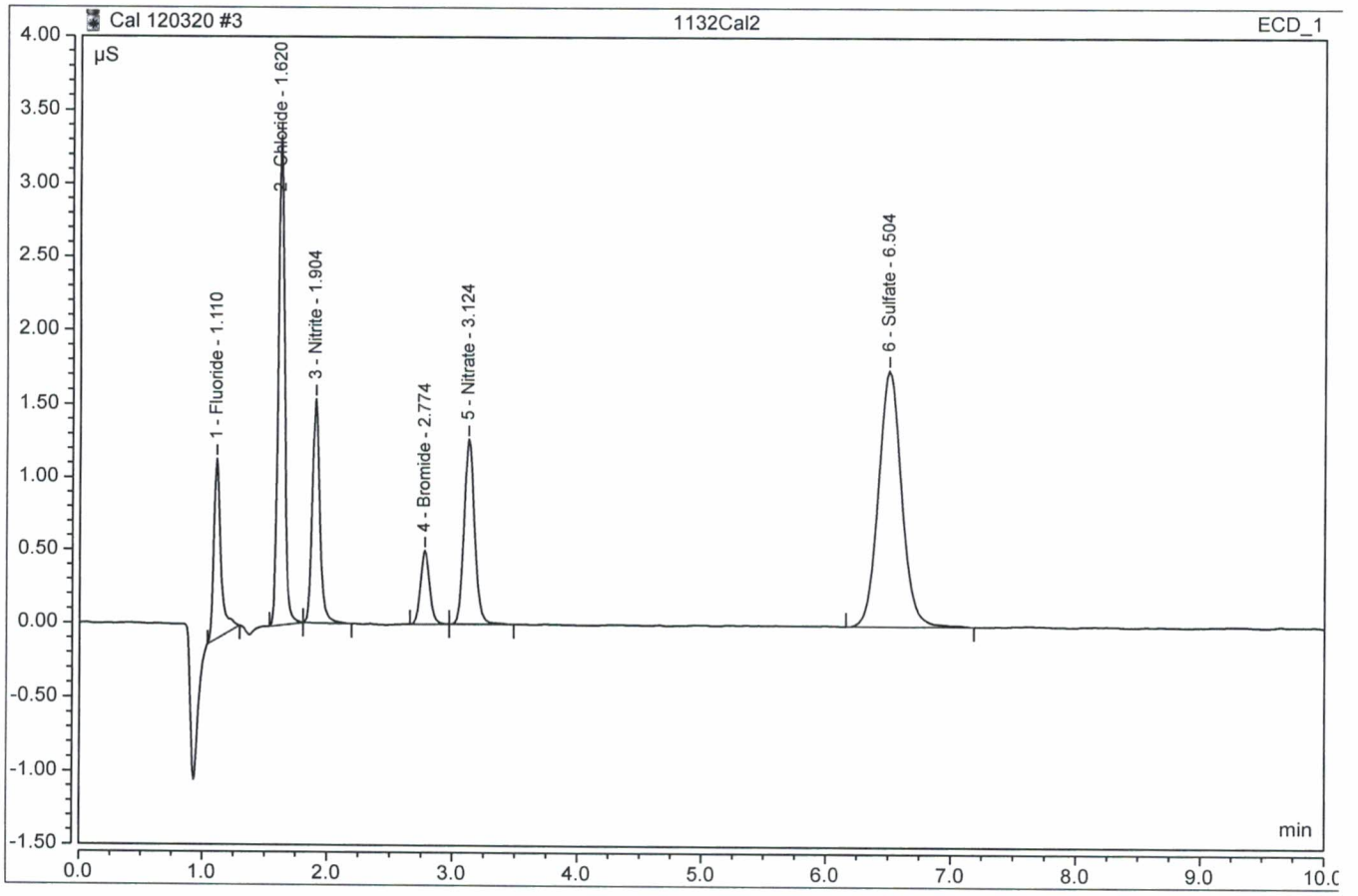
Sample Name:	**1132Cal1**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 09:46**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount	
1	1.11	**Fluoride**	M	0.039	0.542	0.2	0.2106
2	1.62	**Chloride**	M	0.103	1.709	1	1.0962
3	1.90	**Nitrite**	M	0.022	0.300	0.1	0.1063
4	2.78	**Bromide**	M	0.021	0.253	0.5	0.5108
5	3.14	**Nitrate**	M	0.028	0.292	0.1	0.1060
6	6.51	**Sulfate**	M	0.087	0.394	1	1.0744
TOTAL:				0.30	3.49		3.10



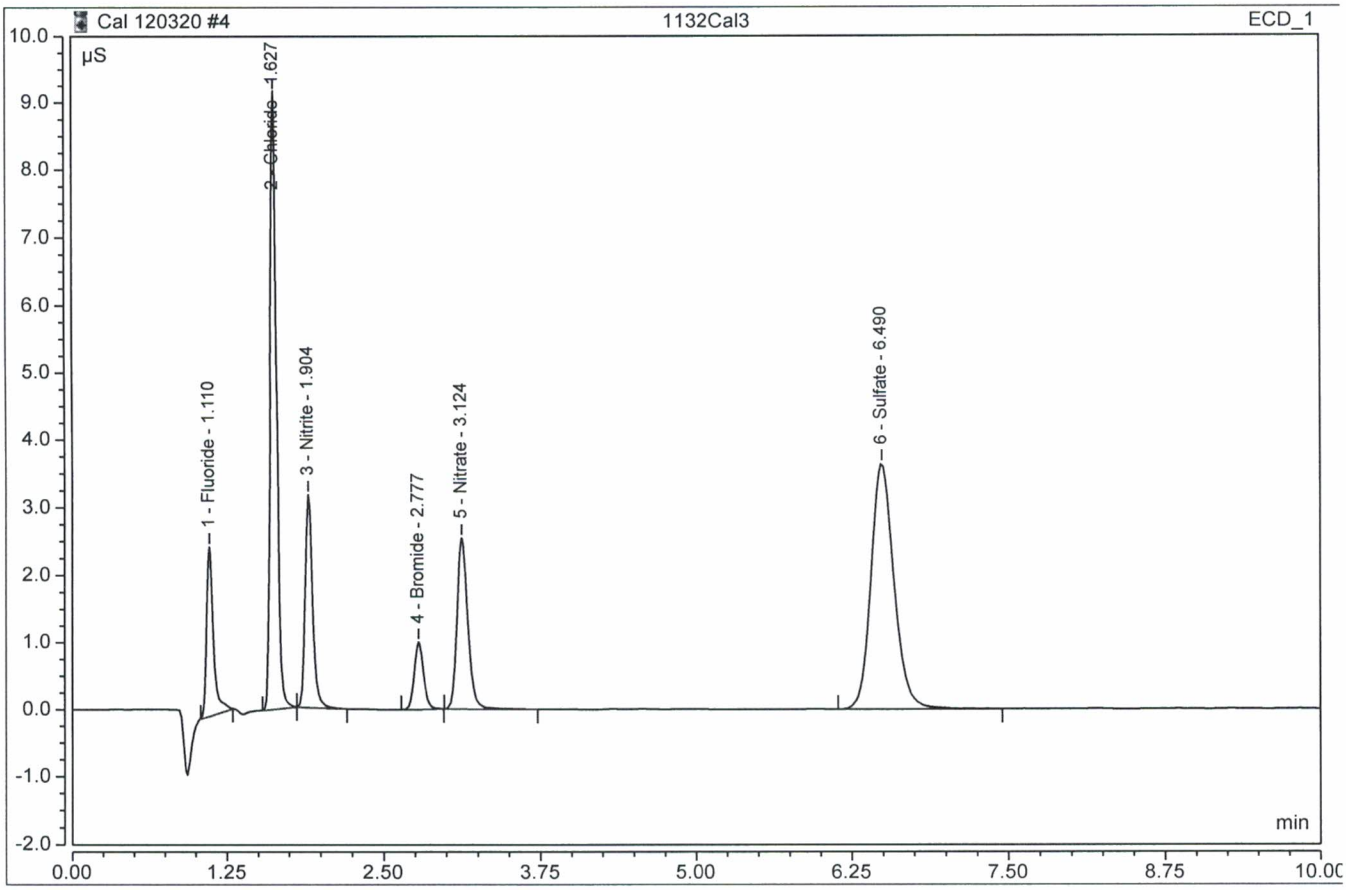
Sample Name:	**1132Cal2**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 09:56**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount	
1	1.11	**Fluoride**	BMB	0.081	1.238	0.5	0.4812
2	1.62	**Chloride**	BMB	0.201	3.339	2	1.8966
3	1.90	**Nitrite**	BMB	0.108	1.532	0.5	0.4803
4	2.77	**Bromide**	BMB	0.043	0.502	1	0.9970
5	3.12	**Nitrate**	BMB	0.124	1.269	0.5	0.4776
6	6.50	**Sulfate**	BMB	0.377	1.750	5	4.6802
TOTAL:				0.93	9.63		9.01



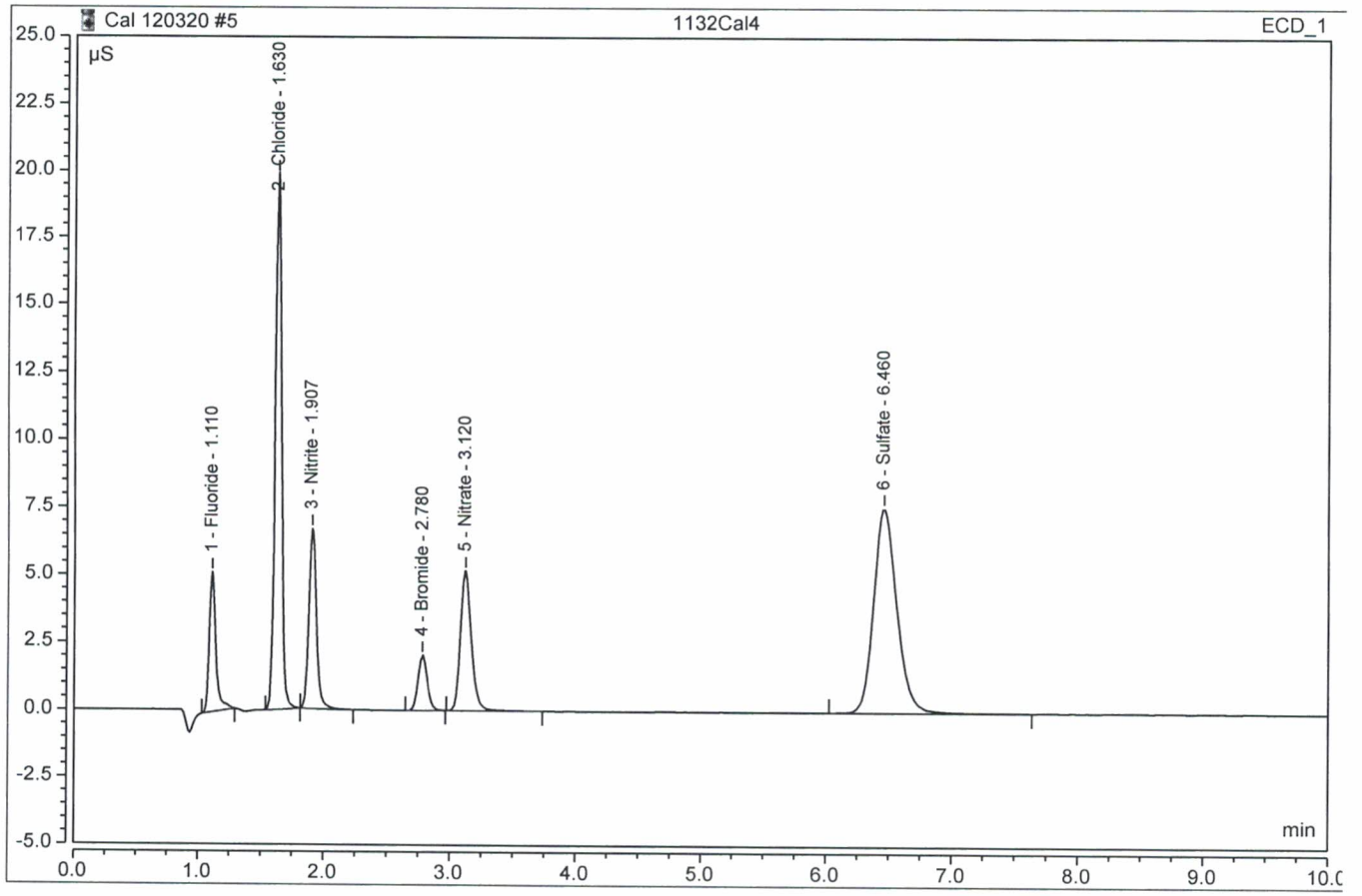
Sample Name:	**1132Cal3**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 10:06**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.11	**Fluoride**	M	0.159	2.515	0.9780
2	1.63	**Chloride**	M	0.542	9.147	4.6938
3	1.90	**Nitrite**	M	0.218	3.154	0.9607
4	2.78	**Bromide**	M	0.086	0.996	1.9756
5	3.12	**Nitrate**	M	0.251	2.537	0.9717
6	6.49	**Sulfate**	M	0.779	3.633	9.6543
TOTAL:				2.03	21.98	19.23



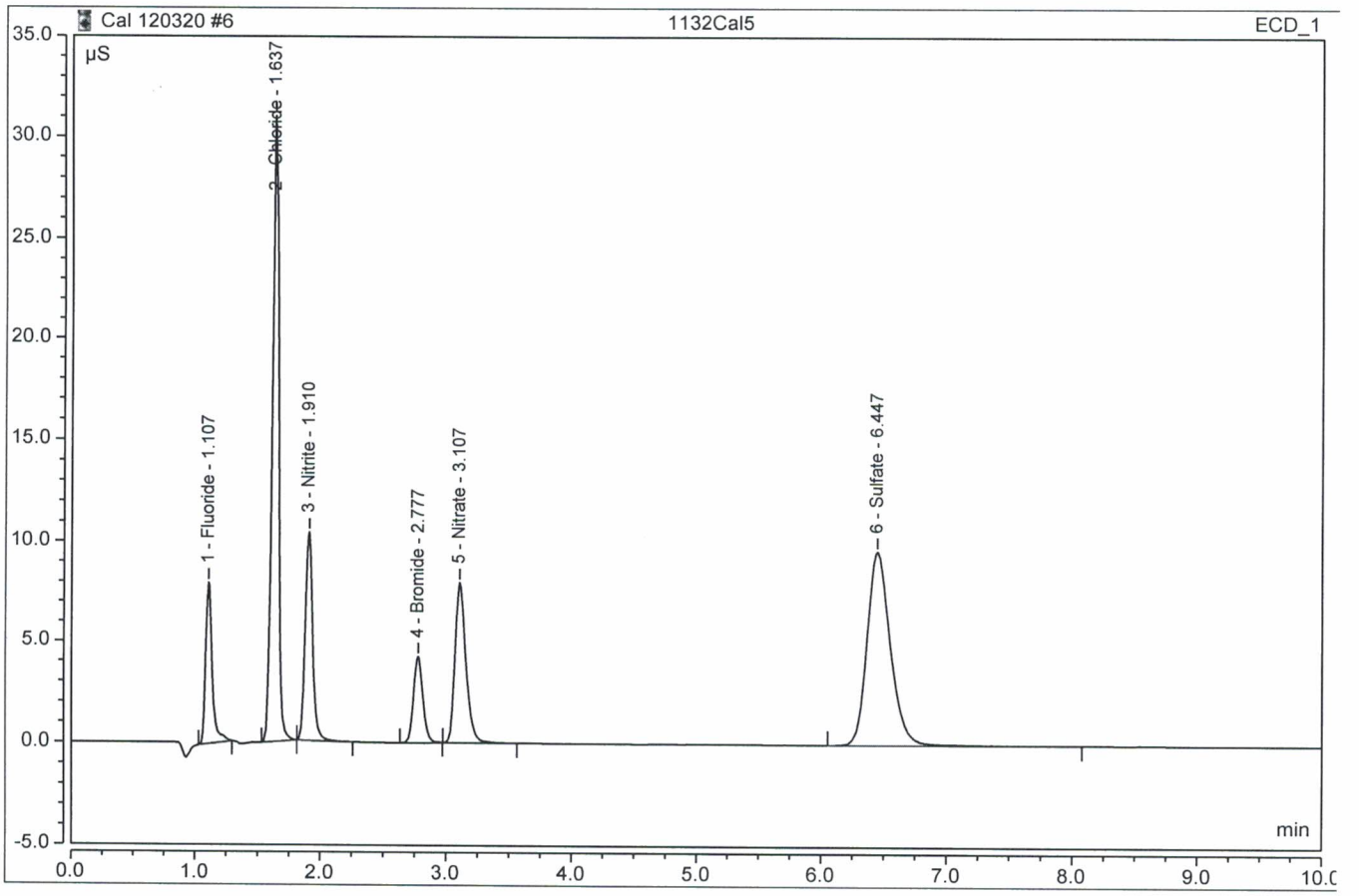
Sample Name:	**1132Cal4**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 10:16**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.11	**Fluoride**	M	0.314	5.172	2 1.9783
2	1.63	**Chloride**	M	1.174	19.854	10 9.8743
3	1.91	**Nitrite**	M	0.453	6.640	2 1.9884
4	2.78	**Bromide**	M	0.172	2.034	4 3.9317
5	3.12	**Nitrate**	M	0.514	5.169	2 1.9910
6	6.46	**Sulfate**	M	1.617	7.566	20 20.0511
TOTAL:				4.24	46.43	39.81



Sample Name:	**1132Cal5**	*Inj. Vol.:*	**5000.00**
Injection Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Instrument Method:	**New Instrument Method**	*Operator:*	**Jeff Phifer**
Inj. Date / Time:	**03-Dec-2020 / 10:26**	*Column:*	**AS4A-SC 038777**

No.	Time min	Peak Name	Peak Type	Area µS*min	Height µS	Amount
1	1.11	**Fluoride**	M	0.481	7.992	3.0519
2	1.64	**Chloride**	M	1.853	30.972	15.4391
3	1.91	**Nitrite**	M	0.700	10.351	3.0643
4	2.78	**Bromide**	M	0.356	4.227	8.0848
5	3.11	**Nitrate**	M	0.788	7.936	3.0538
6	6.45	**Sulfate**	M	2.060	9.609	25.5400
TOTAL:				6.24	71.09	58.23



Total Suspended Solids

TSS: VLIMS Code: 4630; EPA Method: 2540D

Date Started: 28JAN21 | Date Finished: 28JAN21

Time Started: 1530 | Time Finished: 1940

Analyst: [illegible] | Reviewed by: BB

Batch ID: TSS210128 | Review Date: 2/15/2021

Temperature: 102°C | Balance ID: I3

Time in Oven: 4:10 | Oven ID/Thermometer ID: OV5/Quincy

Merit #	Tin #	MLs sample	g. Filter	g. dry solids + filter 103°C	g. reweigh 15 min. 103°C	TSS mg/L	DF	TVSS Y/N	TVSS Tin #
Blank	IM9YD	1000	0.1156	0.1153		-0.30 ND	~~0.30~~ 1.00	N	
LCS Lot 8216-09	YE	100	0.1200	0.1250		50	10.0		
21051.01	YF	200	0.1180	0.1223		21.50 22	5.00		
Dup .01	YG	200	0.1198	0.1238		20	5.00		
21045.01	YH	610	0.1240	0.1240		0.00 ND	1.64		
21058.01	~~YI~~ YR	~~250~~ 150	0.1224	0.1249		16.67 17	6.67		
21073.01	YJ	500	0.1173	0.1242		13.80 14	2.00		
.02	YK	1000	0.1194	0.1293		9.90 10	1.00		
.03	YL	1000	0.1200	0.1211		1.10 ~~ND~~	1.00		
.04	YM	1000	0.1165	0.1239		7.40 7	1.00		
.05	YN	1000	0.1160	0.1158		-0.20 ND	1.00		
.06	YP	1000	0.1172	0.1180		0.80 ND	1.00		
.07	YQ	1000	0.1169	0.1162		-0.70 ND	1.00		

LV

28JAN21 (L)

vs 28JAN21 1-D-flag

LCS value = 57.8 g/L

% Rec = 86.5%

% RPD = 7.2% * Sample was chunky

Acceptance Criteria (mg/L): 45.7-65.6 g/L

Acceptance Criteria (%): 79.1-113%

Acceptance Criteria: ± 5% of average

Total Dissolved Solids

TDS: VLIMS Code: 4615; EPA Method: 2540C

Date Started: 28JAN21 | Date Finished: 31JAN21

Time Started: 1745 | Time Finished: 1410

Analyst: AG | Reviewed by: BB

Batch ID: TDS210128 | Review Date: 2/15/2021

Temperature: 180°C | Balance ID: I30

Time in Oven: 68.25 | Oven ID/Thermometer ID: OV2/AC10365

Merit #	Tin #	sample (mls)	Tin (grams)	dry solids + tin 180°C (grams)	reweigh 15 min. 180°C (grams)	Cond.	TDS (mg/L)
Blank	A0693853	50	3.7804	3.7801			-6/ND
LCS Lot 8216-09	852	25	3.6435	3.6548			452
21073.01	851	50	3.6975	3.7363			776
Dup .01	850	50	3.6758	3.7153			790
.02	849	50	3.7198	3.7860			1320* / 1324
.03	848	50	3.8039	3.8300			522
.04	847	50	3.7131	3.7743			1220* / 1224
.05	846	50	3.8948	3.9347			798
.06	845	50	3.7965	3.8222			514
.07	844	50	3.7920	3.7916			-8/ND
21045.01	843	50	3.7511	3.7726			430
21091.01	842	50	3.7793	3.8115			644
.02	841	50	3.7391	3.8037			1240* / 1292

LCS value = ~~578~~ 457 mg/L 31JAN21

% Rec = 98.9%

% RPD = 1.8%

Acceptance Criteria (mg/L): ~~457 - 699~~ 412 - 503 mg/L AG 31JAN21

Acceptance Criteria (%): ~~79 - 115%~~ 90.2 - 110% AG 31JAN21

Acceptance Criteria: ± 5% of average

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM EPA Assesment 2
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other
Special Instructions

MERIT LAB NO. - FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO_4	Radium 226	Radium 228	TDS	TSS	Special Instructions
21073.01	01/27/21	1226	MW-1 L101070-01	GW	5	2		3					✓	✓	✓	✓	✓	✓	Metals to analyse:
.02	01/27/21	1556	MW-2 -02	GW	5	2		3					✓	✓	✓	✓	✓	✓	B,Ca, Sb, As, Ba, Be, Cd, Cr,
.03	01/27/21	1021	MW-4 -03	GW	5	2		3					✓	✓	✓	✓	✓	✓	Co, Li, Hg, Mo,Pb,Se, Tl,
.04	01/27/21	1636	MW-5 -04	GW	5	2		3					✓	✓	✓	✓	✓	✓	
.05	01/27/21	1421	MW-6 -05	GW	5	2		3					✓	✓	✓	✓	✓	✓	Please send a preliminary report
.06	01/27/21	1021	MW-4 Duplicate -06	GW	5	2		3					✓	✓	✓	✓	✓	✓	
.07	01/27/21	730	Field Blank -07	DI	5	2		3					✓	✓	✓	✓	✓	✓	

RELINQUISHED BY: SIGNATURE/ORGANIZATION (Sampler)	DATE 1-28-21	TIME 1230	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE 1/28/21	TIME 1230	
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 2.4

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague | ☒ SAME
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S21073 | SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER _____

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☒ LEVEL IV ☐ EDD ☐ OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**	Special Instructions
	1/27/20	1226	S21073.01	GW	2			2					✓	✓	* E903.1 Mod.
	1/27/20	1556	S21073.02	GW	2			2					✓	✓	** E904.0/SW 9320 Mod.
	1/27/20	1021	S21073.03	GW	2			2					✓	✓	
	1/27/20	1636	S21073.04	GW	2			2					✓	✓	Please use calculation product &
	1/27/20	1421	S21073.05	GW	2			2					✓	✓	provide Radium 226/228 combined
	1/27/20	1021	S21073.06	GW	2			2					✓	✓	results on the report
	1/27/20	0730	S21073.07 (Field Blank)	L	2			2					✓	✓	
															(No Ice needed)
															** Subcontracted to
															GEL Laboratories, Inc.
															2040 Savage Road
															Charleston, SC 29407

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other _____

RELINQUISHED BY: SIGNATURE/ORGANIZATION: John Smith ☐ Sampler	DATE: 1/28/21	TIME: 1700	
RECEIVED BY: SIGNATURE/ORGANIZATION: UPS	DATE: 1/28/21	TIME: 1700	
RELINQUISHED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:	
RECEIVED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:	

RELINQUISHED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:	
RECEIVED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:	
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	NOTES: TEMP. ON ARRIVAL _____
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Merit Laboratories Login Checklist

Lab Set ID: S21073
Client: BWL01 (Board of Water & Light)
Project: Erickson AM EPA Assessment 2
Submitted: 01/28/2021 12:36 Login User: SRS

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 2.4
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL UPS# 1Z4664770363502504
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Prepared by Merit Laboratories

Merit Laboratories Bottle Preservation Check

Lab Set ID: S21073 Submitted: 01/28/2021 12:36

Client: BWL01 (Board of Water & Light)

Project: Erickson AM EPA Assessment 2

Initial Preservation Check: 01/28/2021 13:05 SRS

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S21073.01	125ml Plastic HNO3	<2			
S21073.01	1L Plastic HNO3	<2			
S21073.01	1L Plastic HNO3	<2			
S21073.02	125ml Plastic HNO3	<2			
S21073.02	1L Plastic HNO3	<2			
S21073.02	1L Plastic HNO3	<2			
S21073.03	125ml Plastic HNO3	<2			
S21073.03	1L Plastic HNO3	<2			
S21073.03	1L Plastic HNO3	<2			
S21073.04	125ml Plastic HNO3	<2			
S21073.04	1L Plastic HNO3	<2			
S21073.04	1L Plastic HNO3	<2			
S21073.05	125ml Plastic HNO3	<2			
S21073.05	1L Plastic HNO3	<2			
S21073.05	1L Plastic HNO3	<2			
S21073.06	125ml Plastic HNO3	<2			
S21073.06	1L Plastic HNO3	<2			
S21073.06	1L Plastic HNO3	<2			
S21073.07	125ml Plastic HNO3	<2			
S21073.07	1L Plastic HNO3	<2			
S21073.07	1L Plastic HNO3	<2			

Sample Set Receipt

Report to

Attention: Jennifer Caporale

Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:

Email: Environmental_Laboratory@LBWL.com

Contacts:

Invoice to

Attention: Kelly Gleason

Address: Board of Water & Light
PO Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX: 517-702-6373

Email: kelly.gleason@lbwl.com

Set ID: S21073 Location: BWL01 (Board of Water & Light) PO #: Login by: SRS

Project: Erickson AM EPA Assessment 2 Backlog Note:

Submitted: 01/28/2021 12:36 Due Date: 01/29/2021 Rush: Yes Collected by: Marc Wahrer QC Level: 3 Custom Limits Present: No

Approved by: Site: Work Order#: Bill to Acct: Bill to Dept:

Sample ID	Sample Tag	Matrix	Date/Time Collected	COC Ref
S21073.01	MW-1 L101070-01	Groundwater	01/27/2021 12:26	
S21073.02	MW-2 L101070-02	Groundwater	01/27/2021 15:56	
S21073.03	MW-4 L101070-03	Groundwater	01/27/2021 10:21	
S21073.04	MW-5 L101070-04	Groundwater	01/27/2021 16:36	
S21073.05	MW-6 L101070-05	Groundwater	01/27/2021 14:21	
S21073.06	MW-4 Duplicate L101070-06	Groundwater	01/27/2021 10:21	
S21073.07	Field Blank L101070-07	Water	01/27/2021 07:30	

Samples: S21073.01-07

Analysis Code	Analysis Title	Method	Units	Holding Date
2140WMS	Calcium	E200.8	mg/L	07/26/2021
2145WMS	Chromium	E200.8	mg/L	07/26/2021
2130WMS	Boron	E200.8	mg/L	07/26/2021
2115WMS	Arsenic	E200.8	mg/L	07/26/2021
2205WMS	Selenium	E200.8	mg/L	07/26/2021
2190WMS	Molybdenum	E200.8	mg/L	07/26/2021
2135WMS	Cadmium	E200.8	mg/L	07/26/2021
2110WMS	Antimony	E200.8	mg/L	07/26/2021
2120WMS	Barium	E200.8	mg/L	07/26/2021
2225WMS	Thallium	E200.8	mg/L	07/26/2021
2165WMS	Lead	E200.8	mg/L	07/26/2021
2125WMS	Beryllium	E200.8	mg/L	07/26/2021
2150WMS	Cobalt	E200.8	mg/L	07/26/2021
2170WMS	Lithium	E200.8	mg/L	07/26/2021
2185W	Mercury	E245.1	mg/L	02/24/2021
4425W	Chloride	E300.0	mg/L	02/24/2021
4530W	Sulfate	E300.0	mg/L	02/24/2021
4455W	Fluoride (Undistilled)	E300.0	mg/L	02/24/2021
MISCSUB	Misc. Special Project			10/23/2023
4630	Total Suspended Solids	SM2540D	mg/L	02/03/2021
4615	Total Dissolved Solids	SM2540C	mg/L	02/03/2021
1605W	Metal Digestion	SW3015A		07/26/2021
1605HGW	Mercury Digestion	E245.1		02/24/2021
SUBCONT	Subcontracting			10/23/2023

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

February 22, 2021

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 533686
SDG: S21073

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 01, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4443.

Sincerely,

Samuel Hogan for
Lindsay Fabra
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S21073
Work Order: 533686

February 22, 2021

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 01, 2021 for analysis. 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.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
533686001	S21073.01
533686002	S21073.02
533686003	S21073.03
533686004	S21073.04
533686005	S21073.05
533686006	S21073.06
533686007	S21073.07

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

Samuel Hogan for
Lindsay Fabra
Project Manager

Chain of Custody and Supporting Documentation

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

533686

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com QUOTE NO.:

INVOICE TO

☒ SAME

CONTACT NAME: Julie Teague
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S21073
SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐1 DAY ☐2 DAYS ☐3 DAYS ☒STANDARD ☐OTHER

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☐LEVEL III ☒LEVEL IV ☐EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☐NPDES
Project Locations: ☐Detroit ☐New York ☐Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**	Special Instructions
	1/27/20	1226	S21073.01	GW	2			2					✓	✓	* E903.1 Mod.
	1/27/20	1556	S21073.02	GW	2			2					✓	✓	** E904.0/SW 9320 Mod.
	1/27/20	1021	S21073.03	GW	2			2					✓	✓	
	1/27/20	1636	S21073.04	GW	2			2					✓	✓	Please use calculation product &
	1/27/20	1421	S21073.05	GW	2			2					✓	✓	provide Radium 226/228 combined
	1/27/20	1021	S21073.06	GW	2			2					✓	✓	results on the report
	1/27/20	0730	S21073.07 (Field Blank)	L	2			2					✓	✓	
															(No Ice needed)
															** Subcontracted to
															GEL Laboratories, Inc.
															2040 Savage Road
															Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION: John Smith ☐Sampler DATE: 1/28/21 TIME: 1700
RECEIVED BY: SIGNATURE/ORGANIZATION: UPS DATE: 1/28/21 TIME: 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: A. Allen DATE: 2/1/21 TIME: 10:10
SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS
SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS
NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

GEL Laboratories LLC

LF

SAMPLE RECEIPT & REVIEW FORM

533686

Client: MERI	**SDG/AR/COC/Work Order:**
Received By: AJA	**Date Received:** 2/1/21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 1Z 466 477 03 6350 2504

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): 0 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 (None) Other: *all temperatures are recorded in Celsius **TEMP:** 21°
4	Daily check performed and passed on IR temperature gun?	✓			**Temperature Device Serial #:** IR1-21 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):

PM (or PMA) review: Initials SH Date 2/2/21 Page 1 of 1

GL-CHL-SR-001 Rev 7

Laboratory Certifications

List of current GEL Certifications as of 22 February 2021

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122020−34
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S21073
Work Order #: 533686

Product: **GFPC Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2090241

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

GEL Sample ID#	Client Sample Identification
533686001	S21073.01
533686002	S21073.02
533686003	S21073.03
533686004	S21073.04
533686005	S21073.05
533686006	S21073.06
533686007	S21073.07
1204749122	Method Blank (MB)
1204749123	533686004(S21073.04) Sample Duplicate (DUP)
1204749124	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 1204749123 (S21073.04DUP) and 533686004 (S21073.04) were non-homogenous matrix. The sample had a small amount of dark sediment. 1204749123 (S21073.04DUP) and 533686004 (S21073.04).

Product: **Lucas Cell, Ra226, Liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2087787

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

GEL Sample ID#	Client Sample Identification
533686001	S21073.01
533686002	S21073.02

533686003	S21073.03
533686004	S21073.04
533686005	S21073.05
533686006	S21073.06
533686007	S21073.07
1204744918	Method Blank (MB)
1204744919	533686001(S21073.01) Sample Duplicate (DUP)
1204744920	533686001(S21073.01) Matrix Spike (MS)
1204744921	Laboratory Control Sample (LCS)

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

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. 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.

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

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

Qualifier Definition Report
for

MERI001 Merit Laboratories, Inc.

Client SDG: S21073 GEL Work Order: 533686

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: 26 FEB 2021 **Title: Group Leader**

Sample Data Summary

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

Certificate of Analysis

Report Date: February 25, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S21073.01	Project:	MERI00120
Sample ID:	533686001	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	27-JAN-21 12:26		
Receive Date:	01-FEB-21		
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	0.850	+/-0.912	1.52	3.00	pCi/L			LXB3	02/23/21	0701	2090241	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.35	+/-0.976			pCi/L		1	AEA	02/25/21	1149	2090287	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.504	+/-0.348	0.477	1.00	pCi/L			MXH8	02/25/21	0955	2087787	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			92.2	(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: February 25, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S21073.02	Project:	MERI00120
Sample ID:	533686002	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	27-JAN-21 15:56		
Receive Date:	01-FEB-21		
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	0.713	+/-1.24	2.15	3.00	pCi/L			LXB3	02/23/21	0701	2090241	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.01	+/-1.27			pCi/L		1	AEA	02/25/21	1149	2090287	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.296	+/-0.249	0.324	1.00	pCi/L			MXH8	02/25/21	0955	2087787	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			86.8	(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: February 25, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S21073.03	Project:	MERI00120
Sample ID:	533686003	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	27-JAN-21 10:21		
Receive Date:	01-FEB-21		
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	-0.957	+/-1.21	2.35	3.00	pCi/L			LXB3	02/23/21	0708	2090241	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.524	+/-1.29			pCi/L		1	AEA	02/25/21	1149	2090287	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.524	+/-0.428	0.638	1.00	pCi/L			MXH8	02/25/21	0955	2087787	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			93.4	(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

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Certificate of Analysis

Report Date: February 25, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S21073.04	Project:	MERI00120
Sample ID:	533686004	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	27-JAN-21 16:36		
Receive Date:	01-FEB-21		
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		3.20	+/-1.09	1.33	3.00	pCi/L			LXB3	02/23/21	0708	2090241	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		3.99	+/-1.19			pCi/L		1	AEA	02/25/21	1149	2090287	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.787	+/-0.493	0.646	1.00	pCi/L			MXH8	02/25/21	0955	2087787	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			93.7	(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: February 25, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S21073.05	Project:	MERI00120
Sample ID:	533686005	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	27-JAN-21 14:21		
Receive Date:	01-FEB-21		
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		1.72	+/-0.884	1.25	3.00	pCi/L			LXB3	02/23/21	0708	2090241	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.98	+/-0.917			pCi/L		1	AEA	02/25/21	1149	2090287	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.263	+/-0.243	0.336	1.00	pCi/L			MXH8	02/25/21	1027	2087787	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			95	(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: February 25, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S21073.06	Project:	MERI00120
Sample ID:	533686006	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	27-JAN-21 10:21		
Receive Date:	01-FEB-21		
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	0.956	+/-1.06	1.78	3.00	pCi/L			LXB3	02/23/21	0708	2090241	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.25	+/-1.11			pCi/L		1	AEA	02/25/21	1149	2090287	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.297	+/-0.322	0.522	1.00	pCi/L			MXH8	02/25/21	1027	2087787	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			92.2	(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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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 25, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S21073.07	Project:	MERI00120
Sample ID:	533686007	Client ID:	MERI001
Matrix:	Water		
Collect Date:	27-JAN-21 07:30		
Receive Date:	01-FEB-21		
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	0.404	+/-1.02	1.82	3.00	pCi/L			LXB3	02/23/21	0708	2090241	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.781	+/-1.08			pCi/L		1	AEA	02/25/21	1149	2090287	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.377	+/-0.346	0.521	1.00	pCi/L			MXH8	02/25/21	1027	2087787	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			87.4	(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

Quality Control Summary

QC Summary

Report Date: February 25, 2021

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **533686**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 2090241										
QC1204749123 533686004 DUP										
Radium-228		3.20	U	1.14	pCi/L	95.2		(0% - 100%)	LXB3	02/23/21 07:08
	Uncertainty	+/-1.09		+/-0.924						
QC1204749124 LCS										
Radium-228	54.8			58.3	pCi/L		106	(75%-125%)		02/23/21 07:08
	Uncertainty			+/-3.63						
QC1204749122 MB										
Radium-228			U	-0.970	pCi/L					02/23/21 07:08
	Uncertainty			+/-0.657						
Rad Ra-226										
Batch 2087787										
QC1204744919 533686001 DUP										
Radium-226		0.504	U	0.407	pCi/L	21.3		(0% - 100%)	MXH8	02/25/21 10:27
	Uncertainty	+/-0.348		+/-0.299						
QC1204744921 LCS										
Radium-226	27.0			28.4	pCi/L		105	(75%-125%)		02/25/21 10:27
	Uncertainty			+/-2.38						
QC1204744918 MB										
Radium-226			U	0.205	pCi/L					02/25/21 10:27
	Uncertainty			+/-0.332						
QC1204744920 533686001 MS										
Radium-226	27.0	0.504		33.4	pCi/L		121	(75%-125%)		02/25/21 10:27
	Uncertainty	+/-0.348		+/-2.49						

Notes:

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

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded

QC Summary

Workorder: **533686**

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

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

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 2090241 Check-list

This check-list was completed on 23-FEB-21 by Nat Long

This batch was reviewed by Kenshalla Oston on 23-FEB-21 and Nat Long on 23-FEB-21.

Batch ID:	**Product:**	**Description:** Gas Flow Radium 228
2090241	GFC28RAL	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 relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **2090241**
Analyst: Lois Buist (LXB3)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 5
Instrument: GFC−8949708441

Due Dates for Lab: 25−FEB−2021 **Package: 27−FEB−2021** **SDG: 01−MAR−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204749124	Radium−228 SPIKE	1965−B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Ac−228 Ingrow (date)	Ac−228 Separation (date)
1	533686001	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
2	533686002	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
3	533686003	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
4	533686004	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
5	533686005	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
6	533686006	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
7	533686007	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
8	1204749122 MB	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
9	1204749123 DUP (533686004)	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00
10	1204749124 LCS	18−FEB−2021	3	300	02/19/21 12:30	02/23/21 05:00

Reagent/Solvent Lot ID	Description	Amount
WORK 1951−B	Barium−133	.1 mL
REGNT 3141227	Glacial Acetic Acid	10 mL
REGNT 3156973	500 mg/mL Neodymium Carrier	.2 mL
REGNT 3159856	Lot #DGA0018	2 g
REGNT 3161275	RGF−Neodymium Subtrate	5 mL
REGNT 3254809.2	RGF−Hydrofluoric Acid	4 mL
REGNT 3254844	Barium Carrier Ra228 REG	1 mL
REGNT 3254859	RGF−7M Nitric Acid	25 mL
REGNT 3256667.12	Concentrated HNO3 (16M)	5 mL
REGNT 3257159	RGF−1M Citric Acid	5 mL
REGNT 3257615	RGF−1.5M Ammonium Sulfate	10 mL
REGNT 3258522	RGF−50% Potassium Carbonate	2 mL
REGNT 3260423	2M HCL	20 mL

Comments:
Pipet Id: RAD−GFC−1795419
Data Entry Date2: 18−FEB−2021 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 1951-B
Tracer Exp Date : 9/23/2021
Tracer Volume Added: 0.10

Batch : 2090241
Analyst : LOI02092
Prep Date : 2/18/2021
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

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

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	533686001.1	0.3000	1.8459E-05	1/27/2021 12:26	777.2	2.07%	716.3	2.16%	0.1	0.000200
2	533686002.1	0.3000	1.8459E-05	1/27/2021 15:56	777.2	2.07%	674.7	2.22%	0.1	0.000200
3	533686003.1	0.3000	1.8459E-05	1/27/2021 10:21	777.2	2.07%	726.0	2.14%	0.1	0.000200
4	533686004.1	0.3000	1.8459E-05	1/27/2021 16:36	777.2	2.07%	727.9	2.14%	0.1	0.000200
5	533686005.1	0.3000	1.8459E-05	1/27/2021 14:21	777.2	2.07%	738.0	2.13%	0.1	0.000200
6	533686006.1	0.3000	1.8459E-05	1/27/2021 10:21	777.2	2.07%	716.7	2.16%	0.1	0.000200
7	533686007.1	0.3000	1.8459E-05	1/27/2021 7:30	777.2	2.07%	679.3	2.22%	0.1	0.000200
8	1204749122.1	0.3000	1.8459E-05	2/18/2021 0:00	777.2	2.07%	733.5	2.13%	0.1	0.000200
9	1204749123.1	0.3000	1.8459E-05	1/27/2021 16:36	777.2	2.07%	735.5	2.13%	0.1	0.000200
10	1204749124.1	0.3000	1.8459E-05	2/18/2021 0:00	777.2	2.07%	713.6	2.16%	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

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	2A	60	7	57	0.950	2/23/2021 7:01	2/19/2021 12:30	2/23/2021 5:00	0.991	0.796	1.000	1.057	92.2%	1.52%
2	2D	60	1	87	1.450	2/23/2021 7:01	2/19/2021 12:30	2/23/2021 5:00	0.991	0.796	1.000	1.057	86.8%	1.54%
3	8A	60	11	102	1.700	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.991	0.785	1.000	1.057	93.4%	1.52%
4	8B	60	8	90	1.500	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.991	0.785	1.000	1.057	93.7%	1.52%
5	8C	60	15	62	1.033	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.991	0.785	1.000	1.057	95.0%	1.51%
6	8D	60	7	75	1.250	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.991	0.785	1.000	1.057	92.2%	1.52%
7	9A	60	6	64	1.067	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.991	0.785	1.000	1.057	87.4%	1.54%
8	9B	60	8	30	0.500	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.998	0.786	1.000	1.057	94.4%	1.51%
9	9C	60	9	63	1.050	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.991	0.786	1.000	1.057	94.6%	1.51%
10	10A	60	5	1042	17.367	2/23/2021 7:08	2/19/2021 12:30	2/23/2021 5:00	0.998	0.785	1.000	1.057	91.8%	1.52%

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	6/1/2020	5/31/2021	0.6160	0.01914	0.710	2/19/2021 18:28	500
2	PIC	6/1/2020	5/31/2021	0.5978	0.00745	1.266	2/19/2021 18:29	500
3	PIC	6/1/2020	5/31/2021	0.6340	0.01579	1.978	2/19/2021 18:34	500
4	PIC	6/1/2020	5/31/2021	0.6352	0.02148	0.566	2/19/2021 18:34	500
5	PIC	6/1/2020	5/31/2021	0.6437	0.01955	0.518	2/19/2021 18:34	500
6	PIC	6/1/2020	5/31/2021	0.6158	0.00609	0.984	2/19/2021 18:34	500
7	PIC	6/1/2020	5/31/2021	0.6275	0.00758	0.958	2/19/2021 18:34	500
8	PIC	6/1/2020	5/31/2021	0.6367	0.00754	0.788	2/19/2021 18:34	500
9	PIC	6/1/2020	5/31/2021	0.6291	0.00584	0.718	2/19/2021 18:34	500
10	PIC	6/1/2020	5/31/2021	0.6416	0.00651	0.408	2/19/2021 18:34	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

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1965-B
LCS Exp Date : 9/24/2021
LCS Activity (dpm/ml): 364.97
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	0.9504	0.6710	3	1.5191	**0.8503**	54.78%	0.2400	0.1314	0.9121	0.9372		SAMPLE				
2	1.3882	0.9801	3	2.1540	**0.7131**	88.82%	0.1840	0.1634	1.2412	1.2540		SAMPLE				
3	1.5419	1.0886	3	2.3493	**-0.9574**	64.67%	-0.2780	0.1797	1.2129	1.2130		SAMPLE				
4	0.8212	0.5797	3	1.3309	**3.2024**	17.51%	0.9340	0.1617	1.0863	1.3568		SAMPLE				
5	0.7646	0.5398	3	1.2465	**1.7198**	26.34%	0.5153	0.1351	0.8839	0.9853		SAMPLE				
6	1.1347	0.8011	3	1.7819	**0.9558**	56.79%	0.2660	0.1510	1.0635	1.0901		SAMPLE				
7	1.1595	0.8186	3	1.8233	**0.4044**	129.15%	0.1087	0.1403	1.0236	1.0286		SAMPLE				
8	0.9520	0.6721	3	1.5126	**-0.9702**	34.61%	-0.2880	0.0995	0.6573	0.6574		MB				
9	0.9238	0.6522	3	1.4757	**1.1370**	41.48%	0.3320	0.1376	0.9237	0.9667	533686004.1	DUP	95.2%			
10	0.6990	0.4935	3	1.1588	**58.2949**	3.58%	16.9587	0.5388	3.6299	15.0551		LCS			54.7998	106.4%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
533686001	2A	60	7	57	2/23/2021 7:01	2/23/2021 8:01	PIC	2090241
533686002	2D	60	1	87	2/23/2021 7:01	2/23/2021 8:01	PIC	2090241
533686003	8A	60	11	102	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241
533686004	8B	60	8	90	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241
533686005	8C	60	15	62	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241
533686006	8D	60	7	75	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241
533686007	9A	60	6	64	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241
1204749122	9B	60	8	30	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241
1204749123	9C	60	9	63	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241
1204749124	10A	60	5	1042	2/23/2021 7:08	2/23/2021 8:08	PIC	2090241

ASSAY 23-Feb-21 5:58:04

Protocol	id	9	Ba-133_1
Time	limit		
Count	limit		
Isotope	Ba-133_1		
Protocol	date	2/23/2021	
Run	id.	2935	

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	92	1	180	2332	777.2	2.07		05:58:04
533686001	2	92	2	180	2149	716.27	2.16	92.16	06:01:18
533686002	3	92	3	180	2024.5	674.71	2.22	86.81	06:04:32
533686003	4	92	4	180	2178.5	726.04	2.14	93.42	06:07:45
533686004	5	92	5	180	2184	727.87	2.14	93.65	06:11:00
533686005	1	15	1	180	2214.5	738.03	2.13	94.96	06:14:49
533686006	2	15	2	180	2150.5	716.7	2.16	92.22	06:18:03
533686007	3	15	3	180	2038	679.27	2.22	87.40	06:21:17
1204749122	4	15	4	180	2201	733.54	2.13	94.38	06:24:30
1204749123	5	15	5	180	2207	735.53	2.13	94.64	06:27:45
1204749124	1	10	1	180	2141	713.56	2.16	91.81	06:31:32

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 23-Feb-2021

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

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
G5400W1X	Above	Alpha XTalk	23-Feb 08:13	5	0.363	0.308	0.362	+3.12
LB4100E1	Above	Alpha bkg	23-Feb 04:35	60	0.350	-5.45E-2	0.290	+4.05
LB4100E1	Above	Alpha XTalk	23-Feb 05:44	5	0.226	0.186	0.223	+3.51
LB4100E1	Above	Beta bkg	23-Feb 04:35	60	2.883	0.697	2.033	+6.82
LB4100E2	Above	Alpha bkg	23-Feb 04:35	60	0.317	-7.23E-2	0.347	+2.57
LB4100E2	Above	Alpha eff	23-Feb 05:44	5	10165	5862	9452	+4.19
LB4100E2	Below	Alpha XTalk	23-Feb 05:44	5	0.308	0.310	0.521	-3.07
LB4100E2	Above	Beta bkg	23-Feb 04:35	60	3.267	0.950	2.756	+4.70
LB4100F1	Below	Alpha eff	23-Feb 05:44	5	9150	9391	10270	-4.65
LB4100F1	Above	Alpha XTalk	23-Feb 05:44	5	0.291	0.249	0.283	+4.39
LB4100F1	Above	Beta bkg	23-Feb 04:35	60	48.750	0.531	1.960	+199.43
LB4100F2	Above	Alpha eff	23-Feb 05:44	5	6466	4005	5977	+4.49
LB4100F2	Above	Beta bkg	23-Feb 04:35	60	5.367	0.560	1.903	+18.47
LB4100F4	Above	Alpha eff	23-Feb 05:44	5	10606	5228	9812	+4.04
LB4100F4	Below	Alpha XTalk	23-Feb 05:44	5	0.391	0.395	0.744	-3.07
LB4100G1	need 2nd	Beta bkg	23-Feb 04:35	60	1.400	0.375	1.637	+1.87
LB4100G1	Below	Beta eff	23-Feb 05:44	5	12882	14840	16920	-8.65
LB4100G2	Above	Beta bkg	23-Feb 04:35	60	16.017	0.721	1.648	+96.03
LB4100G2	Below	Beta eff	23-Feb 05:44	5	13584	15480	16780	-11.75
LB4100G3	Above	Beta bkg	23-Feb 04:35	60	7.250	0.810	1.674	+41.72
LB4100G3	Below	Beta eff	23-Feb 05:44	5	19599	21640	22870	-12.96
LB4100G4	Below	Alpha eff	23-Feb 05:37	5	8817	9308	10630	-5.23
LB4100G4	Below	Beta eff	23-Feb 05:44	5	16125	17350	19580	-6.30
LB4100H3	Above	Alpha XTalk	23-Feb 05:37	5	0.325	0.263	0.323	+3.17
LB4100I2	Above	Beta bkg	23-Feb 04:35	60	6.417	0.454	2.413	+15.26
LB4100I4	Above	Beta bkg	23-Feb 04:35	60	3.133	0.543	1.279	+18.11
PIC1A	Above	Beta bkg	23-Feb 04:46	60	3.283	-3.35E-1	1.820	+7.08
PIC1A	Above	Beta XTalk	23-Feb 04:39	5	0.005	5.23E-5	0.002	+10.45
PIC1B	Below	Alpha eff	23-Feb 09:39	5	12165	12390	12960	-5.37
PIC1B	need 2nd	Alpha XTalk	23-Feb 09:39	5	0.293	0.262	0.294	+2.94

PIC1C	Below	Beta XTalk	23-Feb 04:39	5	0.001	0.005	0.023	-4.34
PIC1D	Below	Beta XTalk	23-Feb 04:39	5	0.003	0.003	0.017	-3.42
PIC3B	Above	Alpha XTalk	23-Feb 04:39	5	0.315	0.294	0.314	+3.08
PIC3B	Above	Beta bkg	23-Feb 05:52	60	2.267	0.712	2.376	+2.61
PIC3D	Below	Alpha eff	23-Feb 06:10	5	9891	9922	10450	-3.36
PIC3D	need 2nd	Beta eff	23-Feb 04:32	5	21727	21700	23960	-2.93
PIC4B	Below	Alpha eff	23-Feb 05:53	5	7669	7809	8291	-4.74
PIC4B	Above	Alpha XTalk	23-Feb 05:53	5	0.412	0.324	0.381	+6.21
PIC4B	need 2nd	Beta eff	23-Feb 04:32	5	20284	19870	21320	-1.29
PIC7D	Below	Alpha eff	23-Feb 06:27	5	10278	10290	10740	-3.16
PIC7D	Above	Alpha XTalk	23-Feb 06:27	5	0.287	0.254	0.287	+3.01
PIC10D	Below	Beta eff	23-Feb 06:35	5	40775	40840	42100	-3.31
PIC11B	Below	Alpha eff	23-Feb 05:21	5	12237	12240	13620	-3.01
PIC11B	Above	Alpha XTalk	23-Feb 05:21	5	0.292	0.259	0.287	+4.06
PIC11C	need 2nd	Alpha eff	23-Feb 05:21	5	9201	9106	9744	-2.10
PIC11C	Above	Alpha XTalk	23-Feb 05:21	5	0.303	0.271	0.303	+3.17
PIC11C	Above	Beta bkg	23-Feb 05:30	60	1.283	-4.01E-2	1.234	+3.23
PIC12B	Above	Beta bkg	23-Feb 05:30	60	2.117	0.134	1.989	+3.41
PIC13B	Above	Alpha XTalk	23-Feb 05:13	5	0.286	0.265	0.285	+3.14
PIC14B	Above	Beta bkg	23-Feb 05:31	60	12.267	-4.73E-1	2.580	+22.04
PIC14C	Above	Alpha XTalk	23-Feb 05:13	5	0.332	0.269	0.320	+4.46

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

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

PIC13C Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by R. Beck-Harmon

Date 2-23-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 2090241**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
533686001	SAMPLE	LXB3	PIC2A	FEB-23-21 07:01:13	DONE	25mm Filter	01-JUN-20 00:00
533686002	SAMPLE	LXB3	PIC2D	FEB-23-21 07:01:15	DONE	25mm Filter	01-JUN-20 00:00
1204749122	MB	LXB3	PIC9B	FEB-23-21 07:08:26	DONE	25mm Filter	01-JUN-20 00:00
1204749123	DUP	LXB3	PIC9C	FEB-23-21 07:08:29	DONE	25mm Filter	01-JUN-20 00:00
1204749124	LCS	LXB3	PIC10A	FEB-23-21 07:08:32	DONE	25mm Filter	01-JUN-20 00:00
533686003	SAMPLE	LXB3	PIC8A	FEB-23-21 07:08:36	DONE	25mm Filter	01-JUN-20 00:00
533686004	SAMPLE	LXB3	PIC8B	FEB-23-21 07:08:40	DONE	25mm Filter	01-JUN-20 00:00
533686005	SAMPLE	LXB3	PIC8C	FEB-23-21 07:08:44	DONE	25mm Filter	01-JUN-20 00:00
533686006	SAMPLE	LXB3	PIC8D	FEB-23-21 07:08:47	DONE	25mm Filter	01-JUN-20 00:00
533686007	SAMPLE	LXB3	PIC9A	FEB-23-21 07:08:52	DONE	25mm Filter	01-JUN-20 00:00

Lucas Cell Raw Data

Batch 2087787 Check-list

This check-list was completed on 25-FEB-21 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 25-FEB-21 and Lyndsey Pace on 25-FEB-21.

Batch ID: 2087787

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	Yes		
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 and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−226 in Liquid

Batch ID: **2087787**
Analyst: Michael Hance (MXH8)
Method: EPA 903.1 Modified
Lab SOP: GL−RAD−A−008 REV# 15
Instrument: GFC−18150253

Due Dates for Lab: 25−FEB−2021 **Package: 27−FEB−2021** **SDG: 01−MAR−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204744921	Radium−226 SPIKE	1715−E	.1	mL
MS	1204744920	Radium−226 SPIKE	1715−E	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	533686001	22−FEB−2021	1	500	02/22/21 11:30	508	02/25/21 07:03	02/25/21 09:55	4	17
2	533686002	22−FEB−2021	1	500	02/22/21 11:30	602	02/25/21 07:03	02/25/21 09:55	1	8
3	533686003	22−FEB−2021	1	500	02/22/21 11:30	706	02/25/21 07:03	02/25/21 09:55	5	16
4	533686004	22−FEB−2021	1	500	02/22/21 11:30	804	02/25/21 07:03	02/25/21 09:55	4	19
5	533686005	22−FEB−2021	1	500	02/22/21 11:30	103	02/25/21 07:45	02/25/21 10:27	1	7
6	533686006	22−FEB−2021	1	500	02/22/21 11:30	208	02/25/21 07:45	02/25/21 10:27	4	11
7	533686007	22−FEB−2021	1	500	02/22/21 11:30	302	02/25/21 07:45	02/25/21 10:27	3	11
8	1204744918 MB	22−FEB−2021	1	500	02/22/21 11:30	403	02/25/21 07:45	02/25/21 10:27	6	11
9	1204744919 DUP (533686001)	22−FEB−2021	1	500	02/22/21 11:30	507	02/25/21 07:45	02/25/21 10:27	3	14
10	1204744920 MS (533686001)	22−FEB−2021	1	500	02/22/21 11:30	701	02/25/21 07:45	02/25/21 10:27	3	701
11	1204744921 LCS	22−FEB−2021	1	500	02/22/21 11:30	805	02/25/21 07:45	02/25/21 10:27	1	547

Reagent/Solvent Lot ID	Description	Amount

Comments:
Spike Pipet ID: RAD−RA226−2766953
Bkg Count Time: 30 Minutes
Sample Count Time: 30 Minutes
Data Entry Date2: 22−FEB−2021 00:00

Radium-226 Liquid

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

Batch : 2087787
Analyst : MIC02086
Prep Date : 2/22/2021
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					Count Raw Data							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	533686001.1	0.5000	2.0256E-05	1/27/2021 12:26	508	30	17	0.567	4	0.133	30	1.9840
2	533686002.1	0.5000	2.0256E-05	1/27/2021 15:56	602	30	8	0.267	1	0.033	30	1.8180
3	533686003.1	0.5000	2.0256E-05	1/27/2021 10:21	706	30	16	0.533	5	0.167	30	1.6160
4	533686004.1	0.5000	2.0256E-05	1/27/2021 16:36	804	30	19	0.633	4	0.133	30	1.4660
5	533686005.1	0.5000	2.0256E-05	1/27/2021 14:21	103	30	7	0.233	1	0.033	30	1.7371
6	533686006.1	0.5000	2.0256E-05	1/27/2021 10:21	208	30	11	0.367	4	0.133	30	1.7960
7	533686007.1	0.5000	2.0256E-05	1/27/2021 7:30	302	30	11	0.367	3	0.100	30	1.6180
8	1204744918.1	0.5000	2.0256E-05	2/22/2021 0:00	403	30	11	0.367	6	0.200	30	1.8570
9	1204744919.1	0.5000	2.0256E-05	1/27/2021 12:26	507	30	14	0.467	3	0.100	30	2.0600
10	1204744920.1	0.5000	2.0256E-05	1/27/2021 12:26	701	30	701	23.367	3	0.100	30	1.5950
11	1204744921.1	0.5000	2.0256E-05	2/22/2021 0:00	805	30	547	18.233	1	0.033	30	1.4670

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			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
3.800%	6/2/2020	5/31/2021	2/22/2021 11:30	2/25/2021 7:03	2/25/2021 9:55	0.400	0.979	1.002	1.000
2.600%	7/2/2020	6/30/2021	2/22/2021 11:30	2/25/2021 7:03	2/25/2021 9:55	0.400	0.979	1.002	1.000
9.200%	11/1/2020	10/31/2021	2/22/2021 11:30	2/25/2021 7:03	2/25/2021 9:55	0.400	0.979	1.002	1.000
4.700%	3/31/2020	3/31/2021	2/22/2021 11:30	2/25/2021 7:03	2/25/2021 9:55	0.400	0.979	1.002	1.000
6.833%	5/1/2020	4/30/2021	2/22/2021 11:30	2/25/2021 7:45	2/25/2021 10:27	0.403	0.980	1.002	1.000
6.200%	8/1/2020	7/31/2021	2/22/2021 11:30	2/25/2021 7:45	2/25/2021 10:27	0.403	0.980	1.002	1.000
9.600%	1/1/2021	12/31/2021	2/22/2021 11:30	2/25/2021 7:45	2/25/2021 10:27	0.403	0.980	1.002	1.000
8.000%	2/1/2021	1/31/2022	2/22/2021 11:30	2/25/2021 7:45	2/25/2021 10:27	0.403	0.980	1.002	1.000
2.300%	6/2/2020	5/31/2021	2/22/2021 11:30	2/25/2021 7:45	2/25/2021 10:27	0.403	0.980	1.002	1.000
3.400%	11/1/2020	10/31/2021	2/22/2021 11:30	2/25/2021 7:45	2/25/2021 10:27	0.403	0.980	1.002	1.000
6.300%	3/31/2020	3/31/2021	2/22/2021 11:30	2/25/2021 7:45	2/25/2021 10:27	0.403	0.980	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-E
Spike Exp Date : 5/21/2021
Spike Activity (dpm/ml): 300.20
Spike Volume Added: 0.10

LCS S/N : 1715-E
LCS Exp Date : 5/21/2021
LCS Activity (dpm/ml): 300.20
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	0.2555	0.1804	1	0.4772	**0.5041**	35.45%	0.4333	0.1528	0.3483	0.3578		SAMPLE				
2	0.1394	0.0984	1	0.3238	**0.2962**	42.94%	0.2333	0.1000	0.2488	0.2529		SAMPLE				
3	0.3508	0.2476	1	0.6381	**0.5237**	42.66%	0.3667	0.1528	0.4276	0.4444		SAMPLE				
4	0.3458	0.2442	1	0.6458	**0.7872**	32.32%	0.5000	0.1599	0.4933	0.5114		SAMPLE				
5	0.1446	0.1021	1	0.3358	**0.2633**	47.63%	0.2000	0.0943	0.2433	0.2487		SAMPLE				
6	0.2797	0.1975	1	0.5223	**0.2971**	55.67%	0.2333	0.1291	0.3222	0.3270		SAMPLE				
7	0.2689	0.1898	1	0.5210	**0.3769**	47.75%	0.2667	0.1247	0.3455	0.3569		SAMPLE				
8	0.3313	0.2339	1	0.5910	**0.2052**	82.85%	0.1667	0.1374	0.3317	0.3346		MB				
9	0.2112	0.1491	1	0.4092	**0.4071**	37.55%	0.3667	0.1374	0.2991	0.3053	533686001.1	DUP	21.3%			
10	0.2728	0.1926	1	0.5286	**33.3605**	5.10%	23.2667	0.8844	2.4855	5.8575	533686001.1	MS			27.0462	121.5%
11	0.1712	0.1209	1	0.3977	**28.3718**	7.62%	18.2000	0.7803	2.3842	5.8933		LCS			27.0454	104.9%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 25-FEB-2021

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:09	1	1.23E+05	122523	-1.11		
LUCAS2	EFF	06:07	1	1.31E+05	130848	-1.24		
LUCAS3	EFF	06:05	1	1.32E+05	132066	-1.29		
LUCAS4	EFF	06:03	1	1.27E+05	127386	-0.6		
LUCAS5	EFF	06:02	1	1.29E+05	129354	-1.63		
LUCAS6	EFF	06:00	1	1.32E+05	131733	-0.89		
LUCAS7	EFF	05:59	1	1.29E+05	129030	-1.38		
LUCAS8	EFF	05:56	1	1.24E+05	124273	-0.72		

Reviewed by: Lyndsey Pace **Date:** 25-FEB-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 2087787**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
533686001	SAMPLE	MXH8	LUCAS5	FEB-25-21 09:55:00	DONE	Lucas Cell	02-JUN-20 00:00
533686002	SAMPLE	MXH8	LUCAS6	FEB-25-21 09:55:00	DONE	Lucas Cell	02-JUL-20 00:00
533686003	SAMPLE	MXH8	LUCAS7	FEB-25-21 09:55:00	DONE	Lucas Cell	01-NOV-20 00:00
533686004	SAMPLE	MXH8	LUCAS8	FEB-25-21 09:55:00	DONE	Lucas Cell	31-MAR-20 00:00
533686005	SAMPLE	MXH8	LUCAS1	FEB-25-21 10:27:00	DONE	Lucas Cell	01-MAY-20 00:00
533686006	SAMPLE	MXH8	LUCAS2	FEB-25-21 10:27:00	DONE	Lucas Cell	01-AUG-20 00:00
533686007	SAMPLE	MXH8	LUCAS3	FEB-25-21 10:27:00	DONE	Lucas Cell	01-JAN-21 00:00
1204744918	MB	MXH8	LUCAS4	FEB-25-21 10:27:00	DONE	Lucas Cell	01-FEB-21 00:00
1204744919	DUP	MXH8	LUCAS5	FEB-25-21 10:27:00	DONE	Lucas Cell	02-JUN-20 00:00
1204744920	MS	MXH8	LUCAS7	FEB-25-21 10:27:00	DONE	Lucas Cell	01-NOV-20 00:00
1204744921	LCS	MXH8	LUCAS8	FEB-25-21 10:27:00	DONE	Lucas Cell	31-MAR-20 00:00

Analytical Laboratory Report

Final Report

Report ID: S23822.01(02)
Generated on 06/07/2021
Replaces report S23822.01(01) generated on 05/07/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S23822.01-S23822.08
Project: Erickson AM MI Sampling #1
Collected Date(s): 05/04/2021
Submitted Date/Time: 05/05/2021 09:30
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

All Metal Results Are Reported As Total

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (8 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S23822.01	MW-1 L105020-01	Groundwater	05/04/21 13:45
S23822.02	MW-2 L105020-02	Groundwater	05/04/21 17:02
S23822.03	MW-3 L105020-03	Groundwater	05/04/21 09:58
S23822.04	MW-4 L105020-04	Groundwater	05/04/21 11:26
S23822.05	MW-5 L105020-05	Groundwater	05/04/21 17:40
S23822.06	MW-6 L105020-06	Groundwater	05/04/21 15:21
S23822.07	Field Dupe MW-4 L105020-07	Groundwater	05/04/21 11:26
S23822.08	Field Blank L105020-08	Water	05/04/21 07:00

Lab Sample ID: S23822.01
Sample Tag: MW-1 L105020-01
Collected Date/Time: 05/04/2021 13:45
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 13:17, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	48	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	65	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	760	20	2	mg/L	2		

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	14	3	1	mg/L	1.67		

Metals

Method: E200.8, Run Date: 05/06/21 14:50, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	156	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 05/06/21 12:48, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.005	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.113	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.19	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	4.84	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.015	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S23822.01 (continued)

Sample Tag: MW-1 L105020-01

Method: E200.8, Run Date: 05/06/21 12:48, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:12, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S23822.02
Sample Tag: MW-2 L105020-02
Collected Date/Time: 05/04/2021 17:02
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 13:27, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 05/05/21 15:18, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	77	25	0.32	mg/L	25	16887-00-6	
Sulfate	505	25	2.6	mg/L	25	14808-79-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,250	20	2	mg/L	2		

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	12	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 05/06/21 14:56, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	254	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 05/06/21 12:51, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.041	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	5.04	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.55	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.061	0.010	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S23822.02 (continued)

Sample Tag: MW-2 L105020-02

Method: E200.8, Run Date: 05/06/21 12:51, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.009	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.025	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:13, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S23822.03
Sample Tag: MW-3 L105020-03
Collected Date/Time: 05/04/2021 09:58
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 13:37, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 05/05/21 15:28, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	89	50	0.65	mg/L	50	16887-00-6	
Sulfate	698	50	5.2	mg/L	50	14808-79-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,490	20	2	mg/L	2		

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	3	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 05/06/21 14:58, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	243	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 05/06/21 12:54, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.021	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	5.41	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	2.01	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.077	0.010	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S23822.03 (continued)

Sample Tag: MW-3 L105020-03

Method: E200.8, Run Date: 05/06/21 12:54, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.162	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:25, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S23822.04
Sample Tag: MW-4 L105020-04
Collected Date/Time: 05/04/2021 11:26
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 13:47, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	72	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	56	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	532	20	2	mg/L	2		

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	1	3	1	mg/L	1.00		b

Metals

Method: E200.8, Run Date: 05/06/21 15:01, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	102	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 05/06/21 12:59, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.156	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.23	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S23822.04 (continued)

Sample Tag: MW-4 L105020-04

Method: E200.8, Run Date: 05/06/21 12:59, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:27, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S23822.05
Sample Tag: MW-5 L105020-05
Collected Date/Time: 05/04/2021 17:40
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 15:38, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	581	50	5.2	mg/L	50	14808-79-8	

Method: E300.0, Run Date: 05/05/21 13:57, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	73	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,230	20	2	mg/L	2		

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	8	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 05/06/21 15:03, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	221	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 05/06/21 13:02, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.002	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.038	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	3.66	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.90	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.073	0.010	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S23822.05 (continued)
Sample Tag: MW-5 L105020-05

Method: E200.8, Run Date: 05/06/21 13:02, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.050	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.010	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:29, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S23822.06
Sample Tag: MW-6 L105020-06
Collected Date/Time: 05/04/2021 15:21
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 15:48, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	133	10	1.0	mg/L	10	14808-79-8	

Method: E300.0, Run Date: 05/05/21 14:07, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	27	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	658	20	2	mg/L	2		

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 05/06/21 15:06, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	149	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 05/06/21 13:05, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.044	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.64	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.048	0.010	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S23822.06 (continued)
Sample Tag: MW-6 L105020-06

Method: E200.8, Run Date: 05/06/21 13:05, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.024	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.006	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:31, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S23822.07
Sample Tag: Field Dupe MW-4 L105020-07
Collected Date/Time: 05/04/2021 11:26
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 14:18, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	75	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	58	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	526	20	2	mg/L	2		

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 05/06/21 15:09, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	107	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 05/06/21 13:08, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.007	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.156	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.27	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.011	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S23822.07 (continued)

Sample Tag: Field Dupe MW-4 L105020-07

Method: E200.8, Run Date: 05/06/21 13:08, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:32, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S23822.08
Sample Tag: Field Blank L105020-08
Collected Date/Time: 05/04/2021 07:00
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	125ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/06/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	05/06/21 10:50	CCM	

Inorganics

Method: E300.0, Run Date: 05/05/21 14:28, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 05/05/21 22:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		b

Method: SM2540D, Run Date: 05/06/21 19:00, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 05/06/21 14:49, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 05/06/21 12:40, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.010	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S23822.08 (continued)

Sample Tag: Field Blank L105020-08

Method: E200.8, Run Date: 05/06/21 12:40, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 05/06/21 14:34, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 06/04/21 10:45, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID: S23822
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI Sampling #1
Submitted: 05/05/2021 09:30 Login User: SRS

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 2.3
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL UPS# 1Z4664770363100948
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S23822 Submitted: 05/05/2021 09:30
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI Sampling #1

Initial Preservation Check: 05/05/2021 09:49 SRS
Preservation Recheck (E200.8): 05/06/2021 14:09 SRS

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S23822.01	125ml Plastic HNO3	<2			
S23822.01	1L Plastic HNO3	<2			
S23822.01	1L Plastic HNO3	<2			
S23822.02	125ml Plastic HNO3	<2			
S23822.02	1L Plastic HNO3	<2			
S23822.02	1L Plastic HNO3	<2			
S23822.03	125ml Plastic HNO3	5	0.5	<2	Lot# 258255
S23822.03	1L Plastic HNO3	<2			
S23822.03	1L Plastic HNO3	<2			
S23822.04	125ml Plastic HNO3	<2			
S23822.04	1L Plastic HNO3	<2			
S23822.04	1L Plastic HNO3	<2			
S23822.05	125ml Plastic HNO3	<2			
S23822.05	1L Plastic HNO3	<2			
S23822.05	1L Plastic HNO3	<2			
S23822.06	125ml Plastic HNO3	<2			
S23822.06	1L Plastic HNO3	<2			
S23822.06	1L Plastic HNO3	<2			
S23822.07	125ml Plastic HNO3	<2			
S23822.07	1L Plastic HNO3	<2			
S23822.07	1L Plastic HNO3	<2			
S23822.08	125ml Plastic HNO3	<2			
S23822.08	1L Plastic HNO3	<2			
S23822.08	1L Plastic HNO3	<2			

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI Sampling # 1
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☒ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Special Instructions
23822.01	05/04/21	1345	MW-1 L105020-01	GW	5	3		2					✓	✓	✓	✓	✓	Metals to analyse:
.02		1702	MW-2 -02	GW	5	3		2					✓	✓	✓	✓	✓	B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		0958	MW-3 -03	GW	5	3		2					✓	✓	✓	✓	✓	Co, Li, Hg, Mo, Pb, Se, Tl,
.04		1126	MW-4 -04	GW	5	3		2					✓	✓	✓	✓	✓	Fe, Cu, Ni, Ag, V, Zn
.05		1740	MW-5 -05	GW	5	3		2					✓	✓	✓	✓	✓	Please send a preliminary report
.06		1521	MW-6 -06	GW	5	3		2					✓	✓	✓	✓	✓	
.07		1126	Field Dupe MW-4 -07	GW	5	3		2					✓	✓	✓	✓	✓	
.08		0700	Field Blank -08	DI	5	3		2					✓	✓	✓	✓	✓	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	☒ Sampler	DATE: 5-5-21	TIME: 0930
RECEIVED BY: SIGNATURE/ORGANIZATION	Sam Smith	DATE: 5/5/21	TIME: 0930
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE:	TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE:	TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE:	TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE:	TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 2.3

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

June 03, 2021

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 543765
SDG: S23822

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 07, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4523.

Sincerely,

Samuel Hogan
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S23822
Work Order: 543765

June 03, 2021

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on May 07, 2021 for analysis. 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.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
543765001	S23822.01
543765002	S23822.02
543765003	S23822.03
543765004	S23822.04
543765005	S23822.05
543765006	S23822.06
543765007	S23822.07
543765008	S23822.08 (Field Blank)

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

Samuel Hogan
Project Manager

Chain of Custody and Supporting Documentation

543765

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague | ☒ SAME
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S23822 | SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐1 DAY ☐2 DAYS ☐3 DAYS ☒STANDARD ☐OTHER

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☐LEVEL III ☒LEVEL IV ☐EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☐NPDES
Project Locations: ☐Detroit ☐New York ☐Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**
	5/4	1345	S23822.01	GW	2			2					✓	✓
	5/4	1702	S23822.02	GW	2			2					✓	✓
	5/4	0958	S23822.03	GW	2			2					✓	✓
	5/4	1126	S23822.04	GW	2			2					✓	✓
	5/4	1740	S23822.05	GW	2			2					✓	✓
	5/4	1521	S23822.06	GW	2			2					✓	✓
	5/4	1126	S23822.07	GW	2			2					✓	✓
	5/4	0700	S23822.08 (Field Blank)	L	2			2					✓	✓

Special Instructions:
* E903.1 Mod.
** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report

(No Ice needed)

** Subcontracted to GEL Laboratories, Inc. 2040 Savage Road Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Jon Smith ☐Sampler	DATE: 5/5/21	TIME: 1700	
RECEIVED BY: SIGNATURE/ORGANIZATION: UPS	DATE: 5/5/21	TIME: 1700	
RELINQUISHED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:	
RECEIVED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:	

RELINQUISHED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:	
RECEIVED BY: SIGNATURE/ORGANIZATION:	DATE: 5/7/21	TIME: 1020	

SEAL NO. | SEAL INTACT YES☐ NO☐ | INITIALS
SEAL NO. | SEAL INTACT YES☐ NO☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 2°

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	**SDG/AR/COC/Work Order:** 543765
Received By:	**Date Received:** 5/7/21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 1Z4664770363100948

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?		X	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?		X	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
D) Did the client designate samples are hazardous?		X	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		X	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?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	X			Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		X		Preservation Method: Wet Ice Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius **TEMP:** 21.
4	Daily check performed and passed on IR temperature gun?	X			**Temperature Device Serial #:** IR1-21 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	X			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			X	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?	X			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	X			ID's and containers affected:
10	Date & time on COC match date & time on bottles?	X			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?	X			Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?			X	
13	COC form is properly signed in relinquished/received sections?	X			Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials NEG Date 5/10/21 Page 1 of 1

GL-CHL-SR-001 Rev 7

Laboratory Certifications

List of current GEL Certifications as of 03 June 2021

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122021−35
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S23822
Work Order #: 543765

Product: **GFPC Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2128473

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

GEL Sample ID#	Client Sample Identification
543765001	S23822.01
543765002	S23822.02
543765003	S23822.03
543765004	S23822.04
543765005	S23822.05
543765006	S23822.06
543765007	S23822.07
543765008	S23822.08 (Field Blank)
1204822402	Method Blank (MB)
1204822403	543765004(S23822.04) Sample Duplicate (DUP)
1204822404	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
1204822403 (S23822.04DUP)	Radium-228	RPD 105* (0.0%-100.0%) RER 2.1 (0-3)

Product: **Lucas Cell, Ra226, Liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2125740

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

GEL Sample ID#	Client Sample Identification
543765001	S23822.01
543765002	S23822.02
543765003	S23822.03
543765004	S23822.04
543765005	S23822.05
543765006	S23822.06
543765007	S23822.07
543765008	S23822.08 (Field Blank)
1204816776	Method Blank (MB)
1204816777	543921003(NonSDG) Sample Duplicate (DUP)
1204816778	543921003(NonSDG) Matrix Spike (MS)
1204816779	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, 1204816778 (Non SDG 543921003MS), 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

MERI001 Merit Laboratories, Inc.

Client SDG: S23822 GEL Work Order: 543765

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: Kenshalla Oston **Name: Kenshalla Oston**

Date: 03 JUN 2021 **Title: Analyst I**

Sample Data Summary

GEL LABORATORIES LLC
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Certificate of Analysis

Report Date: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S23822.01	Project:	MERI00120
Sample ID:	543765001	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	04-MAY-21 13:45		
Receive Date:	07-MAY-21		
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		3.47	+/-1.42	2.02	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		4.03	+/-1.44			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.560	+/-0.266	0.300	1.00	pCi/L			LXP1	05/17/21	1039	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			86.7	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S23822.02	Project:	MERI00120
Sample ID:	543765002	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	04-MAY-21 17:02		
Receive Date:	07-MAY-21		
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	0.150	+/-0.670	1.26	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.515	+/-0.723			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.366	+/-0.271	0.400	1.00	pCi/L			LXP1	05/17/21	1039	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			83.7	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S23822.03	Project:	MERI00120
Sample ID:	543765003	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	04-MAY-21 09:58		
Receive Date:	07-MAY-21		
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	0.760	+/-0.912	1.54	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.20	+/-0.938			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.437	+/-0.220	0.197	1.00	pCi/L			LXP1	05/17/21	1039	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			82.2	(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

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Certificate of Analysis

Report Date: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S23822.04
Sample ID: 543765004
Matrix: Ground Water
Collect Date: 04-MAY-21 11:26
Receive Date: 07-MAY-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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		2.89	+/-1.50	2.16	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		5.00	+/-1.57			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		2.12	+/-0.455	0.308	1.00	pCi/L			LXP1	05/17/21	1039	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			60.4	(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

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Certificate of Analysis

Report Date: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S23822.05	Project:	MERI00120
Sample ID:	543765005	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	04-MAY-21 17:40		
Receive Date:	07-MAY-21		
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	0.726	+/-0.797	1.33	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.08	+/-0.841			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.349	+/-0.268	0.390	1.00	pCi/L			LXP1	05/17/21	1039	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			88.8	(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

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Certificate of Analysis

Report Date: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S23822.06	Project:	MERI00120
Sample ID:	543765006	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	04-MAY-21 15:21		
Receive Date:	07-MAY-21		
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	1.13	+/-1.01	1.65	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.45	+/-1.03			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.320	+/-0.196	0.204	1.00	pCi/L			LXP1	05/17/21	1039	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			89.8	(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

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Certificate of Analysis

Report Date: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S23822.07	Project:	MERI00120
Sample ID:	543765007	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	04-MAY-21 11:26		
Receive Date:	07-MAY-21		
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	-0.910	+/-0.844	1.78	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.626	+/-0.890			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.626	+/-0.284	0.273	1.00	pCi/L			LXP1	05/17/21	1113	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			90	(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: June 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S23822.08 (Field Blank)	Project:	MERI00120
Sample ID:	543765008	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	04-MAY-21 07:00		
Receive Date:	07-MAY-21		
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	-0.361	+/-1.37	2.57	3.00	pCi/L			LXB3	05/28/21	1115	2128473	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.219	+/-1.38			pCi/L		1	AEA	06/02/21	0435	2129841	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.219	+/-0.185	0.269	1.00	pCi/L			LXP1	05/17/21	1113	2125740	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			76.4	(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

Quality Control Summary

QC Summary

Report Date: June 3, 2021

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **543765**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 2128473										
QC1204822403 543765004 DUP										
Radium-228		2.89	U	0.897	pCi/L	105*		(0% - 100%)	LXB3	05/28/21 11:14
	Uncertainty	+/-1.50		+/-0.785						
QC1204822404 LCS										
Radium-228	17.7			20.8	pCi/L		118	(75%-125%)		05/28/21 11:15
	Uncertainty			+/-1.45						
QC1204822402 MB										
Radium-228			U	0.0790	pCi/L					05/28/21 11:14
	Uncertainty			+/-0.439						
Rad Ra-226										
Batch 2125740										
QC1204816777 543921003 DUP										
Radium-226		0.296		0.454	pCi/L	42.2		(0% - 100%)	LXP1	05/17/21 11:46
	Uncertainty	+/-0.188		+/-0.174						
QC1204816779 LCS										
Radium-226	16.9			13.9	pCi/L		82	(75%-125%)		05/17/21 11:46
	Uncertainty			+/-0.958						
QC1204816776 MB										
Radium-226			U	0.0308	pCi/L					05/17/21 11:46
	Uncertainty			+/-0.0954						
QC1204816778 543921003 MS										
Radium-226	135	0.296		114	pCi/L		83.9	(75%-125%)		05/17/21 11:46
	Uncertainty	+/-0.188		+/-7.64						

Notes:

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

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded

QC Summary

Workorder: **543765**

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

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

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 2128473 Check-list

This check-list was completed on 28-MAY-21 by Nat Long

This batch was reviewed by Nat Long on 28-MAY-21 and Kenshalla Oston on 01-JUN-21.

Batch ID: 2128473

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	Yes		
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 relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?		No	
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **2128473**
Analyst: Lois Buist (LXB3)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 5
Instrument: GFC−8949708441

Due Dates for Lab: 01−JUN−2021 **Package: 05−JUN−2021** **SDG: 03−JUN−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204822404	Radium−228 SPIKE	1965−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	543765001	25−MAY−2021	3	300.32	300.32	05/26/21 13:22	05/28/21 09:37
2	543765002	25−MAY−2021	3	298.47	298.47	05/26/21 13:22	05/28/21 09:37
3	543765003	25−MAY−2021	3	299.51	299.51	05/26/21 13:22	05/28/21 09:37
4	543765004	25−MAY−2021	3	298.23	298.23	05/26/21 13:22	05/28/21 09:37
5	543765005	25−MAY−2021	3	304.67	304.67	05/26/21 13:22	05/28/21 09:37
6	543765006	25−MAY−2021	3	297.85	297.85	05/26/21 13:22	05/28/21 09:37
7	543765007	25−MAY−2021	3	298.81	298.81	05/26/21 13:22	05/28/21 09:37
8	543765008	25−MAY−2021	3	298.91	298.91	05/26/21 13:22	05/28/21 09:37
9	544339001	25−MAY−2021	1	901.4	901.4	05/26/21 13:22	05/28/21 09:37
10	544339002	25−MAY−2021	1	901.58	901.58	05/26/21 13:22	05/28/21 09:37
11	544521021	25−MAY−2021	1	896.81	896.81	05/26/21 13:22	05/28/21 09:37
12	544521022	25−MAY−2021	1	897.59	897.59	05/26/21 13:22	05/28/21 09:37
13	1204822402 MB	25−MAY−2021	1		901.58	05/26/21 13:22	05/28/21 09:37
14	1204822403 DUP (543765004)	25−MAY−2021	3	297.18	297.18	05/26/21 13:22	05/28/21 09:37
15	1204822404 LCS	25−MAY−2021	1		901.58	05/26/21 13:22	05/28/21 09:37

Reagent/Solvent Lot ID	Description	Amount
WORK 1951−B	Barium−133	.1 mL
REGNT 3098468	RGF−1.5M Ammonium Sulfate	10 mL
REGNT 3277416.1	Concentrated HNO3 (16M)	5 mL
REGNT 3279944	RGF−1M Citric Acid	5 mL
REGNT 3284536.3	RGF−Hydrofluoric Acid	4 mL
REGNT 3285394.1	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 3290189	RGF−7M Nitric Acid	25 mL
REGNT 3290193	Barium Carrier Ra228 REG	1 mL
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL
REGNT 3293588	RGF−Neodymium Subtrate	5 mL
REGNT 3293878	RGF−50% Potassium Carbonate	2 mL
REGNT 3294537	2M HCL	20 mL
REGNT 3298457.20	Lot #DGA0021	2 g

Comments:
Pipet Id: RAD−GFC−1795419
Data Entry Date2: 25−MAY−2021 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 1951-B
Tracer Exp Date : 9/23/2021
Tracer Volume Added: 0.10

Batch : 2128473
Analyst : LOI02092
Prep Date : 5/25/2021
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 1 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	543765001.1	0.3003	1.8464E-05	5/4/2021 13:45	692.9	2.19%	600.9	2.36%	0.1	0.000200
2	543765002.1	0.2985	1.8433E-05	5/4/2021 17:02	692.9	2.19%	579.8	2.40%	0.1	0.000200
3	543765003.1	0.2995	1.8451E-05	5/4/2021 9:58	692.9	2.19%	569.4	2.42%	0.1	0.000200
4	543765004.1	0.2982	1.8429E-05	5/4/2021 11:26	692.9	2.19%	418.8	2.82%	0.1	0.000200
5	543765005.1	0.3047	1.8537E-05	5/4/2021 17:40	692.9	2.19%	615.3	2.33%	0.1	0.000200
6	543765006.1	0.2979	1.8422E-05	5/4/2021 15:21	692.9	2.19%	622.4	2.31%	0.1	0.000200
7	543765007.1	0.2988	1.8439E-05	5/4/2021 11:26	692.9	2.19%	623.8	2.31%	0.1	0.000200
8	543765008.1	0.2989	1.8440E-05	5/4/2021 7:00	692.9	2.19%	529.1	2.51%	0.1	0.000200
9	544339001.1	0.9014	2.0764E-05	5/11/2021 10:40	692.9	2.19%	557.1	2.45%	0.1	0.000200
10	544339002.1	0.9016	2.0764E-05	5/11/2021 12:00	692.9	2.19%	512.1	2.55%	0.1	0.000200
11	544521021.1	0.8968	2.0774E-05	5/12/2021 13:38	692.9	2.19%	465.8	2.68%	0.1	0.000200
12	544521022.1	0.8976	2.0773E-05	5/12/2021 12:00	692.9	2.19%	468.4	2.67%	0.1	0.000200
13	1204822402.1	0.9016	2.0764E-05	5/25/2021 0:00	692.9	2.19%	519.6	2.53%	0.1	0.000200
14	1204822403.1	0.2972	1.8411E-05	5/4/2021 11:26	692.9	2.19%	602.9	2.35%	0.1	0.000200
15	1204822404.1	0.9016	2.0764E-05	5/25/2021 0:00	692.9	2.19%	536.4	2.49%	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

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	1A	60	6	130	2.167	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.832	0.993	1.057	86.7%	1.63%
2	1B	60	1	28	0.467	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.831	0.993	1.057	83.7%	1.65%
3	1C	60	2	46	0.767	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.831	0.993	1.057	82.2%	1.66%
4	1D	60	4	72	1.200	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.831	0.993	1.057	60.4%	1.81%
5	2A	60	5	45	0.750	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.831	0.993	1.057	88.8%	1.62%
6	2B	60	7	73	1.217	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.831	0.993	1.057	89.8%	1.62%
7	2C	60	15	46	0.767	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.831	0.993	1.057	90.0%	1.62%
8	2D	60	10	86	1.433	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.992	0.831	0.993	1.057	76.4%	1.69%
9	3C	60	1	50	0.833	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.994	0.831	0.993	1.057	80.4%	1.67%
10	4A	60	3	105	1.750	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.994	0.831	0.993	1.057	73.9%	1.70%
11	4B	60	2	36	0.600	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.995	0.830	0.993	1.057	67.2%	1.75%
12	4C	60	14	52	0.867	5/28/2021 11:16	5/26/2021 13:22	5/28/2021 9:37	0.995	0.830	0.993	1.057	67.6%	1.75%
13	4D	60	12	74	1.233	5/28/2021 11:14	5/26/2021 13:22	5/28/2021 9:37	0.999	0.832	0.993	1.057	75.0%	1.70%
14	5D	60	2	45	0.750	5/28/2021 11:14	5/26/2021 13:22	5/28/2021 9:37	0.992	0.832	0.993	1.057	87.0%	1.63%
15	6A	60	8	938	15.633	5/28/2021 11:15	5/26/2021 13:22	5/28/2021 9:37	0.999	0.832	0.993	1.057	77.4%	1.68%

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	6/1/2020	5/31/2021	0.6059	0.00738	1.224	5/21/2021 17:01	500
2	PIC	6/1/2020	5/31/2021	0.6327	0.00711	0.426	5/21/2021 17:01	500
3	PIC	6/1/2020	5/31/2021	0.5993	0.00847	0.574	5/21/2021 17:01	500
4	PIC	6/1/2020	5/31/2021	0.6146	0.00692	0.650	5/21/2021 17:01	500
5	PIC	6/1/2020	5/31/2021	0.6160	0.01914	0.542	5/21/2021 17:01	500
6	PIC	6/1/2020	5/31/2021	0.6250	0.02111	0.892	5/21/2021 17:02	500
7	PIC	6/1/2020	5/31/2021	0.6118	0.01274	1.024	5/21/2021 17:04	500
8	PIC	6/1/2020	5/31/2021	0.5978	0.00745	1.518	5/21/2021 17:04	500
9	PIC	6/1/2020	5/31/2021	0.6296	0.00988	0.832	5/21/2021 18:05	500
10	PIC	6/1/2020	5/31/2021	0.6297	0.01123	1.362	5/21/2021 17:05	500
11	PIC	6/1/2020	5/31/2021	0.6255	0.01519	0.524	5/21/2021 18:06	500
12	PIC	6/1/2020	5/31/2021	0.6256	0.00889	0.724	5/21/2021 18:06	500
13	PIC	6/1/2020	5/31/2021	0.5764	0.00773	1.180	5/21/2021 17:05	500
14	PIC	6/1/2020	5/31/2021	0.6511	0.00925	0.490	5/21/2021 17:05	500
15	PIC	6/1/2020	5/31/2021	0.5743	0.02228	1.160	5/21/2021 16:59	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

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1965-B
LCS Exp Date : 9/24/2021
LCS Activity (dpm/ml): 353.58
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	1.2972	0.9158	3	2.0158	**3.4721**	20.91%	0.9427	0.1964	1.4176	1.6640		SAMPLE				
2	0.7645	0.5398	3	1.2635	**0.1496**	228.44%	0.0407	0.0929	0.6700	0.6710		SAMPLE				
3	0.9508	0.6713	3	1.5397	**0.7596**	61.28%	0.1927	0.1180	0.9119	0.9316		SAMPLE				
4	1.3473	0.9512	3	2.1649	**2.8872**	26.61%	0.5500	0.1459	1.5016	1.6679		SAMPLE				
5	0.8178	0.5774	3	1.3293	**0.7258**	56.09%	0.2080	0.1166	0.7972	0.8181		SAMPLE				
6	1.0458	0.7384	3	1.6506	**1.1293**	45.83%	0.3247	0.1485	1.0126	1.0525		SAMPLE				
7	1.1387	0.8039	3	1.7845	**-0.9096**	47.36%	-0.2573	0.1218	0.8436	0.8437		SAMPLE				
8	1.6724	1.1807	3	2.5747	**-0.3610**	193.81%	-0.0847	0.1641	1.3713	1.3715		SAMPLE				
9	0.3694	0.2608	1	0.5852	**1.696E-03**	9353.34%	0.0013	0.1247	0.3110	0.3110		SAMPLE				
10	0.5141	0.3630	1	0.7952	**0.5370**	46.07%	0.3880	0.1786	0.4844	0.5029		SAMPLE				
11	0.3548	0.2505	1	0.5779	**0.1170**	138.32%	0.0760	0.1051	0.3172	0.3186		SAMPLE				
12	0.4144	0.2925	1	0.6616	**0.2182**	88.39%	0.1427	0.1261	0.3780	0.3819		SAMPLE				
13	0.5120	0.3615	1	0.7970	**0.0790**	283.84%	0.0533	0.1514	0.4393	0.4397		MB				
14	0.7688	0.5428	3	1.2581	**0.8971**	44.69%	0.2600	0.1161	0.7852	0.8169	543765004.1	DUP	105.2%	2.1004		
15	0.4937	0.3486	1	0.7691	**20.8409**	4.51%	14.4733	0.5127	1.4470	5.4974		LCS			17.6659	118.0%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
543765001	1A	60	6	130	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
543765002	1B	60	1	28	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
543765003	1C	60	2	46	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
543765004	1D	60	4	72	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
543765005	2A	60	5	45	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
543765006	2B	60	7	73	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
543765007	2C	60	15	46	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
543765008	2D	60	10	86	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
544339001	3C	60	1	50	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
544339002	4A	60	3	105	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
544521021	4B	60	2	36	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473
544521022	4C	60	14	52	5/28/2021 11:16	5/28/2021 12:16	PIC	2128473
1204822402	4D	60	12	74	5/28/2021 11:14	5/28/2021 12:14	PIC	2128473
1204822403	5D	60	2	45	5/28/2021 11:14	5/28/2021 12:14	PIC	2128473
1204822404	6A	60	8	938	5/28/2021 11:15	5/28/2021 12:15	PIC	2128473

ASSAY 28-May-21 10:12:02
Wizard 2480 s/n 46190630
Protocol id 8 Ba-133
Time limit
Count limit
Isotope Ba-133
Protocol date 5/28/2021
Run id. 3675

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	95	1	180	2079	692.86	2.19		10:12:02
543765001	2	95	2	180	1803	600.92	2.36	86.73	10:15:16
543765002	3	95	3	180	1739.5	579.76	2.4	83.68	10:18:30
543765003	4	95	4	180	1708.5	569.38	2.42	82.18	10:21:44
543765004	5	95	5	180	1256.5	418.77	2.82	60.44	10:24:58
543765005	1	98	1	180	1846	615.26	2.33	88.80	10:28:30
543765006	2	98	2	180	1867.5	622.37	2.31	89.83	10:31:44
543765007	3	98	3	180	1871.5	623.75	2.31	90.03	10:34:58
543765008	4	98	4	180	1587.5	529.1	2.51	76.36	10:38:12
544339001	5	98	5	180	1671.5	557.09	2.45	80.40	10:41:26
544339002	1	15	1	180	1536.5	512.05	2.55	73.90	10:45:02
544521021	2	15	2	180	1397.5	465.77	2.68	67.22	10:48:16
544521022	3	15	3	180	1405.5	468.43	2.67	67.61	10:51:30
1204822402	4	15	4	180	1559	519.55	2.53	74.99	10:54:43
1204822403	5	15	5	180	1809	602.92	2.35	87.02	10:57:58
1204822404	1	14	1	180	1609.5	536.43	2.49	77.42	11:01:40

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 28-May-2021

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

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100A1	Above	Beta bkg	28-May 06:05	60	1.967	0.628	1.888	+3.37
LB4100E1	Above	Alpha bkg	28-May 05:10	60	0.417	-5.45E-2	0.290	+5.22
LB4100E2	need 2nd	Alpha bkg	28-May 05:10	60	0.200	-7.23E-2	0.347	+0.90
LB4100E2	Above	Beta bkg	28-May 05:10	60	2.183	0.950	2.756	+1.10
LB4100E2	Below	Beta eff	28-May 04:40	5	15065	15220	16690	-3.63
LB4100E3	Above	Alpha bkg	28-May 05:10	60	2.617	-4.47E-2	0.174	+69.92
LB4100E3	Above	Beta bkg	28-May 05:10	60	3.283	-1.31E+0	6.766	+0.41
LB4100E3	Above	Beta XTalk	28-May 04:40	5	5.42E-4	8.54E-5	4.65E-4	+4.23
LB4100E4	Above	Alpha bkg	28-May 05:10	60	0.433	-1.15E-1	0.271	+5.53
LB4100F2	Above	Alpha bkg	28-May 05:10	60	0.467	0.026	0.366	+4.77
LB4100F3	need 2nd	Alpha bkg	28-May 05:10	60	0.283	-7.68E-2	0.332	+2.28
LB4100G2	Above	Beta bkg	28-May 05:10	60	36.333	0.721	1.648	+227.57
LB4100G3	Above	Beta bkg	28-May 05:10	60	6.383	0.810	1.674	+35.70
LB4100I1	Below	Alpha eff	28-May 04:50	5	5909	9480	11610	-13.06
LB4100I1	Above	Alpha XTalk	28-May 04:50	5	0.442	0.037	0.345	+4.88
LB4100I1	Above	Beta bkg	28-May 05:10	60	1.617	0.522	1.597	+3.11
LB4100I2	Below	Alpha eff	28-May 04:50	5	6352	11640	13830	-17.49
LB4100I2	Above	Alpha XTalk	28-May 04:50	5	0.519	0.161	0.317	+10.82
LB4100I2	Below	Beta eff	28-May 04:56	5	14314	14760	17300	-4.05
LB4100I3	Above	Alpha bkg	28-May 05:10	60	0.233	-5.83E-2	0.217	+3.35
LB4100I3	Below	Alpha eff	28-May 04:50	5	4849	8322	10490	-12.61
LB4100I3	Above	Alpha XTalk	28-May 04:50	5	0.467	0.150	0.264	+13.72
LB4100I4	Below	Alpha eff	28-May 04:50	5	4815	8929	10920	-15.40
LB4100I4	Above	Alpha XTalk	28-May 04:50	5	0.528	0.233	0.280	+34.45
LB4100I4	need 2nd	Beta bkg	28-May 05:10	60	1.083	0.543	1.279	+1.41
LB4100I4	Below	Beta eff	28-May 04:56	5	14779	15290	19590	-3.71
PIC3B	Below	Alpha XTalk	28-May 04:53	5	0.264	0.286	0.320	-6.90
PIC3B	Below	Beta bkg	28-May 05:06	60	0.533	0.736	2.484	-3.69
PIC3D	Below	Alpha XTalk	28-May 04:53	5	0.262	0.277	0.327	-4.81
PIC3D	Above	Beta XTalk	28-May 05:00	5	0.001	6.19E-5	3.97E-4	+18.79

PIC5A	Above	Alpha bkg	28-May 06:24	60	0.417	0.056	0.371	+3.86
PIC5A	Above	Alpha XTalk	28-May 04:58	5	0.276	0.250	0.275	+3.26
PIC5B	Below	Alpha eff	28-May 08:43	5	11832	11850	12330	-3.23
PIC5C	Below	Alpha eff	28-May 08:43	5	8772	8774	10290	-3.01
PIC6B	need 2nd	Alpha bkg	28-May 06:26	60	0.250	-2.38E-2	0.389	+0.98
PIC6B	Above	Beta bkg	28-May 06:26	60	3.900	0.703	2.442	+8.03
PIC8B	Above	Alpha bkg	28-May 05:19	60	0.583	-9.90E-2	0.340	+6.32
PIC8B	Below	Alpha XTalk	28-May 05:04	5	0.270	0.272	0.304	-3.37
PIC8B	Above	Beta bkg	28-May 05:19	60	7.917	0.129	2.354	+18.00
PIC8B	need 2nd	Beta eff	28-May 05:12	5	21488	20420	21560	+2.62
PIC10B	Below	Alpha eff	28-May 05:10	5	8672	8876	9719	-4.45
PIC10B	Above	Beta bkg	28-May 05:24	60	2.383	0.054	2.370	+3.03
PIC10C	need 2nd	Alpha eff	28-May 05:10	5	20591	19500	20710	+2.41
PIC10C	Below	Beta eff	28-May 05:18	5	25010	25110	26130	-3.59
PIC11C	Below	Alpha eff	28-May 10:16	5	8837	8994	9738	-4.26
PIC14A	Above	Beta bkg	28-May 07:16	60	2.117	-4.31E-1	2.663	+1.94
PIC14C	Above	Beta bkg	28-May 07:17	60	4.717	0.320	2.451	+9.38
PIC14D	Above	Beta bkg	28-May 05:35	60	6.333	-4.86E-1	2.461	+10.89

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

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

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

Reviewed by R. Beck-Nannan

Date 5-28-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 2128473**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204822402	MB	LXB3	PIC4D	MAY-28-21 11:14:47	DONE	25mm Filter	01-JUN-20 00:00
1204822403	DUP	LXB3	PIC5D	MAY-28-21 11:14:51	DONE	25mm Filter	01-JUN-20 00:00
1204822404	LCS	LXB3	PIC6A	MAY-28-21 11:15:03	DONE	25mm Filter	01-JUN-20 00:00
543765001	SAMPLE	LXB3	PIC1A	MAY-28-21 11:15:08	DONE	25mm Filter	01-JUN-20 00:00
543765002	SAMPLE	LXB3	PIC1B	MAY-28-21 11:15:19	DONE	25mm Filter	01-JUN-20 00:00
543765003	SAMPLE	LXB3	PIC1C	MAY-28-21 11:15:23	DONE	25mm Filter	01-JUN-20 00:00
543765004	SAMPLE	LXB3	PIC1D	MAY-28-21 11:15:26	DONE	25mm Filter	01-JUN-20 00:00
543765005	SAMPLE	LXB3	PIC2A	MAY-28-21 11:15:30	DONE	25mm Filter	01-JUN-20 00:00
543765006	SAMPLE	LXB3	PIC2B	MAY-28-21 11:15:34	DONE	25mm Filter	01-JUN-20 00:00
543765007	SAMPLE	LXB3	PIC2C	MAY-28-21 11:15:37	DONE	25mm Filter	01-JUN-20 00:00
543765008	SAMPLE	LXB3	PIC2D	MAY-28-21 11:15:41	DONE	25mm Filter	01-JUN-20 00:00
544339001	SAMPLE	LXB3	PIC3C	MAY-28-21 11:15:44	DONE	25mm Filter	01-JUN-20 00:00
544339002	SAMPLE	LXB3	PIC4A	MAY-28-21 11:15:51	DONE	25mm Filter	01-JUN-20 00:00
544521021	SAMPLE	LXB3	PIC4B	MAY-28-21 11:15:57	DONE	25mm Filter	01-JUN-20 00:00
544521022	SAMPLE	LXB3	PIC4C	MAY-28-21 11:16:03	DONE	25mm Filter	01-JUN-20 00:00

Lucas Cell Raw Data

Batch 2125740 Check-list

This check-list was completed on 18-MAY-21 by Lyndsey Pace

This batch was reviewed by Lyndsey Pace on 18-MAY-21 and Elizabeth Krouse on 19-MAY-21.

Batch ID: 2125740 **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	Yes		
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 and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−226 in Liquid

Batch ID: **2125740**
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL−RAD−A−008 REV# 15
Instrument: GFC−18150253

Due Dates for Lab: 03−JUN−2021 **Package: 05−JUN−2021** **SDG: 07−JUN−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204816779	Radium−226 SPIKE	1715−E	.1	mL
MS	1204816778	Radium−226 SPIKE	1715−E	.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	543765001	11−MAY−2021	1	500	500	05/11/21 10:40	205	05/17/21 07:00	05/17/21 10:39	4	27
2	543765002	11−MAY−2021	1	500	500	05/11/21 10:40	301	05/17/21 07:00	05/17/21 10:39	7	21
3	543765003	11−MAY−2021	1	500	500	05/11/21 10:40	401	05/17/21 07:00	05/17/21 10:39	1	18
4	543765004	11−MAY−2021	1	500	500	05/11/21 10:40	608	05/17/21 07:00	05/17/21 10:39	5	97
5	543765005	11−MAY−2021	1	500	500	05/11/21 10:40	704	05/17/21 07:00	05/17/21 10:39	5	17
6	543765006	11−MAY−2021	1	500	500	05/11/21 10:40	802	05/17/21 07:00	05/17/21 10:39	1	13
7	543765007	11−MAY−2021	1	500	500	05/11/21 10:40	107	05/17/21 07:30	05/17/21 11:13	2	24
8	543765008	11−MAY−2021	1	500	500	05/11/21 10:40	207	05/17/21 07:30	05/17/21 11:13	3	12
9	543788001	11−MAY−2021	.3	800	800	05/11/21 10:40	307	05/17/21 07:30	05/17/21 11:13	3	9
10	543921001	11−MAY−2021	.3	800	800	05/11/21 10:40	405	05/17/21 07:30	05/17/21 11:13	1	37
11	543921002	11−MAY−2021	.3	800	800	05/11/21 10:40	607	05/17/21 07:30	05/17/21 11:13	5	44
12	543921003	11−MAY−2021	.3	800	800	05/11/21 10:40	703	05/17/21 07:30	05/17/21 11:13	8	26
13	543921004	11−MAY−2021	.3	800	800	05/11/21 10:40	804	05/17/21 07:30	05/17/21 11:13	3	29
14	543921005	11−MAY−2021	.3	800	800	05/11/21 10:40	102	05/17/21 08:00	05/17/21 11:46	5	19
15	543921006	11−MAY−2021	.3	800	800	05/11/21 10:40	206	05/17/21 08:00	05/17/21 11:46	1	45
16	543921007	11−MAY−2021	.3	800	800	05/11/21 10:40	304	05/17/21 08:00	05/17/21 11:46	8	38
17	1204816776 MB	11−MAY−2021	.3	800	800	05/11/21 10:40	407	05/17/21 08:00	05/17/21 11:46	4	6
18	1204816777 DUP (543921003)	11−MAY−2021	.3	800	800	05/11/21 10:40	602	05/17/21 08:00	05/17/21 11:46	1	29
19	1204816778 MS (543921003)	11−MAY−2021	.3	100	100	05/11/21 10:40	708	05/17/21 08:00	05/17/21 11:46	1	854
20	1204816779 LCS	11−MAY−2021	.3	800	800	05/11/21 10:40	806	05/17/21 08:00	05/17/21 11:46	1	806

Reagent/Solvent Lot ID	Description	Amount

Comments:
Spike Pipet ID: RAD−RA226−2766953
Bkg Count Time: 30 Minutes
Sample Count Time: 30 Minutes
Data Entry Date2: 11−MAY−2021 00:00

Radium-226 Liquid

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

Batch : 2125740
Analyst : LIN01615
Prep Date : 5/11/2021
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 0.3 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	543765001.1	0.5000	2.0256E-05	5/4/2021 13:45	205	30	27	0.900	4	0.133	30	1.9430
2	543765002.1	0.5000	2.0256E-05	5/4/2021 17:02	301	30	21	0.700	7	0.233	30	1.8110
3	543765003.1	0.5000	2.0256E-05	5/4/2021 9:58	401	30	18	0.600	1	0.033	30	1.8400
4	543765004.1	0.5000	2.0256E-05	5/4/2021 11:26	608	30	97	3.233	5	0.167	30	2.0570
5	543765005.1	0.5000	2.0256E-05	5/4/2021 17:40	704	30	17	0.567	5	0.167	30	1.6260
6	543765006.1	0.5000	2.0256E-05	5/4/2021 15:21	802	30	13	0.433	1	0.033	30	1.7740
7	543765007.1	0.5000	2.0256E-05	5/4/2021 11:26	107	30	24	0.800	2	0.067	30	1.6610
8	543765008.1	0.5000	2.0256E-05	5/4/2021 7:00	207	30	12	0.400	3	0.100	30	1.9400
9	543788001.1	0.8000	2.0861E-05	5/6/2021 11:10	307	30	9	0.300	3	0.100	30	1.8160
10	543921001.1	0.8000	2.0861E-05	5/7/2021 13:20	405	30	37	1.233	1	0.033	30	1.5630
11	543921002.1	0.8000	2.0861E-05	5/7/2021 10:40	607	30	44	1.467	5	0.167	30	1.9750
12	543921003.1	0.8000	2.0861E-05	5/7/2021 9:25	703	30	26	0.867	8	0.267	30	1.7970
13	543921004.1	0.8000	2.0861E-05	5/7/2021 0:02	804	30	29	0.967	3	0.100	30	1.4740
14	543921005.1	0.8000	2.0861E-05	5/7/2021 11:22	102	30	19	0.633	5	0.167	30	1.5460
15	543921006.1	0.8000	2.0861E-05	5/7/2021 9:47	206	30	45	1.500	1	0.033	30	1.8890
16	543921007.1	0.8000	2.0861E-05	5/7/2021 12:40	304	30	38	1.267	8	0.267	30	1.7870
17	1204816776.1	0.8000	2.0861E-05	5/11/2021 0:00	407	30	6	0.200	4	0.133	30	1.9150
18	1204816777.1	0.8000	2.0861E-05	5/7/2021 9:25	602	30	29	0.967	1	0.033	30	1.8180
19	1204816778.1	0.1000	1.1370E-05	5/7/2021 9:25	708	30	854	28.467	1	0.033	30	1.7700
20	1204816779.1	0.8000	2.0861E-05	5/11/2021 0:00	806	30	806	26.867	1	0.033	30	1.7130

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			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
3.400%	8/1/2020	7/31/2021	5/11/2021 10:40	5/17/2021 7:00	5/17/2021 10:39	0.654	0.973	1.002	1.000
0.700%	1/1/2021	12/31/2021	5/11/2021 10:40	5/17/2021 7:00	5/17/2021 10:39	0.654	0.973	1.002	1.000
6.400%	2/1/2021	1/31/2022	5/11/2021 10:40	5/17/2021 7:00	5/17/2021 10:39	0.654	0.973	1.002	1.000
1.800%	7/2/2020	6/30/2021	5/11/2021 10:40	5/17/2021 7:00	5/17/2021 10:39	0.654	0.973	1.002	1.000
2.200%	11/1/2020	10/31/2021	5/11/2021 10:40	5/17/2021 7:00	5/17/2021 10:39	0.654	0.973	1.002	1.000
2.000%	4/1/2021	3/31/2022	5/11/2021 10:40	5/17/2021 7:00	5/17/2021 10:39	0.654	0.973	1.002	1.000
8.500%	5/2/2021	4/30/2022	5/11/2021 10:40	5/17/2021 7:30	5/17/2021 11:13	0.655	0.972	1.002	1.000
5.100%	8/1/2020	7/31/2021	5/11/2021 10:40	5/17/2021 7:30	5/17/2021 11:13	0.655	0.972	1.002	1.000
2.100%	1/1/2021	12/31/2021	5/11/2021 10:40	5/17/2021 7:30	5/17/2021 11:13	0.655	0.972	1.002	1.000
8.100%	2/1/2021	1/31/2022	5/11/2021 10:40	5/17/2021 7:30	5/17/2021 11:13	0.655	0.972	1.002	1.000
2.400%	7/2/2020	6/30/2021	5/11/2021 10:40	5/17/2021 7:30	5/17/2021 11:13	0.655	0.972	1.002	1.000
9.100%	11/1/2020	10/31/2021	5/11/2021 10:40	5/17/2021 7:30	5/17/2021 11:13	0.655	0.972	1.002	1.000
3.700%	4/1/2021	3/31/2022	5/11/2021 10:40	5/17/2021 7:30	5/17/2021 11:13	0.655	0.972	1.002	1.000
2.800%	5/2/2021	4/30/2022	5/11/2021 10:40	5/17/2021 8:00	5/17/2021 11:46	0.656	0.972	1.002	1.000
8.800%	8/1/2020	7/31/2021	5/11/2021 10:40	5/17/2021 8:00	5/17/2021 11:46	0.656	0.972	1.002	1.000
3.300%	1/1/2021	12/31/2021	5/11/2021 10:40	5/17/2021 8:00	5/17/2021 11:46	0.656	0.972	1.002	1.000
8.500%	2/1/2021	1/31/2022	5/11/2021 10:40	5/17/2021 8:00	5/17/2021 11:46	0.656	0.972	1.002	1.000
2.600%	7/2/2020	6/30/2021	5/11/2021 10:40	5/17/2021 8:00	5/17/2021 11:46	0.656	0.972	1.002	1.000
7.100%	11/1/2020	10/31/2021	5/11/2021 10:40	5/17/2021 8:00	5/17/2021 11:46	0.656	0.972	1.002	1.000
1.500%	4/1/2021	3/31/2022	5/11/2021 10:40	5/17/2021 8:00	5/17/2021 11:46	0.656	0.972	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-E
Spike Exp Date : 5/21/2021
Spike Activity (dpm/ml): 300.18
Spike Volume Added: 0.10

LCS S/N : 1715-E
LCS Exp Date : 5/21/2021
LCS Activity (dpm/ml): 300.18
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	0.1605	0.1133	1	0.2997	**0.5602**	24.45%	0.7667	0.1856	0.2658	0.2803		SAMPLE				
2	0.2278	0.1608	1	0.4001	**0.3658**	37.80%	0.4667	0.1764	0.2710	0.2762		SAMPLE				
3	0.0847	0.0598	1	0.1968	**0.4372**	26.43%	0.5667	0.1453	0.2197	0.2351		SAMPLE				
4	0.1695	0.1197	1	0.3084	**2.1165**	11.12%	3.0667	0.3367	0.4554	0.5535		SAMPLE				
5	0.2144	0.1514	1	0.3901	**0.3492**	39.15%	0.4000	0.1563	0.2676	0.2727		SAMPLE				
6	0.0879	0.0621	1	0.2041	**0.3201**	31.24%	0.4000	0.1247	0.1956	0.2014		SAMPLE				
7	0.1326	0.0936	1	0.2725	**0.6259**	24.69%	0.7333	0.1700	0.2843	0.3160		SAMPLE				
8	0.1390	0.0981	1	0.2694	**0.2192**	43.33%	0.3000	0.1291	0.1849	0.1889		SAMPLE				
9	0.0928	0.0655	0.3	0.1798	**0.0976**	57.77%	0.2000	0.1155	0.1104	0.1114		SAMPLE				
10	0.0623	0.0440	0.3	0.1446	**0.6802**	18.94%	1.2000	0.2055	0.2283	0.2710		SAMPLE				
11	0.1102	0.0778	0.3	0.2004	**0.5832**	18.11%	1.3000	0.2333	0.2052	0.2234		SAMPLE				
12	0.1532	0.1081	0.3	0.2656	**0.2958**	33.65%	0.6000	0.1944	0.1878	0.1997		SAMPLE				
13	0.1144	0.0807	0.3	0.2216	**0.5209**	22.07%	0.8667	0.1886	0.2221	0.2376		SAMPLE				
14	0.1405	0.0992	0.3	0.2556	**0.2670**	35.10%	0.4667	0.1633	0.1831	0.1877		SAMPLE				
15	0.0514	0.0363	0.3	0.1195	**0.6868**	17.75%	1.4667	0.2261	0.2075	0.2587		SAMPLE				
16	0.1538	0.1086	0.3	0.2666	**0.4950**	22.85%	1.0000	0.2261	0.2193	0.2329		SAMPLE				
17	0.1015	0.0716	0.3	0.1895	**0.0308**	158.34%	0.0667	0.1054	0.0954	0.0957		MB				
18	0.0534	0.0377	0.3	0.1241	**0.4541**	19.73%	0.9333	0.1826	0.1741	0.1875	543921003.1	DUP	42.2%			
19	0.4391	0.3100	0.3	1.0199	**113.6767**	7.88%	28.4333	0.9747	7.6377	24.0384	543921003.1	MS			135.2152	83.9%
20	0.0567	0.0400	0.3	0.1317	**13.8561**	3.83%	26.8333	0.9469	0.9584	2.2550		LCS			16.9018	82.0%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 17-MAY-2021

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:00	1	1.21E+05	120720	-1.06		
LUCAS2	EFF	06:30	1	1.30E+05	130206	-0.24		
LUCAS3	EFF	06:29	1	1.31E+05	131199	-2.47		
LUCAS4	EFF	07:21	1	1.26E+05	126254	-2.68		
LUCAS5	EFF	06:58	1	1.28E+05	128004	-2.75		
LUCAS6	EFF	06:56	1	1.30E+05	130464	-2.44		
LUCAS7	EFF	06:25	1	1.31E+05	131185	-0.65		
LUCAS8	EFF	06:24	1	1.26E+05	125593	-0.07		

Reviewed by: Lyndsey Pace **Date:** 17-MAY-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 2125740**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
543765001	SAMPLE	LXP1	LUCAS2	MAY-17-21 10:39:00	DONE	Lucas Cell	01-AUG-20 00:00
543765002	SAMPLE	LXP1	LUCAS3	MAY-17-21 10:39:00	DONE	Lucas Cell	01-JAN-21 00:00
543765003	SAMPLE	LXP1	LUCAS4	MAY-17-21 10:39:00	DONE	Lucas Cell	01-FEB-21 00:00
543765004	SAMPLE	LXP1	LUCAS6	MAY-17-21 10:39:00	DONE	Lucas Cell	02-JUL-20 00:00
543765005	SAMPLE	LXP1	LUCAS7	MAY-17-21 10:39:00	DONE	Lucas Cell	01-NOV-20 00:00
543765006	SAMPLE	LXP1	LUCAS8	MAY-17-21 10:39:00	DONE	Lucas Cell	01-APR-21 00:00
543765007	SAMPLE	LXP1	LUCAS1	MAY-17-21 11:13:00	DONE	Lucas Cell	02-MAY-21 00:00
543765008	SAMPLE	LXP1	LUCAS2	MAY-17-21 11:13:00	DONE	Lucas Cell	01-AUG-20 00:00
543788001	SAMPLE	LXP1	LUCAS3	MAY-17-21 11:13:00	DONE	Lucas Cell	01-JAN-21 00:00
543921001	SAMPLE	LXP1	LUCAS4	MAY-17-21 11:13:00	DONE	Lucas Cell	01-FEB-21 00:00
543921002	SAMPLE	LXP1	LUCAS6	MAY-17-21 11:13:00	DONE	Lucas Cell	02-JUL-20 00:00
543921003	SAMPLE	LXP1	LUCAS7	MAY-17-21 11:13:00	DONE	Lucas Cell	01-NOV-20 00:00
543921004	SAMPLE	LXP1	LUCAS8	MAY-17-21 11:13:00	DONE	Lucas Cell	01-APR-21 00:00
543921005	SAMPLE	LXP1	LUCAS1	MAY-17-21 11:46:00	DONE	Lucas Cell	02-MAY-21 00:00
543921006	SAMPLE	LXP1	LUCAS2	MAY-17-21 11:46:00	DONE	Lucas Cell	01-AUG-20 00:00
543921007	SAMPLE	LXP1	LUCAS3	MAY-17-21 11:46:00	DONE	Lucas Cell	01-JAN-21 00:00
1204816776	MB	LXP1	LUCAS4	MAY-17-21 11:46:00	DONE	Lucas Cell	01-FEB-21 00:00
1204816777	DUP	LXP1	LUCAS6	MAY-17-21 11:46:00	DONE	Lucas Cell	02-JUL-20 00:00
1204816778	MS	LXP1	LUCAS7	MAY-17-21 11:46:00	DONE	Lucas Cell	01-NOV-20 00:00
1204816779	LCS	LXP1	LUCAS8	MAY-17-21 11:46:00	DONE	Lucas Cell	01-APR-21 00:00

Analytical Laboratory Report

Preliminary Report

Report ID: S25279.01(01)
Generated on 06/17/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S25279.01-S25279.06
Project: Erickson AM MI New Wells 7-10
Collected Date(s): 06/15/2021
Submitted Date/Time: 06/15/2021 15:57
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

All Metal Results Are Reported As Total

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S25279.01	MW-7 L106052-01	Groundwater	06/15/21 14:11
S25279.02	MW-8 L106052-02	Groundwater	06/15/21 12:41
S25279.03	MW-9 L106052-03	Groundwater	06/15/21 10:51
S25279.04	MW-10 L106052-04	Groundwater	06/15/21 08:59
S25279.05	Field Dupe MW-9 L106052-05	Groundwater	06/15/21 10:51
S25279.06	Field Blank L106052-06	Water	06/15/21 07:40

Lab Sample ID: S25279.01
Sample Tag: MW-7 L106052-01
Collected Date/Time: 06/15/2021 14:11
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.2	IR
2	1L Plastic	None	Yes	3.2	IR
1	125ml Plastic	HNO3	Yes	3.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	06/16/21 09:45	JRH	
Metal Digestion	Completed	SW3015A	06/16/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 06/16/21 08:22, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 06/16/21 09:52, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	73	10	0.13	mg/L	10	16887-00-6	
Sulfate	189	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 06/15/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	586	20	2	mg/L	2		

Method: SM2540D, Run Date: 06/16/21 10:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 06/16/21 13:48, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	110	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 06/16/21 11:51, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.056	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	1.88	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.34	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.089	0.010	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S25279.01 (continued)

Sample Tag: MW-7 L106052-01

Method: E200.8, Run Date: 06/16/21 11:51, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.259	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 06/16/21 13:10, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Incomplete						

Lab Sample ID: S25279.02
Sample Tag: MW-8 L106052-02
Collected Date/Time: 06/15/2021 12:41
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.2	IR
2	1L Plastic	None	Yes	3.2	IR
1	125ml Plastic	HNO3	Yes	3.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	06/16/21 09:45	JRH	
Metal Digestion	Completed	SW3015A	06/16/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 06/16/21 08:32, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	11	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	25	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 06/15/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	392	20	2	mg/L	2		

Method: SM2540D, Run Date: 06/16/21 10:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 06/16/21 13:50, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	91.2	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 06/16/21 11:55, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.028	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.11	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.011	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S25279.02 (continued)

Sample Tag: MW-8 L106052-02

Method: E200.8, Run Date: 06/16/21 11:55, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 06/16/21 13:12, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Incomplete						

Lab Sample ID: S25279.03
Sample Tag: MW-9 L106052-03
Collected Date/Time: 06/15/2021 10:51
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.2	IR
2	1L Plastic	None	Yes	3.2	IR
1	125ml Plastic	HNO3	Yes	3.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	06/16/21 09:45	JRH	
Metal Digestion	Completed	SW3015A	06/16/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 06/16/21 08:42, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 06/15/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	232	20	2	mg/L	2		

Method: SM2540D, Run Date: 06/16/21 10:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 06/16/21 13:51, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	62.1	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 06/16/21 12:00, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.015	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S25279.03 (continued)

Sample Tag: MW-9 L106052-03

Method: E200.8, Run Date: 06/16/21 12:00, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 06/16/21 13:13, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Incomplete						

Lab Sample ID: S25279.04
Sample Tag: MW-10 L106052-04
Collected Date/Time: 06/15/2021 08:59
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.2	IR
2	1L Plastic	None	Yes	3.2	IR
1	125ml Plastic	HNO3	Yes	3.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	06/16/21 09:45	JRH	
Metal Digestion	Completed	SW3015A	06/16/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 06/16/21 08:52, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	12	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 06/15/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	446	20	2	mg/L	2		

Method: SM2540D, Run Date: 06/16/21 10:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 06/16/21 13:53, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	132	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 06/16/21 12:04, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.044	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S25279.04 (continued)

Sample Tag: MW-10 L106052-04

Method: E200.8, Run Date: 06/16/21 12:04, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 06/16/21 13:15, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Incomplete						

Lab Sample ID: S25279.05
Sample Tag: Field Dupe MW-9 L106052-05
Collected Date/Time: 06/15/2021 10:51
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.2	IR
2	1L Plastic	None	Yes	3.2	IR
1	125ml Plastic	HNO3	Yes	3.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	06/16/21 09:45	JRH	
Metal Digestion	Completed	SW3015A	06/16/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 06/16/21 09:02, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 06/15/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	240	20	2	mg/L	2		

Method: SM2540D, Run Date: 06/16/21 10:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 06/16/21 13:55, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	64.2	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 06/16/21 12:09, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.015	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.010	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S25279.05 (continued)

Sample Tag: Field Dupe MW-9 L106052-05

Method: E200.8, Run Date: 06/16/21 12:09, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 06/16/21 13:17, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Incomplete						

Lab Sample ID: S25279.06
Sample Tag: Field Blank L106052-06
Collected Date/Time: 06/15/2021 07:40
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.2	IR
2	1L Plastic	None	Yes	3.2	IR
1	125ml Plastic	HNO3	Yes	3.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	06/16/21 09:45	JRH	
Metal Digestion	Completed	SW3015A	06/16/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 06/16/21 09:12, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 06/15/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	12	20	2	mg/L	2		bB

Method: SM2540D, Run Date: 06/16/21 10:45, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 06/16/21 13:47, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 06/16/21 11:47, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.010	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	

b-Value detected less than reporting limit, but greater than MDL B-Compound also found in associated method blank

Lab Sample ID: S25279.06 (continued)

Sample Tag: Field Blank L106052-06

Method: E200.8, Run Date: 06/16/21 11:47, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 06/16/21 13:19, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Incomplete						

Merit Laboratories Login Checklist

Lab Set ID: S25279
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI New Wells 7-10
Submitted: 06/15/2021 15:57 Login User: MMC

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 3.4
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[ ] Yes	[X] No	[ ] N/A	Sample tag on bottles match COC	Collection times are different.
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S25279 Submitted: 06/15/2021 15:57

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 06/15/2021 16:16 MMC

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S25279.01	125ml Plastic HNO3	<2			
S25279.01	1L Plastic HNO3	<2			
S25279.01	1L Plastic HNO3	<2			
S25279.02	125ml Plastic HNO3	<2			
S25279.02	1L Plastic HNO3	<2			
S25279.02	1L Plastic HNO3	<2			
S25279.03	125ml Plastic HNO3	<2			
S25279.03	1L Plastic HNO3	<2			
S25279.03	1L Plastic HNO3	<2			
S25279.04	125ml Plastic HNO3	<2			
S25279.04	1L Plastic HNO3	<2			
S25279.04	1L Plastic HNO3	<2			
S25279.05	125ml Plastic HNO3	<2			
S25279.05	1L Plastic HNO3	<2			
S25279.05	1L Plastic HNO3	<2			
S25279.06	125ml Plastic HNO3	<2			
S25279.06	1L Plastic HNO3	<2			
S25279.06	1L Plastic HNO3	<2			

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI New Wells 7-10
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☒ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES

Project Locations: ☐ Detroit ☐ New York ☐ Other

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS
25279.01	06/15/21	1411	MW-7 L106052-01	GW	5	3		2					✓	✓	✓	✓	✓
.02	06/15/21	1241	MW-8 -02	GW	5	3		2					✓	✓	✓	✓	✓
.03	06/15/21	1051	MW-9 -03	GW	5	3		2					✓	✓	✓	✓	✓
.04	06/15/21	0859	MW-10 -04	GW	5	3		2					✓	✓	✓	✓	✓
.05	06/15/21	1051	Field Dupe MW-9 -05	GW	5	3		2					✓	✓	✓	✓	✓
.06	06/15/21	0740	Field Blank -06	DI	5	3		2					✓	✓	✓	✓	✓

Special Instructions:
Metals to analyse:
B, Ca, Sb, As, Ba, Be, Cd, Cr,
Co, Li, Hg, Mo, Pb, Se, Tl,
Fe, Cu, Ni, Ag, V, Zn
Please send a preliminary report

See attached reporting limits.

RELINQUISHED BY: SIGNATURE/ORGANIZATION	☒ Sampler	DATE 6-15-21	TIME 1557
RECEIVED BY: SIGNATURE/ORGANIZATION	M Wahrer	DATE 6/15/21	TIME 1557
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 3.2

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Reporting Limits to go to Merit with COC

							RL
Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

Analytical Laboratory Report

Final Report

Report ID: S26384.01(02)
Generated on 08/20/2021
Replaces report S26384.01(01) generated on 07/23/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S26384.01-S26384.06
Project: Erickson AM MI New Wells 7-10
Collected Date(s): 07/20/2021
Submitted Date/Time: 07/21/2021 08:50
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S26384.01	MW-7 L107016-01	Groundwater	07/20/21 13:56
S26384.02	MW-8 L107016-02	Groundwater	07/20/21 12:31
S26384.03	MW-9 L107016-03	Groundwater	07/20/21 10:41
S26384.04	MW-10 L107016-04	Groundwater	07/20/21 08:56
S26384.05	Field Dupe MW-9 L107016-05	Groundwater	07/20/21 10:41
S26384.06	Field Blank L107016-06	Water	07/20/21 08:05

Lab Sample ID: S26384.01
Sample Tag: MW-7 L107016-01
Collected Date/Time: 07/20/2021 13:56
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.4	IR
2	1L Plastic	None	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	07/22/21 08:40	JRH	
Metal Digestion	Completed	SW3015A	07/21/21 09:50	CCM	

Inorganics

Method: E300.0, Run Date: 07/21/21 10:06, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 07/21/21 11:06, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	74	10	0.13	mg/L	10	16887-00-6	
Sulfate	181	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 07/21/21 15:50, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	574	20	2	mg/L	2		

Method: SM2540D, Run Date: 07/22/21 16:25, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 07/21/21 14:23, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	111	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 07/21/21 11:47, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.060	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	1.78	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.25	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.096	0.005	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S26384.01 (continued)
Sample Tag: MW-7 L107016-01

Method: E200.8, Run Date: 07/21/21 11:47, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.260	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.007	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 07/22/21 13:14, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 08/20/21 15:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26384.02
Sample Tag: MW-8 L107016-02
Collected Date/Time: 07/20/2021 12:31
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.4	IR
2	1L Plastic	None	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	07/22/21 08:40	JRH	
Metal Digestion	Completed	SW3015A	07/21/21 09:50	CCM	

Inorganics

Method: E300.0, Run Date: 07/21/21 10:16, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	17	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	35	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 07/21/21 15:50, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	384	20	2	mg/L	2		

Method: SM2540D, Run Date: 07/22/21 16:25, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 07/21/21 14:25, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	94.6	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 07/21/21 11:51, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.021	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.10	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.006	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S26384.02 (continued)

Sample Tag: MW-8 L107016-02

Method: E200.8, Run Date: 07/21/21 11:51, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 07/22/21 13:16, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 08/20/21 15:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26384.03
Sample Tag: MW-9 L107016-03
Collected Date/Time: 07/20/2021 10:41
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.4	IR
2	1L Plastic	None	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	07/22/21 08:40	JRH	
Metal Digestion	Completed	SW3015A	07/21/21 09:50	CCM	

Inorganics

Method: E300.0, Run Date: 07/21/21 10:26, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 07/21/21 15:50, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	242	20	2	mg/L	2		

Method: SM2540D, Run Date: 07/22/21 16:25, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 07/21/21 14:27, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	66.3	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 07/21/21 11:55, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.013	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S26384.03 (continued)

Sample Tag: MW-9 L107016-03

Method: E200.8, Run Date: 07/21/21 11:55, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 07/22/21 13:18, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 08/20/21 15:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26384.04
Sample Tag: MW-10 L107016-04
Collected Date/Time: 07/20/2021 08:56
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.4	IR
2	1L Plastic	None	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	07/22/21 08:40	JRH	
Metal Digestion	Completed	SW3015A	07/21/21 09:50	CCM	

Inorganics

Method: E300.0, Run Date: 07/21/21 10:36, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	15	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 07/21/21 15:50, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	410	20	2	mg/L	2		

Method: SM2540D, Run Date: 07/22/21 16:25, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 07/21/21 14:28, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	128	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 07/21/21 11:58, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.041	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S26384.04 (continued)

Sample Tag: MW-10 L107016-04

Method: E200.8, Run Date: 07/21/21 11:58, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 07/22/21 13:20, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 08/20/21 15:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26384.05
Sample Tag: Field Dupe MW-9 L107016-05
Collected Date/Time: 07/20/2021 10:41
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.4	IR
2	1L Plastic	None	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	07/22/21 08:40	JRH	
Metal Digestion	Completed	SW3015A	07/21/21 09:50	CCM	

Inorganics

Method: E300.0, Run Date: 07/21/21 10:46, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 07/21/21 15:50, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	232	20	2	mg/L	2		

Method: SM2540D, Run Date: 07/22/21 16:25, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 07/21/21 14:30, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	67.5	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 07/21/21 12:12, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.014	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S26384.05 (continued)

Sample Tag: Field Dupe MW-9 L107016-05

Method: E200.8, Run Date: 07/21/21 12:12, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 07/22/21 13:21, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 08/20/21 15:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26384.06
Sample Tag: Field Blank L107016-06
Collected Date/Time: 07/20/2021 08:05
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.4	IR
2	1L Plastic	None	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	07/22/21 08:40	JRH	
Metal Digestion	Completed	SW3015A	07/21/21 09:50	CCM	

Inorganics

Method: E300.0, Run Date: 07/21/21 10:56, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 07/21/21 15:50, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		

Method: SM2540D, Run Date: 07/22/21 16:25, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 07/21/21 14:10, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 07/21/21 11:32, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S26384.06 (continued)

Sample Tag: Field Blank L107016-06

Method: E200.8, Run Date: 07/21/21 11:32, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 07/22/21 13:23, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 08/20/21 15:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID: S26384
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI New Wells 7-10
Submitted: 07/21/2021 08:50 Login User: SRS

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.4
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S26384 Submitted: 07/21/2021 08:50

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 07/21/2021 09:05 SRS

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S26384.01	125ml Plastic HNO3	<2			
S26384.01	1L Plastic HNO3	<2			
S26384.01	1L Plastic HNO3	<2			
S26384.02	125ml Plastic HNO3	<2			
S26384.02	1L Plastic HNO3	<2			
S26384.02	1L Plastic HNO3	<2			
S26384.03	125ml Plastic HNO3	<2			
S26384.03	1L Plastic HNO3	<2			
S26384.03	1L Plastic HNO3	<2			
S26384.04	125ml Plastic HNO3	<2			
S26384.04	1L Plastic HNO3	<2			
S26384.04	1L Plastic HNO3	<2			
S26384.05	125ml Plastic HNO3	<2			
S26384.05	1L Plastic HNO3	<2			
S26384.05	1L Plastic HNO3	<2			
S26384.06	125ml Plastic HNO3	<2			
S26384.06	1L Plastic HNO3	<2			
S26384.06	1L Plastic HNO3	<2			

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI New Wells 7-10
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐1 DAY ☒2 DAYS ☐3 DAYS ☐STANDARD ☒OTHER ASAP

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☒LEVEL III ☐LEVEL IV ☒EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☒NPDES
Project Locations: ☐Detroit ☐New York ☐Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS
263841.01	07/20/21	1356	MW-7 L107016-01	GW	5	3		2					✓	✓	✓	✓	✓
.02	07/20/21	1231	MW-8 L107016-02	GW	5	3		2					✓	✓	✓	✓	✓
.03	07/20/21	1041	MW-9 L107016-03	GW	5	3		2					✓	✓	✓	✓	✓
.04	07/20/21	0856	MW-10 L107016-04	GW	5	3		2					✓	✓	✓	✓	✓
.05	07/20/21	1041	Field Dupe MW-9 L107016-05	GW	5	3		2					✓	✓	✓	✓	✓
.06	07/20/21	0805	Field Blank L107016-06	DI	5	3		2					✓	✓	✓	✓	✓

Special Instructions:
Metals to analyse:
B, Ca, Sb, As, Ba, Be, Cd, Cr,
Co, Li, Hg, Mo, Pb, Se, Tl,
Fe, Cu, Ni, Ag, V, Zn
Please send a preliminary report

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Sampler	DATE 7-21-21	TIME 0850
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE 7/21/21	TIME 0850
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 4.4

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

August 18, 2021

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 550670
SDG: S26384

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 26, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4523.

Sincerely,

Samuel Hogan
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S26384
Work Order: 550670

August 18, 2021

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on July 26, 2021 for analysis. 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.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
550670001	S26384.01
550670002	S26384.02
550670003	S26384.03
550670004	S26384.04
550670005	S26384.05
550670006	S26384.06 (Field Blank)

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

Samuel Hogan
Project Manager

Chain of Custody and Supporting Documentation

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

550670

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague | ☒ SAME
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S26384 | SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☒ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**
	7/20/21	1356	S26384.01	GW	2			2					✓	✓
	7/20/21	1231	S26384.02	GW	2			2					✓	✓
	7/20/21	1041	S26384.03	GW	2			2					✓	✓
	7/20/21	0856	S26384.04	GW	2			2					✓	✓
	7/20/21	1041	S26384.05	GW	2			2					✓	✓
	7/20/21	0805	S26384.06 (Field Blank)	L	2			2					✓	✓

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other
Special Instructions:
* E903.1 Mod.
** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report

(No Ice needed)
** Subcontracted to
GEL Laboratories, Inc.
2040 Savage Road
Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Sam Smith	☐ Sampler	DATE: 7/21/21	TIME: 1700
RECEIVED BY: SIGNATURE/ORGANIZATION: UPS		DATE: 7/22/21	TIME: 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION:		DATE:	TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION:		DATE:	TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION:		DATE:	TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION:		DATE: 7/26/21	TIME: 1000

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 2.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

S4

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	SDG/AR/COC/Work Order: 550670
Received By: BE	Date Received: 7/26/21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground (UPS) Field Services Courier Other 1Z 466 477 03 6261 2825

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): 0 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 (None) Other: *all temperatures are recorded in Celsius TEMP: 26
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR2-21 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):

PM (or PMA) review: Initials GB Date 7/27/21 Page 1 of 1

GL-CHL-SR-001 Rev 7

Laboratory Certifications

List of current GEL Certifications as of 18 August 2021

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122021−35
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S26384
Work Order #: 550670

Product: **GFPC Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2155848

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

GEL Sample ID#	Client Sample Identification
550670001	S26384.01
550670002	S26384.02
550670003	S26384.03
550670004	S26384.04
550670005	S26384.05
550670006	S26384.06 (Field Blank)
1204873957	Method Blank (MB)
1204873958	550391001(NonSDG) Sample Duplicate (DUP)
1204873959	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.

Technical Information

Recounts
Sample 550670004 (S26384.04) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: **Lucas Cell, Ra226, Liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2155852

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

GEL Sample ID#	Client Sample Identification
550670001	S26384.01
550670002	S26384.02
550670003	S26384.03

550670004	S26384.04
550670005	S26384.05
550670006	S26384.06 (Field Blank)
1204873969	Method Blank (MB)
1204873970	550391001(NonSDG) Sample Duplicate (DUP)
1204873971	550391001(NonSDG) Matrix Spike (MS)
1204873972	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, 1204873971 (Non SDG 550391001MS), 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

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

Qualifier Definition Report
for

MERI001 Merit Laboratories, Inc.

Client SDG: S26384 GEL Work Order: 550670

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: Kenshalla Oston **Name: Kenshalla Oston**

Date: 20 AUG 2021 **Title: Analyst I**

Sample Data Summary

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

Certificate of Analysis

Report Date: August 20, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S26384.01
Sample ID: 550670001
Matrix: Ground Water
Collect Date: 20-JUL-21 13:56
Receive Date: 26-JUL-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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		3.42	+/-1.25	1.55	3.00	pCi/L			JXC9	08/11/21	1517	2155848	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		4.82	+/-1.31			pCi/L		1	AEA	08/18/21	1026	2157691	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.40	+/-0.414	0.233	1.00	pCi/L			LXP1	08/16/21	1003	2155852	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			81.1	(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: August 20, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S26384.02
Sample ID: 550670002
Matrix: Ground Water
Collect Date: 20-JUL-21 12:31
Receive Date: 26-JUL-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	-0.103	+/-1.38	2.52	3.00	pCi/L			JXC9	08/11/21	1517	2155848	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.389	+/-1.39			pCi/L		1	AEA	08/18/21	1026	2157691	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.389	+/-0.218	0.213	1.00	pCi/L			LXP1	08/16/21	1003	2155852	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			85.3	(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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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: August 20, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S26384.03
Sample ID: 550670003
Matrix: Ground Water
Collect Date: 20-JUL-21 10:41
Receive Date: 26-JUL-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.286	+/-0.724	1.32	3.00	pCi/L			JXC9	08/11/21	1517	2155848	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.475	+/-0.752			pCi/L		1	AEA	08/18/21	1026	2157691	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.189	+/-0.205	0.332	1.00	pCi/L			LXP1	08/16/21	1003	2155852	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	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
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: August 20, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S26384.04
Sample ID: 550670004
Matrix: Ground Water
Collect Date: 20-JUL-21 08:56
Receive Date: 26-JUL-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	-0.994	+/-1.31	2.65	3.00	pCi/L			JXC9	08/11/21	1818	2155848	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.262	+/-1.34			pCi/L		1	AEA	08/18/21	1026	2157691	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.262	+/-0.272	0.439	1.00	pCi/L			LXP1	08/16/21	1003	2155852	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			94.6	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: August 20, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S26384.05
Sample ID: 550670005
Matrix: Ground Water
Collect Date: 20-JUL-21 10:41
Receive Date: 26-JUL-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	-0.125	+/-1.07	1.99	3.00	pCi/L			JXC9	08/11/21	1517	2155848	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.166	+/-1.10			pCi/L		1	AEA	08/18/21	1026	2157691	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.166	+/-0.254	0.447	1.00	pCi/L			LXP1	08/16/21	1003	2155852	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			95	(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: August 20, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S26384.06 (Field Blank)
Sample ID: 550670006
Matrix: Water
Collect Date: 20-JUL-21 08:05
Receive Date: 26-JUL-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	-0.0672	+/-0.785	1.52	3.00	pCi/L			JXC9	08/11/21	1517	2155848	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.232	+/-0.829			pCi/L		1	AEA	08/18/21	1026	2157691	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.232	+/-0.266	0.443	1.00	pCi/L			LXP1	08/16/21	1003	2155852	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			92.1	(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

Quality Control Summary

QC Summary

Report Date: August 20, 2021

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **550670**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch 2155848											
QC1204873958 550391001 DUP											
Radium-228	U	0.0427	U	0.00213	pCi/L	N/A		N/A	JXC9	08/11/21	15:16
	Uncertainty	+/-0.237		+/-0.272							
QC1204873959 LCS											
Radium-228	17.2			15.4	pCi/L		89.4	(75%-125%)		08/11/21	15:16
	Uncertainty			+/-1.15							
QC1204873957 MB											
Radium-228			U	0.105	pCi/L					08/11/21	15:16
	Uncertainty			+/-0.281							
Rad Ra-226											
Batch 2155852											
QC1204873970 550391001 DUP											
Radium-226		0.923		0.896	pCi/L	2.88		(0% - 100%)	LXP1	08/16/21	10:38
	Uncertainty	+/-0.383		+/-0.366							
QC1204873972 LCS											
Radium-226	26.7			23.1	pCi/L		86.4	(75%-125%)		08/16/21	10:38
	Uncertainty			+/-1.58							
QC1204873969 MB											
Radium-226			U	0.150	pCi/L					08/16/21	10:03
	Uncertainty			+/-0.242							
QC1204873971 550391001 MS											
Radium-226	133	0.923		128	pCi/L		96	(75%-125%)		08/16/21	10:38
	Uncertainty	+/-0.383		+/-8.62							

Notes:

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

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded

QC Summary

Workorder: **550670**

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

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

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 2155848 Check-list

This check-list was completed on 12-AUG-21 by Nat Long

This batch was reviewed by Nat Long on 12-AUG-21 and Rhonda Birch on 12-AUG-21.

Batch ID: 2155848

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	Yes		
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 relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **2155848**
Analyst: Jasmine Conley (JXC9)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 5
Instrument: SP−C018367602

Due Dates for Lab: 17−AUG−2021 **Package: 21−AUG−2021** **SDG: 19−AUG−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204873959	Radium−228 SPIKE	1965−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	550391001	04−AUG−2021	1	901.6	901.6	08/06/21 13:00	08/11/21 12:20
2	550402001	04−AUG−2021	1	901.7	901.7	08/06/21 13:00	08/11/21 12:20
3	550489001	04−AUG−2021	3	300.7	300.7	08/06/21 13:00	08/11/21 12:20
4	550670001	04−AUG−2021	3	301.5	301.5	08/06/21 13:00	08/11/21 12:20
5	550670002	04−AUG−2021	3	300.3	300.3	08/06/21 13:00	08/11/21 12:20
6	550670003	04−AUG−2021	3	302.5	302.5	08/06/21 13:00	08/11/21 12:20
7	550670004	04−AUG−2021	3	300.3	300.3	08/06/21 13:00	08/11/21 12:20
8	550670005	04−AUG−2021	3	300.8	300.8	08/06/21 13:00	08/11/21 12:20
9	550670006	04−AUG−2021	3	300.9	300.9	08/06/21 13:00	08/11/21 12:20
10	1204873957 MB	04−AUG−2021	1		903.2	08/06/21 13:00	08/11/21 12:20
11	1204873958 DUP (550391001)	04−AUG−2021	1	903.2	903.2	08/06/21 13:00	08/11/21 12:20
12	1204873959 LCS	04−AUG−2021	1		903.2	08/06/21 13:00	08/11/21 12:20

Reagent/Solvent Lot ID	Description	Amount
WORK 1951−B	Barium−133	.1 mL
REGNT 3244856.9	RGF−Hydrofluoric Acid	4 mL
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL
REGNT 3300169	2M HCL	20 mL
REGNT 3301783	Barium Carrier Ra228 REG	1 mL
REGNT 3304359.1	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 3308483	Lot #DGA0022	2 g
REGNT 3314778.7	Concentrated HNO3 (16M)	5 mL
REGNT 3318677	RGF−50% Potassium Carbonate	2 mL
REGNT 3321022	RGF−1.5M Ammonium Sulfate	10 mL
REGNT 3321027	RGF−1M Citric Acid	5 mL
REGNT 3321613	RGF−Neodymium Subtrate	5 mL
REGNT 3324266	RGF−7M Nitric Acid	25 mL

Comments:
Pipet Id: RAD−GFC−1795419
Data Entry Date2: 04−AUG−2021 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 1951-B
Tracer Exp Date : 9/23/2021
Tracer Volume Added: 0.10

Batch : 2155848
Analyst : JAS02031
Prep Date : 8/4/2021
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 1 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	550391001.1	0.9016	2.0764E-05	7/20/2021 9:00	575.6	2.41%	523.2	2.52%	0.1	0.000200
2	550402001.1	0.9017	2.0764E-05	7/20/2021 11:00	575.6	2.41%	504.4	2.57%	0.1	0.000200
3	550489001.1	0.3007	1.8471E-05	7/17/2021 12:15	575.6	2.41%	477.0	2.64%	0.1	0.000200
4	550670001.1	0.3015	1.8484E-05	7/20/2021 13:56	575.6	2.41%	466.9	2.67%	0.1	0.000200
5	550670002.1	0.3003	1.8464E-05	7/20/2021 12:31	575.6	2.41%	491.1	2.61%	0.1	0.000200
6	550670003.1	0.3025	1.8501E-05	7/20/2021 10:41	575.6	2.41%	522.9	2.52%	0.1	0.000200
7	550670004.1	0.3003	1.8464E-05	7/20/2021 8:56	575.6	2.41%	544.2	2.47%	0.1	0.000200
8	550670005.1	0.3008	1.8473E-05	7/20/2021 10:41	575.6	2.41%	547.1	2.47%	0.1	0.000200
9	550670006.1	0.3009	1.8474E-05	7/20/2021 8:05	575.6	2.41%	530.1	2.51%	0.1	0.000200
10	1204873957.1	0.9032	2.0760E-05	8/4/2021 0:00	575.6	2.41%	555.9	2.45%	0.1	0.000200
11	1204873958.1	0.9032	2.0760E-05	7/20/2021 9:00	575.6	2.41%	520.9	2.53%	0.1	0.000200
12	1204873959.1	0.9032	2.0760E-05	8/4/2021 0:00	575.6	2.41%	514.6	2.54%	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

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	3B	60	4	31	0.517	8/11/2021 15:16	8/6/2021 13:00	8/11/2021 12:20	0.993	0.717	1.000	1.057	90.9%	1.77%
2	3C	60	0	39	0.650	8/11/2021 15:16	8/6/2021 13:00	8/11/2021 12:20	0.993	0.717	1.000	1.057	87.6%	1.78%
3	3D	60	5	46	0.767	8/11/2021 15:17	8/6/2021 13:00	8/11/2021 12:20	0.992	0.717	1.000	1.057	82.9%	1.81%
4	5A	60	6	82	1.367	8/11/2021 15:17	8/6/2021 13:00	8/11/2021 12:20	0.993	0.717	1.000	1.057	81.1%	1.82%
5	5C	60	5	109	1.817	8/11/2021 15:17	8/6/2021 13:00	8/11/2021 12:20	0.993	0.717	1.000	1.057	85.3%	1.80%
6	5D	60	7	33	0.550	8/11/2021 15:17	8/6/2021 13:00	8/11/2021 12:20	0.993	0.717	1.000	1.057	90.9%	1.77%
7	14B	60	4	58	0.967	8/11/2021 18:18	8/6/2021 13:00	8/11/2021 12:20	0.993	0.510	1.000	1.057	94.6%	1.75%
8	8D	60	0	76	1.267	8/11/2021 15:17	8/6/2021 13:00	8/11/2021 12:20	0.993	0.717	1.000	1.057	95.0%	1.75%
9	9A	60	6	39	0.650	8/11/2021 15:17	8/6/2021 13:00	8/11/2021 12:20	0.993	0.716	1.000	1.057	92.1%	1.76%
10	9B	60	3	53	0.883	8/11/2021 15:16	8/6/2021 13:00	8/11/2021 12:20	0.997	0.718	1.000	1.057	96.6%	1.74%
11	9C	60	4	40	0.667	8/11/2021 15:16	8/6/2021 13:00	8/11/2021 12:20	0.993	0.717	1.000	1.057	90.5%	1.77%
12	9D	60	10	793	13.217	8/11/2021 15:16	8/6/2021 13:00	8/11/2021 12:20	0.997	0.717	1.000	1.057	89.4%	1.77%

Pos.	Calibration Data: 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	6/1/2021	5/31/2022	0.6428	0.01614	0.483	8/6/2021 18:34	1000
2	PIC	6/1/2021	5/31/2022	0.6497	0.00988	0.768	8/6/2021 18:34	1000
3	PIC	6/1/2021	5/31/2022	0.6259	0.02297	0.574	8/6/2021 18:34	1000
4	PIC	6/1/2021	5/31/2022	0.6571	0.00851	0.545	8/6/2021 18:35	1000
5	PIC	6/1/2021	5/31/2022	0.6672	0.00657	1.843	8/6/2021 18:35	1000
6	PIC	6/1/2021	5/31/2022	0.6476	0.00925	0.474	8/6/2021 18:35	1000
7	PIC	6/1/2021	5/31/2022	0.6514	0.01028	1.162	8/6/2021 18:29	1000
8	PIC	6/1/2021	5/31/2022	0.6443	0.00609	1.301	8/6/2021 18:32	1000
9	PIC	6/1/2021	5/31/2022	0.6471	0.00758	0.668	8/6/2021 18:32	1000
10	PIC	6/1/2021	5/31/2022	0.6635	0.00754	0.792	8/6/2021 18:32	1000
11	PIC	6/1/2021	5/31/2022	0.6408	0.00584	0.665	8/6/2021 18:32	1000
12	PIC	6/1/2021	5/31/2022	0.6629	0.02610	0.828	8/6/2021 18:32	1000

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 : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1965-B
LCS Exp Date : 9/24/2021
LCS Activity (dpm/ml): 345.40
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	0.2733	0.1929	1	0.4493	**0.0427**	283.27%	0.0337	0.0954	0.2373	0.2376		SAMPLE				
2	0.3537	0.2497	1	0.5645	**-0.1538**	91.30%	-0.1180	0.1077	0.2751	0.2752		SAMPLE				
3	1.0076	0.7114	3	1.6375	**0.8274**	60.05%	0.1927	0.1155	0.9726	0.9952		SAMPLE				
4	0.9519	0.6720	3	1.5523	**3.4210**	18.69%	0.8217	0.1527	1.2463	1.5147		SAMPLE				
5	1.6460	1.1621	3	2.5200	**-0.1031**	680.60%	-0.0263	0.1792	1.3753	1.3754		SAMPLE				
6	0.8019	0.5661	3	1.3203	**0.2858**	129.21%	0.0760	0.0982	0.7238	0.7273		SAMPLE				
7	1.6995	1.1999	3	2.6543	**-0.9944**	67.31%	-0.1953	0.1314	1.3114	1.3116		SAMPLE				
8	1.2840	0.9065	3	1.9947	**-0.1248**	436.04%	-0.0343	0.1497	1.0666	1.0667		SAMPLE				
9	0.9453	0.6674	3	1.5215	**-0.0672**	595.80%	-0.0180	0.1072	0.7850	0.7852		SAMPLE				
10	0.3169	0.2237	1	0.5049	**0.1050**	136.39%	0.0913	0.1246	0.2807	0.2819		MB				
11	0.3224	0.2277	1	0.5191	**2.128E-03**	6511.07%	0.0017	0.1085	0.2716	0.2716	550391001.1	DUP	* 0.0%			
12	0.3504	0.2474	1	0.5570	**15.4062**	4.94%	12.3887	0.4702	1.1461	4.1087		LCS			17.2258	89.4%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
550391001	3B	60	4	31	8/11/2021 15:16	8/11/2021 16:16	PIC	2155848
550402001	3C	60	0	39	8/11/2021 15:16	8/11/2021 16:16	PIC	2155848
550489001	3D	60	5	46	8/11/2021 15:17	8/11/2021 16:17	PIC	2155848
550670001	5A	60	6	82	8/11/2021 15:17	8/11/2021 16:17	PIC	2155848
550670002	5C	60	5	109	8/11/2021 15:17	8/11/2021 16:17	PIC	2155848
550670003	5D	60	7	33	8/11/2021 15:17	8/11/2021 16:17	PIC	2155848
550670004	14B	60	4	58	8/11/2021 18:18	8/11/2021 19:18	PIC	2155848
550670005	8D	60	0	76	8/11/2021 15:17	8/11/2021 16:17	PIC	2155848
550670006	9A	60	6	39	8/11/2021 15:17	8/11/2021 16:17	PIC	2155848
1204873957	9B	60	3	53	8/11/2021 15:16	8/11/2021 16:16	PIC	2155848
1204873958	9C	60	4	40	8/11/2021 15:16	8/11/2021 16:16	PIC	2155848
1204873959	9D	60	10	793	8/11/2021 15:16	8/11/2021 16:16	PIC	2155848

ASSAY 11-Aug-21 13:10:44
Wizard 2480 s/n 46190630
Protocol id 9 Ba-133_1
Time limit
Count limit
Isotope Ba-133_1
Protocol date 8/11/2021
Run id. 4076

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	94	1	180	1727	575.57	2.41		01:10:44
550391001	2	94	2	180	1570	523.24	2.52	90.91	01:13:58
550402001	3	94	3	180	1513.5	504.4	2.57	87.63	01:17:12
550489001	4	94	4	180	1431	476.95	2.64	82.87	01:20:26
550670001	5	94	5	180	1401	466.91	2.67	81.12	01:23:40
550670002	1	6	1	180	1473.5	491.08	2.61	85.32	01:27:23
550670003	2	6	2	180	1569	522.91	2.52	90.85	01:30:37
550670004	3	6	3	180	1633	544.24	2.47	94.56	01:33:51
550670005	4	6	4	180	1641.5	547.07	2.47	95.05	01:37:05
550670006	5	6	5	180	1590.5	530.08	2.51	92.10	01:40:19
1204873957	1	98	1	180	1668	555.9	2.45	96.58	01:43:55
1204873958	2	98	2	180	1563	520.9	2.53	90.50	01:47:09
1204873959	3	98	3	180	1544	514.57	2.54	89.40	01:50:22

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 11-Aug-2021

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

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
G5400W1W	Above	Alpha eff	11-Aug 07:32	5	10961	9243	10360	+6.23
G5400W1W	Below	Alpha XTalk	11-Aug 07:32	5	0.268	0.315	0.385	-7.02
G5400W1X	Above	Alpha eff	11-Aug 07:32	5	12921	11590	12740	+3.94
G5400W1X	Below	Alpha XTalk	11-Aug 07:32	5	0.275	0.309	0.362	-6.71
G5400W1X	Above	Beta eff	11-Aug 07:38	5	14697	10900	14350	+3.60
G5400W1Y	Below	Alpha XTalk	11-Aug 07:32	5	0.285	0.323	0.399	-5.94
G5400W1Z	Above	Alpha eff	11-Aug 07:32	5	10649	9353	10020	+8.66
G5400W1Z	Below	Alpha XTalk	11-Aug 07:32	5	0.278	0.324	0.364	-10.07
LB4100E2	Above	Beta bkg	11-Aug 03:28	60	2.783	0.950	2.756	+3.09
LB4100E2	Below	Beta eff	11-Aug 04:33	5	14990	15220	16690	-3.94
LB4100F3	need 2nd	Alpha bkg	11-Aug 05:06	60	0.283	-7.68E-2	0.332	+2.28
LB4100F3	Above	Beta bkg	11-Aug 05:06	60	2.233	0.623	1.869	+4.75
LB4100G3	Above	Beta bkg	11-Aug 03:29	60	6.217	0.810	1.674	+34.55
LB4100I2	Above	Beta bkg	11-Aug 03:29	60	6.650	0.454	2.413	+15.98
LB4100I3	Above	Alpha bkg	11-Aug 03:29	60	0.317	-5.83E-2	0.217	+5.16
LB4100I3	need 2nd	Alpha eff	11-Aug 04:53	5	8550	8322	10490	-2.37
LB4100I3	Above	Beta bkg	11-Aug 03:29	60	2.233	-1.28E-1	3.548	+0.85
LB4100I3	Below	Beta eff	11-Aug 04:46	5	13392	13560	17000	-3.29
LB4100I4	need 2nd	Alpha eff	11-Aug 04:53	5	9329	8929	10920	-1.80
LB4100I4	need 2nd	Beta bkg	11-Aug 03:29	60	1.250	0.543	1.279	+2.76
LB4100I4	need 2nd	Beta eff	11-Aug 04:46	5	15393	15290	19590	-2.86
PIC1A	Above	Beta bkg	11-Aug 03:56	60	2.550	-7.65E-1	2.862	+2.48
PIC1B	Below	Alpha eff	11-Aug 03:39	5	9496	9633	13740	-3.20
PIC1B	Above	Alpha XTalk	11-Aug 03:39	5	0.564	0.154	0.541	+3.35
PIC2A	Below	Beta eff	11-Aug 05:28	5	50486	50780	53290	-3.70
PIC2B	Above	Beta bkg	11-Aug 04:57	60	1.483	-8.03E-2	1.272	+3.94
PIC5B	Above	Alpha XTalk	11-Aug 06:11	5	0.320	0.255	0.317	+3.27
PIC5B	need 2nd	Beta eff	11-Aug 04:43	5	19978	19670	22170	-2.26
PIC6B	need 2nd	Alpha bkg	11-Aug 04:50	60	0.00E+0	-6.69E-2	0.412	-2.16
PIC6B	Above	Beta bkg	11-Aug 04:50	60	2.783	0.389	2.636	+3.39

PIC8A	Above	Beta bkg	11-Aug 06:10	60	2.167	-8.65E-2	2.044	+3.35
PIC8C	Below	Alpha eff	11-Aug 06:11	5	19746	19780	22670	-3.07
PIC10B	Below	Alpha eff	11-Aug 04:48	5	8556	8621	9829	-3.32
PIC10C	Above	Beta bkg	11-Aug 05:02	60	2.783	-4.21E-1	2.248	+4.20
PIC11A	Above	Beta bkg	11-Aug 06:14	60	2.133	0.488	1.849	+4.25
PIC13A	need 2nd	Alpha bkg	11-Aug 07:23	60	0.150	-5.93E-2	0.321	+0.30
PIC13A	Above	Beta bkg	11-Aug 07:23	60	4.333	-4.90E-2	2.532	+7.19
PIC13B	Above	Alpha bkg	11-Aug 06:17	60	0.683	-5.85E-2	0.391	+6.89
PIC13B	Above	Beta bkg	11-Aug 06:17	60	2.450	0.150	2.262	+3.53
PIC13B	Above	Beta XTalk	11-Aug 05:07	5	7.01E-4	1.58E-4	6.72E-4	+3.33

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

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

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

Reviewed by R. Beck - Narmoa

Date 8-11-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 2155848**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204873957	MB	JXC9	PIC9B	AUG-11-21 15:16:40	DONE	25mm Filter	01-JUN-21 00:00
1204873958	DUP	JXC9	PIC9C	AUG-11-21 15:16:44	DONE	25mm Filter	01-JUN-21 00:00
1204873959	LCS	JXC9	PIC9D	AUG-11-21 15:16:48	DONE	25mm Filter	01-JUN-21 00:00
550391001	SAMPLE	JXC9	PIC3B	AUG-11-21 15:16:53	DONE	25mm Filter	01-JUN-21 00:00
550402001	SAMPLE	JXC9	PIC3C	AUG-11-21 15:16:57	DONE	25mm Filter	01-JUN-21 00:00
550489001	SAMPLE	JXC9	PIC3D	AUG-11-21 15:17:00	DONE	25mm Filter	01-JUN-21 00:00
550670001	SAMPLE	JXC9	PIC5A	AUG-11-21 15:17:05	DONE	25mm Filter	01-JUN-21 00:00
550670002	SAMPLE	JXC9	PIC5C	AUG-11-21 15:17:12	DONE	25mm Filter	01-JUN-21 00:00
550670003	SAMPLE	JXC9	PIC5D	AUG-11-21 15:17:15	DONE	25mm Filter	01-JUN-21 00:00
550670005	SAMPLE	JXC9	PIC8D	AUG-11-21 15:17:26	DONE	25mm Filter	01-JUN-21 00:00
550670006	SAMPLE	JXC9	PIC9A	AUG-11-21 15:17:29	DONE	25mm Filter	01-JUN-21 00:00
550670004	SAMPLE	JXC9	PIC14B	AUG-11-21 18:18:52	DONE	25mm Filter	01-JUN-21 00:00

Lucas Cell Raw Data

Batch 2155852 Check-list

This check-list was completed on 16-AUG-21 by Lyndsey Pace

This batch was reviewed by Lyndsey Pace on 16-AUG-21 and Elizabeth Krouse on 17-AUG-21.

Batch ID:	**Product:**	**Description:** Lucas Cell Radium 226
2155852	LUC26RAL	GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
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 and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−226 in Liquid

Batch ID: **2155852**
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL−RAD−A−008 REV# 15
Instrument: SP−C018367602

Due Dates for Lab: 17−AUG−2021 **Package: 21−AUG−2021** **SDG: 19−AUG−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204873972	Radium−226 SPIKE	1715−E	.1	mL
MS	1204873971	Radium−226 SPIKE	1715−E	.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	550391001	04−AUG−2021	1	502.84	502.84	08/11/21 08:25	703	08/16/21 06:35	08/16/21 09:31	7	39
2	550402001	04−AUG−2021	1	500.51	500.51	08/11/21 08:25	801	08/16/21 06:35	08/16/21 09:31	1	16
3	550489001	04−AUG−2021	1	500.86	500.86	08/11/21 08:25	102	08/16/21 07:05	08/16/21 10:03	2	4
4	550670001	04−AUG−2021	1	503.45	503.45	08/11/21 08:25	204	08/16/21 07:05	08/16/21 10:03	1	47
5	550670002	04−AUG−2021	1	501.3	501.3	08/11/21 08:25	305	08/16/21 07:05	08/16/21 10:03	1	15
6	550670003	04−AUG−2021	1	503.43	503.43	08/11/21 08:25	407	08/16/21 07:05	08/16/21 10:03	4	11
7	550670004	04−AUG−2021	1	502.73	502.73	08/11/21 08:25	504	08/16/21 07:05	08/16/21 10:03	5	13
8	550670005	04−AUG−2021	1	506.25	506.25	08/11/21 08:25	606	08/16/21 07:05	08/16/21 10:03	8	14
9	550670006	04−AUG−2021	1	501.73	501.73	08/11/21 08:25	705	08/16/21 07:05	08/16/21 10:03	7	15
10	1204873969 MB	04−AUG−2021	1		506.25	08/11/21 08:25	806	08/16/21 07:05	08/16/21 10:03	6	11
11	1204873970 DUP (550391001)	04−AUG−2021	1	500.78	500.78	08/11/21 08:25	105	08/16/21 07:35	08/16/21 10:38	3	31
12	1204873971 MS (550391001)	04−AUG−2021	1	101.78	101.78	08/11/21 08:25	208	08/16/21 07:35	08/16/21 10:38	1	855
13	1204873972 LCS	04−AUG−2021	1		506.25	08/11/21 08:25	307	08/16/21 07:35	08/16/21 10:38	1	819

Reagent/Solvent Lot ID	Description	Amount

Comments:
Spike Pipet ID: RAD−RA226−2766953
Bkg Count Time: 30 Minutes
Sample Count Time: 30 Minutes
Data Entry Date2: 16−AUG−2021 09:31 SP−C018367602 Lyndsey Pace
Data Entry Date2: 16−AUG−2021 10:03 SP−C018367602 Lyndsey Pace
Data Entry Date2: 16−AUG−2021 10:38 SP−C018367602 Lyndsey Pace
Data Entry Date3: 04−AUG−2021 00:00

Radium-226 Liquid

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

Batch : 2155852
Analyst : LIN01615
Prep Date : 8/4/2021
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	550391001.1	0.5028	2.0267E-05	7/20/2021 9:00	703	30	39	1.300	7	0.233	30	1.7970
2	550402001.1	0.5005	2.0258E-05	7/20/2021 11:00	801	30	16	0.533	1	0.033	30	1.4860
3	550489001.1	0.5009	2.0259E-05	7/17/2021 12:15	102	30	4	0.133	2	0.067	30	1.5460
4	550670001.1	0.5035	2.0270E-05	7/20/2021 13:56	204	30	47	1.567	1	0.033	30	1.6950
5	550670002.1	0.5013	2.0261E-05	7/20/2021 12:31	305	30	15	0.500	1	0.033	30	1.8640
6	550670003.1	0.5034	2.0270E-05	7/20/2021 10:41	407	30	11	0.367	4	0.133	30	1.9150
7	550670004.1	0.5027	2.0267E-05	7/20/2021 8:56	504	30	13	0.433	5	0.167	30	1.5780
8	550670005.1	0.5063	2.0281E-05	7/20/2021 10:41	606	30	14	0.467	8	0.267	30	1.8560
9	550670006.1	0.5017	2.0263E-05	7/20/2021 8:05	705	30	15	0.500	7	0.233	30	1.7890
10	1204873969.1	0.5063	2.0281E-05	8/4/2021 0:00	806	30	11	0.367	6	0.200	30	1.7130
11	1204873970.1	0.5008	2.0259E-05	7/20/2021 9:00	105	30	31	1.033	3	0.100	30	1.6180
12	1204873971.1	0.1018	1.1479E-05	7/20/2021 9:00	208	30	855	28.500	1	0.033	30	1.6950
13	1204873972.1	0.5063	2.0281E-05	8/4/2021 0:00	307	30	819	27.300	1	0.033	30	1.8160

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			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
9.100%	11/1/2020	10/31/2021	8/11/2021 8:25	8/16/2021 6:35	8/16/2021 9:31	0.590	0.978	1.002	1.000
1.000%	4/1/2021	3/31/2022	8/11/2021 8:25	8/16/2021 6:35	8/16/2021 9:31	0.590	0.978	1.002	1.000
2.800%	5/2/2021	4/30/2022	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
7.800%	8/1/2021	7/31/2022	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
7.600%	1/1/2021	12/31/2021	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
8.500%	2/1/2021	1/31/2022	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
8.500%	6/1/2021	5/31/2022	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
4.100%	7/1/2021	6/30/2022	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
8.600%	11/1/2020	10/31/2021	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
1.500%	4/1/2021	3/31/2022	8/11/2021 8:25	8/16/2021 7:05	8/16/2021 10:03	0.592	0.978	1.002	1.000
1.700%	5/2/2021	4/30/2022	8/11/2021 8:25	8/16/2021 7:35	8/16/2021 10:38	0.593	0.977	1.002	1.000
2.600%	8/1/2021	7/31/2022	8/11/2021 8:25	8/16/2021 7:35	8/16/2021 10:38	0.593	0.977	1.002	1.000
2.100%	1/1/2021	12/31/2021	8/11/2021 8:25	8/16/2021 7:35	8/16/2021 10:38	0.593	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-E
Spike Exp Date : 5/21/2022
Spike Activity (dpm/ml): 300.15
Spike Volume Added: 0.10

LCS S/N : 1715-E
LCS Exp Date : 5/21/2022
LCS Activity (dpm/ml): 300.15
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	0.2513	0.1775	1	0.4414	**0.9226**	23.07%	1.0667	0.2261	0.3833	0.4378		SAMPLE				
2	0.1154	0.0815	1	0.2681	**0.5254**	27.51%	0.5000	0.1374	0.2831	0.2932		SAMPLE				
3	0.1564	0.1104	1	0.3215	**0.0671**	122.51%	0.0667	0.0816	0.1611	0.1615		SAMPLE				
4	0.1004	0.0709	1	0.2331	**1.4010**	16.96%	1.5333	0.2309	0.4136	0.5078		SAMPLE				
5	0.0917	0.0647	1	0.2129	**0.3894**	29.56%	0.4667	0.1333	0.2181	0.2325		SAMPLE				
6	0.1777	0.1254	1	0.3317	**0.1887**	55.98%	0.2333	0.1291	0.2046	0.2088		SAMPLE				
7	0.2414	0.1704	1	0.4391	**0.2621**	53.71%	0.2667	0.1414	0.2724	0.2785		SAMPLE				
8	0.2578	0.1820	1	0.4470	**0.1660**	78.28%	0.2000	0.1563	0.2543	0.2558		SAMPLE				
9	0.2524	0.1782	1	0.4433	**0.2316**	59.26%	0.2667	0.1563	0.2662	0.2711		SAMPLE				
10	0.2419	0.1708	1	0.4315	**0.1498**	82.48%	0.1667	0.1374	0.2422	0.2432		MB				
11	0.1827	0.1290	1	0.3540	**0.8964**	20.89%	0.9333	0.1944	0.3659	0.3892	550391001.1	DUP	2.9%			
12	0.4954	0.3498	1	1.1506	**128.4039**	4.30%	28.4667	0.9752	8.6221	21.4641	550391001.1	MS			132.8388	96.0%
13	0.0930	0.0656	1	0.2159	**23.0790**	4.08%	27.2667	0.9545	1.5835	3.8090		LCS			26.7064	86.4%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 16-AUG-2021

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:30	1	1.22E+05	121990	-0.25		
LUCAS2	EFF	06:30	1	1.33E+05	133257	2.17		
LUCAS3	EFF	06:30	1	1.34E+05	134485	2		
LUCAS4	EFF	06:30	1	1.28E+05	128319	1.12		
LUCAS5	EFF	06:30	1	1.29E+05	129403	-0.26		
LUCAS6	EFF	06:30	1	1.30E+05	129841	-2.02		
LUCAS7	EFF	06:30	1	1.32E+05	131514	-0.54		
LUCAS8	EFF	06:30	1	1.29E+05	129459	0.7		

Reviewed by: Lyndsey Pace **Date:** 16-AUG-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 2155852**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
550391001	SAMPLE	LXP1	LUCAS7	AUG-16-21 09:31:00	DONE	Lucas Cell	01-NOV-20 00:00
550402001	SAMPLE	LXP1	LUCAS8	AUG-16-21 09:31:00	DONE	Lucas Cell	01-APR-21 00:00
550489001	SAMPLE	LXP1	LUCAS1	AUG-16-21 10:03:00	DONE	Lucas Cell	02-MAY-21 00:00
550670001	SAMPLE	LXP1	LUCAS2	AUG-16-21 10:03:00	DONE	Lucas Cell	01-AUG-21 00:00
550670002	SAMPLE	LXP1	LUCAS3	AUG-16-21 10:03:00	DONE	Lucas Cell	01-JAN-21 00:00
550670003	SAMPLE	LXP1	LUCAS4	AUG-16-21 10:03:00	DONE	Lucas Cell	01-FEB-21 00:00
550670004	SAMPLE	LXP1	LUCAS5	AUG-16-21 10:03:00	DONE	Lucas Cell	01-JUN-21 00:01
550670005	SAMPLE	LXP1	LUCAS6	AUG-16-21 10:03:00	DONE	Lucas Cell	01-JUL-21 00:00
550670006	SAMPLE	LXP1	LUCAS7	AUG-16-21 10:03:00	DONE	Lucas Cell	01-NOV-20 00:00
1204873969	MB	LXP1	LUCAS8	AUG-16-21 10:03:00	DONE	Lucas Cell	01-APR-21 00:00
1204873970	DUP	LXP1	LUCAS1	AUG-16-21 10:38:00	DONE	Lucas Cell	02-MAY-21 00:00
1204873971	MS	LXP1	LUCAS2	AUG-16-21 10:38:00	DONE	Lucas Cell	01-AUG-21 00:00
1204873972	LCS	LXP1	LUCAS3	AUG-16-21 10:38:00	DONE	Lucas Cell	01-JAN-21 00:00

Analytical Laboratory Report

Final Report

Report ID: S26817.01(02)
Generated on 09/01/2021
Replaces report S26817.01(01) generated on 08/06/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S26817.01-S26817.08
Project: Erickson AM MI Sampling
Collected Date(s): 08/03/2021
Submitted Date/Time: 08/04/2021 09:45
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (8 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S26817.01	MW-1 L108012-01	Groundwater	08/03/21 13:52
S26817.02	MW-2 L108012-02	Groundwater	08/03/21 16:59
S26817.03	MW-3 L108012-03	Groundwater	08/03/21 10:28
S26817.04	MW-4 L108012-04	Groundwater	08/03/21 12:01
S26817.05	MW-5 L108012-05	Groundwater	08/03/21 17:28
S26817.06	MW-6 L108012-06	Groundwater	08/03/21 15:26
S26817.07	Field Dupe MW-4 L108012-07	Groundwater	08/03/21 12:01
S26817.08	Field Blank L108012-08	Groundwater	08/03/21 07:45

Lab Sample ID: S26817.01
Sample Tag: MW-1 L108012-01
Collected Date/Time: 08/03/2021 13:52
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 09:41, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 09:44, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	46	10	0.16	mg/L	10	16887-00-6	
Sulfate	57	10	0.59	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	748	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	11	3	1	mg/L	1.33		

Metals

Method: E200.8, Run Date: 08/05/21 16:35, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	153	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 13:48, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:17, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	0.005	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.109	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	0.22	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	

Lab Sample ID: S26817.01 (continued)
Sample Tag: MW-1 L108012-01

Method: E200.8, Run Date: 08/04/21 14:17, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.016	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:08, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	6.61	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 14:52, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26817.02
Sample Tag: MW-2 L108012-02
Collected Date/Time: 08/03/2021 16:59
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 09:51, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 09:57, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	79	25	0.40	mg/L	25	16887-00-6	
Sulfate	504	25	1.5	mg/L	25	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,300	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	10	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/05/21 16:36, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	226	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 13:50, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:19, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.039	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	6.17	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	

Lab Sample ID: S26817.02 (continued)
Sample Tag: MW-2 L108012-02

Method: E200.8, Run Date: 08/04/21 14:19, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.058	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	0.012	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	0.025	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:09, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	0.66	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 14:54, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26817.03
Sample Tag: MW-3 L108012-03
Collected Date/Time: 08/03/2021 10:28
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 10:02, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 10:10, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	92	50	0.80	mg/L	50	16887-00-6	
Sulfate	727	50	3.0	mg/L	50	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,500	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	1	3	1	mg/L	1.00		b

Metals

Method: E200.8, Run Date: 08/05/21 16:37, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	223	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 13:52, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:22, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.021	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	6.16	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S26817.03 (continued)

Sample Tag: MW-3 L108012-03

Method: E200.8, Run Date: 08/04/21 14:22, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.086	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	0.153	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:11, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	2.05	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 14:56, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26817.04
Sample Tag: MW-4 L108012-04
Collected Date/Time: 08/03/2021 12:01
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 10:12, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 10:23, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	68	10	0.16	mg/L	10	16887-00-6	
Sulfate	52	10	0.59	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	568	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	1	3	1	mg/L	1.00		b

Metals

Method: E200.8, Run Date: 08/05/21 16:39, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	98.4	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 13:54, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:24, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	0.008	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.155	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	0.08	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S26817.04 (continued)
Sample Tag: MW-4 L108012-04

Method: E200.8, Run Date: 08/04/21 14:24, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.010	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	0.009	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:12, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	1.43	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 14:57, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26817.05
Sample Tag: MW-5 L108012-05
Collected Date/Time: 08/03/2021 17:28
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 10:22, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 10:36, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	66	50	0.80	mg/L	50	16887-00-6	
Sulfate	700	50	3.0	mg/L	50	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,390	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	4	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/05/21 16:40, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	229	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 13:56, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:26, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.040	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	4.82	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	

Lab Sample ID: S26817.05 (continued)
Sample Tag: MW-5 L108012-05

Method: E200.8, Run Date: 08/04/21 14:26, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.078	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	0.039	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	0.010	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:13, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	1.12	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	0.005	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 14:59, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26817.06
Sample Tag: MW-6 L108012-06
Collected Date/Time: 08/03/2021 15:26
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 10:32, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 10:49, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	27	10	0.16	mg/L	10	16887-00-6	
Sulfate	139	10	0.59	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	692	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	2	3	1	mg/L	1.00		b

Metals

Method: E200.8, Run Date: 08/05/21 16:41, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	146	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 13:57, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:29, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.043	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	0.76	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S26817.06 (continued)

Sample Tag: MW-6 L108012-06

Method: E200.8, Run Date: 08/04/21 14:29, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.047	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	0.029	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	0.007	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:15, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	0.02	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 15:01, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26817.07
Sample Tag: Field Dupe MW-4 L108012-07
Collected Date/Time: 08/03/2021 12:01
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 10:42, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 11:02, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	68	10	0.16	mg/L	10	16887-00-6	
Sulfate	53	10	0.59	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	570	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	1	3	1	mg/L	1.00		b

Metals

Method: E200.8, Run Date: 08/05/21 16:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	94.6	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 13:59, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:36, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	0.008	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.159	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	0.07	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S26817.07 (continued)
Sample Tag: Field Dupe MW-4 L108012-07

Method: E200.8, Run Date: 08/04/21 14:36, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.010	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:16, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	1.46	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 15:05, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S26817.08
Sample Tag: Field Blank L108012-08
Collected Date/Time: 08/03/2021 07:45
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/04/21 12:00	CCM	
Metal Digestion	Completed	SW3015A	08/04/21 12:00	JRH	

Inorganics

Method: E300.0, Run Date: 08/05/21 10:52, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	

Method: E300.0, Run Date: 08/05/21 11:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.04	mg/L	2.5	16887-00-6	
Sulfate	Not detected	2.5	0.15	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 08/04/21 13:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/04/21 14:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/05/21 16:33, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 08/05/21 14:01, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	

Method: E200.8, Run Date: 08/04/21 14:34, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.00026	mg/L	5	7440-38-2	
Barium	Not detected	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	

Lab Sample ID: S26817.08 (continued)
Sample Tag: Field Blank L108012-08

Method: E200.8, Run Date: 08/04/21 14:34, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	

Method: E200.8, Run Date: 08/04/21 16:17, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Iron	Not detected	0.02	0.0019	mg/L	5	7439-89-6	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 08/04/21 15:03, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/01/21 15:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID: S26817
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI Sampling
Submitted: 08/04/2021 09:45 Login User: PFD

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 2.8
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL UPS# 1Z4664770363164488
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S26817 Submitted: 08/04/2021 09:45

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Sampling

Initial Preservation Check: 08/04/2021 10:18 PFD

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S26817.01	125ml Plastic HNO3	<2			
S26817.01	1L Plastic HNO3	<2			
S26817.01	1L Plastic HNO3	<2			
S26817.02	125ml Plastic HNO3	<2			
S26817.02	1L Plastic HNO3	<2			
S26817.02	1L Plastic HNO3	<2			
S26817.03	125ml Plastic HNO3	<2			
S26817.03	1L Plastic HNO3	<2			
S26817.03	1L Plastic HNO3	<2			
S26817.04	125ml Plastic HNO3	<2			
S26817.04	1L Plastic HNO3	<2			
S26817.04	1L Plastic HNO3	<2			
S26817.05	125ml Plastic HNO3	<2			
S26817.05	1L Plastic HNO3	<2			
S26817.05	1L Plastic HNO3	<2			
S26817.06	125ml Plastic HNO3	<2			
S26817.06	1L Plastic HNO3	<2			
S26817.06	1L Plastic HNO3	<2			
S26817.07	125ml Plastic HNO3	<2			
S26817.07	1L Plastic HNO3	<2			
S26817.07	1L Plastic HNO3	<2			
S26817.08	125ml Plastic HNO3	<2			
S26817.08	1L Plastic HNO3	<2			
S26817.08	1L Plastic HNO3	<2			

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI Sampling
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☒ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES

Project Locations: ☐ Detroit ☐ New York ☐ Other

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Special Instructions
26817.01	8/3/21	1352	MW-1 L108012-01	GW	5	3		2					✓	✓	✓	✓	✓	Metals to analyse:
.02		1659	MW-2 -02	GW	5	3		2					✓	✓	✓	✓	✓	B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		1028	MW-3 -03	GW	5	3		2					✓	✓	✓	✓	✓	Co, Li, Hg, Mo, Pb, Se, Tl,
.04		1201	MW-4 -04	GW	5	3		2					✓	✓	✓	✓	✓	Fe, Cu, Ni, Ag, V, Zn
.05		1728	MW-5 -05	GW	5	3		2					✓	✓	✓	✓	✓	Please send a preliminary report
.06		1526	MW-6 -06	GW	5	3		2					✓	✓	✓	✓	✓	
.07		1201	Field Dupe MW-4 -07	GW	5	3		2					✓	✓	✓	✓	✓	
.08		0745	Field Blank -08	DI	5	3		2					✓	✓	✓	✓	✓	

RELINQUISHED BY: SIGNATURE/ORGANIZATION ☒ Sampler DATE 8-4-21 TIME 0944
RECEIVED BY: SIGNATURE/ORGANIZATION DATE 8/4/21 TIME 0945
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 2.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Final Report

Report ID: S27480.01(02)
Generated on 09/24/2021
Replaces report S27480.01(01) generated on 08/27/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S27480.01-S27480.06
Project: Erickson AM MI New Wells 7-10
Collected Date(s): 08/24/2021
Submitted Date/Time: 08/25/2021 08:42
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S27480.01	MW-7 L108011-01	Groundwater	08/24/21 14:06
S27480.02	MW-8 L108011-02	Groundwater	08/24/21 12:36
S27480.03	MW-9 L108011-03	Groundwater	08/24/21 10:51
S27480.04	MW-10 L108011-04	Groundwater	08/24/21 09:16
S27480.05	Field Dupe MW-9 L108011-05	Groundwater	08/24/21 10:51
S27480.06	Field Blank L108011-06	Water	08/24/21 08:20

Lab Sample ID: S27480.01
Sample Tag: MW-7 L108011-01
Collected Date/Time: 08/24/2021 14:06
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.0	IR
2	1L Plastic	None	Yes	4.0	IR
1	125ml Plastic	HNO3	Yes	4.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/25/21 11:15	JRH	
Metal Digestion	Completed	SW3015A	08/25/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 08/26/21 09:13, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 08/26/21 10:23, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	74	10	0.13	mg/L	10	16887-00-6	
Sulfate	184	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 08/25/21 20:40, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	592	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/25/21 16:30, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1.00	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/25/21 14:14, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	112	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 08/25/21 11:54, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	0.007	0.002	0.000102	mg/L	2	7440-38-2	
Barium	0.052	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	1.89	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	1.31	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	0.093	0.005	0.000654	mg/L	2	7439-93-2	

Lab Sample ID: S27480.01 (continued)
Sample Tag: MW-7 L108011-01

Method: E200.8, Run Date: 08/25/21 11:54, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.292	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	0.014	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 08/25/21 14:47, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/24/21 15:17, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S27480.02
Sample Tag: MW-8 L108011-02
Collected Date/Time: 08/24/2021 12:36
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.0	IR
2	1L Plastic	None	Yes	4.0	IR
1	125ml Plastic	HNO3	Yes	4.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/25/21 11:15	JRH	
Metal Digestion	Completed	SW3015A	08/25/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 08/26/21 09:23, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	10	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	17	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 08/25/21 20:40, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	362	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/25/21 16:30, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1.00	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/25/21 14:15, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	89.8	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 08/25/21 11:59, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	0.022	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	0.08	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S27480.02 (continued)

Sample Tag: MW-8 L108011-02

Method: E200.8, Run Date: 08/25/21 11:59, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 08/25/21 14:48, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/24/21 15:17, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S27480.03
Sample Tag: MW-9 L108011-03
Collected Date/Time: 08/24/2021 10:51
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.0	IR
2	1L Plastic	None	Yes	4.0	IR
1	125ml Plastic	HNO3	Yes	4.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/25/21 11:15	JRH	
Metal Digestion	Completed	SW3015A	08/25/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 08/26/21 09:33, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 08/25/21 20:40, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	242	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/25/21 16:30, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1.00	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/25/21 14:17, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	69.2	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 08/25/21 12:02, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	0.015	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S27480.03 (continued)

Sample Tag: MW-9 L108011-03

Method: E200.8, Run Date: 08/25/21 12:02, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 08/25/21 14:50, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/24/21 15:17, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S27480.04
Sample Tag: MW-10 L108011-04
Collected Date/Time: 08/24/2021 09:16
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.0	IR
2	1L Plastic	None	Yes	4.0	IR
1	125ml Plastic	HNO3	Yes	4.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/25/21 11:15	JRH	
Metal Digestion	Completed	SW3015A	08/25/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 08/26/21 09:43, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	14	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 08/25/21 20:40, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	432	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/25/21 16:30, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1.00	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/25/21 14:19, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	129	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 08/25/21 12:05, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	0.047	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	0.06	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S27480.04 (continued)
Sample Tag: MW-10 L108011-04

Method: E200.8, Run Date: 08/25/21 12:05, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 08/25/21 14:52, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/24/21 15:17, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S27480.05
Sample Tag: Field Dupe MW-9 L108011-05
Collected Date/Time: 08/24/2021 10:51
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.0	IR
2	1L Plastic	None	Yes	4.0	IR
1	125ml Plastic	HNO3	Yes	4.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/25/21 11:15	JRH	
Metal Digestion	Completed	SW3015A	08/25/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 08/26/21 09:53, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 08/25/21 20:40, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	256	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/25/21 16:30, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1.00	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/25/21 14:20, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	68.8	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 08/25/21 12:30, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	0.014	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S27480.05 (continued)

Sample Tag: Field Dupe MW-9 L108011-05

Method: E200.8, Run Date: 08/25/21 12:30, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 08/25/21 14:54, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/24/21 15:17, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S27480.06
Sample Tag: Field Blank L108011-06
Collected Date/Time: 08/24/2021 08:20
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.0	IR
2	1L Plastic	None	Yes	4.0	IR
1	125ml Plastic	HNO3	Yes	4.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	08/25/21 11:15	JRH	
Metal Digestion	Completed	SW3015A	08/25/21 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 08/26/21 10:03, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 08/25/21 20:40, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		

Method: SM2540D, Run Date: 08/25/21 16:30, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1.00	mg/L	1.00		

Metals

Method: E200.8, Run Date: 08/25/21 14:22, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 08/25/21 12:12, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S27480.06 (continued)

Sample Tag: Field Blank L108011-06

Method: E200.8, Run Date: 08/25/21 12:12, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 08/25/21 14:56, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 09/24/21 15:17, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID: S27480
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI New Wells 7-10
Submitted: 08/25/2021 08:42 Login User: MMC

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL UPS# 1Z4664770363322851
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S27480 Submitted: 08/25/2021 08:42

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 08/25/2021 08:57 MMC

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S27480.01	125ml Plastic HNO3	<2			
S27480.01	1L Plastic HNO3	<2			
S27480.01	1L Plastic HNO3	<2			
S27480.02	125ml Plastic HNO3	<2			
S27480.02	1L Plastic HNO3	<2			
S27480.02	1L Plastic HNO3	<2			
S27480.03	125ml Plastic HNO3	<2			
S27480.03	1L Plastic HNO3	<2			
S27480.03	1L Plastic HNO3	<2			
S27480.04	125ml Plastic HNO3	<2			
S27480.04	1L Plastic HNO3	<2			
S27480.04	1L Plastic HNO3	<2			
S27480.05	125ml Plastic HNO3	<2			
S27480.05	1L Plastic HNO3	<2			
S27480.05	1L Plastic HNO3	<2			
S27480.06	125ml Plastic HNO3	<2			
S27480.06	1L Plastic HNO3	<2			
S27480.06	1L Plastic HNO3	<2			

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing | STATE: Mi | ZIP CODE: 48901
PHONE NO.: 517-702-6372 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: | STATE: | ZIP CODE:
PHONE NO.: | E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI New Wells 7-10
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☒ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Special Instructions
27480.01	08/24/21	1406	MW-7 L108011-01	GW	5	3		2					✓	✓	✓	✓	✓	Metals to analyse:
.02		1236	MW-8 L108011-02	GW	5	3		2					✓	✓	✓	✓	✓	B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		1051	MW-9 L108011-03	GW	5	3		2					✓	✓	✓	✓	✓	Co, Li, Hg, Mo, Pb, Se, Tl,
.04		0916	MW-10 L108011-04	GW	5	3		2					✓	✓	✓	✓	✓	Fe, Cu, Ni, Ag, V, Zn
.05		1051	Field Dupe MW-9 L108011-05	GW	5	3		2					✓	✓	✓	✓	✓	Please send a preliminary report
.06		0820	Field Blank L108011-06	DI	5	3		2					✓	✓	✓	✓	✓	

RELINQUISHED BY: SIGNATURE/ORGANIZATION (Sampler)	DATE 8-25-21	TIME 0842	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE 8/25/21	TIME 0842	
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	NOTES: TEMP. ON ARRIVAL 4.0
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

September 23, 2021

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 553997
SDG: S27480

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 27, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4523.

Sincerely,

Grace Bodiford

Grace Bodiford for
Samuel Hogan
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S27480
Work Order: 553997

September 23, 2021

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 27, 2021 for analysis. 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.

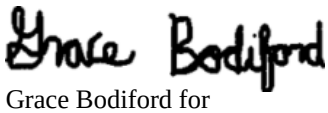
Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
553997001	S27480.01
553997002	S27480.02
553997003	S27480.03
553997004	S27480.04
553997005	S27480.05
553997006	S27480.06 (Field Blank)

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Grace Bodiford for
Samuel Hogan
Project Manager

Chain of Custody and Supporting Documentation

553997

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 FAX NO.:
E-MAIL ADDRESS: results@meritlabs.com P.O. NO.: QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague ☒ SAME
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S27480 SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐1 DAY ☐2 DAYS ☐3 DAYS ☒STANDARD ☐OTHER

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☐LEVEL III ☒LEVEL IV ☐EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**
	8/24/21	1406	S27480.01	GW	2			2					✓	✓
	8/24/21	1236	S27480.02	GW	2			2					✓	✓
	8/24/21	1051	S27480.03	GW	2			2					✓	✓
	8/24/21	0916	S27480.04	GW	2			2					✓	✓
	8/24/21	1051	S27480.05	GW	2			2					✓	✓
	8/24/21	0820	S27480.06 (Field Blank)	Wa	2			2					✓	✓

Certifications
☐OHIO VAP ☐Drinking Water
☐DoD ☐NPDES
Project Locations
☐Detroit ☐New York
☐Other

Special Instructions
* E903.1 Mod.
** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report

(No Ice needed)

** Subcontracted to
GEL Laboratories, Inc.
2040 Savage Road
Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION	☐Sampler	DATE 8/25/21	TIME 1100
RECEIVED BY: SIGNATURE/ORGANIZATION UPS		DATE 8/25/21	TIME 1100
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE 8/27/21	TIME 1005

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS
SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS

NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	SDG/AR/COC/Work Order: 553997
Received By: BE	Date Received: 8/27/21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground (UPS) Field Services Courier Other 1Z 466 477 03 6332 2851

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): 0 (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 (None) Other: *all temperatures are recorded in Celsius TEMP: 23
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR2-21 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):

PM (or PMA) review: Initials NRC Date 8/31/21 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 23 September 2021

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122021−35
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S27480
Work Order #: 553997

Product: **GFPC Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2169339

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

GEL Sample ID#	Client Sample Identification
553997001	S27480.01
553997002	S27480.02
553997003	S27480.03
553997004	S27480.04
553997005	S27480.05
553997006	S27480.06 (Field Blank)
1204900892	Method Blank (MB)
1204900893	554098008(NonSDG) Sample Duplicate (DUP)
1204900894	Laboratory Control Sample (LCS)
1204900895	554098008(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 1204900893 (Non SDG 554098008DUP) and 1204900895 (Non SDG 554098008MS) were non-homogenous matrix. Samples 1204900893 (Non SDG 554098008DUP) and 1204900895 (Non SDG 554098008MS) were dirty water.

Miscellaneous Information

Additional Comments
The matrix spike, 1204900895 (Non SDG 554098008MS), aliquot was reduced to conserve sample volume.

Product: **Lucas Cell, Ra226, Liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2169340

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

GEL Sample ID#	Client Sample Identification
553997001	S27480.01
553997002	S27480.02
553997003	S27480.03
553997004	S27480.04
553997005	S27480.05
553997006	S27480.06 (Field Blank)
1204900896	Method Blank (MB)
1204900897	554098009(NonSDG) Sample Duplicate (DUP)
1204900898	554098009(NonSDG) Matrix Spike (MS)
1204900899	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 1204900897 (Non SDG 554098009DUP) and 1204900898 (Non SDG 554098009MS) were non-homogenous matrix.

Miscellaneous Information

Additional Comments
The matrix spike, 1204900898 (Non SDG 554098009MS), 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

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

Qualifier Definition Report
for

MERI001 Merit Laboratories, Inc.

Client SDG: S27480 GEL Work Order: 553997

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: Kate Gellatly**

Date: 24 SEP 2021 **Title: Analyst I**

Sample Data Summary

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

Certificate of Analysis

Report Date: September 24, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S27480.01	Project:	MERI00120
Sample ID:	553997001	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	24-AUG-21 14:06		
Receive Date:	27-AUG-21		
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	0.535	+/-1.27	2.24	3.00	pCi/L			JXC9	09/22/21	1301	2169339	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.30	+/-1.31			pCi/L		1	NXL1	09/23/21	0850	2169762	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.766	+/-0.313	0.303	1.00	pCi/L			LXP1	09/15/21	0838	2169340	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			89.5	(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: September 24, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S27480.02
Sample ID: 553997002
Matrix: Ground Water
Collect Date: 24-AUG-21 12:36
Receive Date: 27-AUG-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.114	+/-0.849	1.59	3.00	pCi/L			JXC9	09/22/21	1301	2169339	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.551	+/-0.891			pCi/L		1	NXL1	09/23/21	0850	2169762	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.437	+/-0.271	0.370	1.00	pCi/L			LXP1	09/15/21	0838	2169340	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			85	(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: September 24, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S27480.03	Project:	MERI00120
Sample ID:	553997003	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	24-AUG-21 10:51		
Receive Date:	27-AUG-21		
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	-0.359	+/-0.975	1.90	3.00	pCi/L			JXC9	09/22/21	1301	2169339	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.266	+/-0.998			pCi/L		1	NXL1	09/23/21	0850	2169762	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.266	+/-0.209	0.295	1.00	pCi/L			LXP1	09/15/21	0838	2169340	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			82.1	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor	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: September 24, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S27480.04
Sample ID: 553997004
Matrix: Ground Water
Collect Date: 24-AUG-21 09:16
Receive Date: 27-AUG-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.187	+/-0.806	1.49	3.00	pCi/L			JXC9	09/22/21	1301	2169339	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.371	+/-0.821			pCi/L		1	NXL1	09/23/21	0850	2169762	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.183	+/-0.156	0.219	1.00	pCi/L			LXP1	09/15/21	0838	2169340	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			84.8	(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

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

Certificate of Analysis

Report Date: September 24, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S27480.05	Project:	MERI00120
Sample ID:	553997005	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	24-AUG-21 10:51		
Receive Date:	27-AUG-21		
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	1.65	+/-1.25	2.01	3.00	pCi/L			JXC9	09/22/21	1301	2169339	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.07	+/-1.27			pCi/L		1	NXL1	09/23/21	0850	2169762	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.421	+/-0.208	0.212	1.00	pCi/L			LXP1	09/15/21	0838	2169340	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			87.1	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor	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: September 24, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S27480.06 (Field Blank)	Project:	MERI00120
Sample ID:	553997006	Client ID:	MERI001
Matrix:	Water		
Collect Date:	24-AUG-21 08:20		
Receive Date:	27-AUG-21		
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	1.87	+/-1.51	2.42	3.00	pCi/L			JXC9	09/22/21	1301	2169339	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.31	+/-1.52			pCi/L		1	NXL1	09/23/21	0850	2169762	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.442	+/-0.219	0.223	1.00	pCi/L			LXP1	09/15/21	0838	2169340	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			65.5	(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

Quality Control Summary

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

QC Summary

Report Date: September 24, 2021

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **553997**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch 2169339											
QC1204900893 554098008 DUP											
Radium-228	U	0.479	U	-0.110	pCi/L	N/A		N/A	JXC9	09/22/21	13:00
	Uncertainty	+/-0.828		+/-1.06							
QC1204900894 LCS											
Radium-228	50.9			47.5	pCi/L		93.4	(75%-125%)		09/22/21	13:00
	Uncertainty			+/-3.50							
QC1204900892 MB											
Radium-228			U	0.0158	pCi/L					09/22/21	13:00
	Uncertainty			+/-0.785							
QC1204900895 554098008 MS											
Radium-228	104 U	0.479		104	pCi/L		101	(75%-125%)		09/22/21	13:00
	Uncertainty	+/-0.828		+/-7.53							
Rad Ra-226											
Batch 2169340											
QC1204900897 554098009 DUP											
Radium-226		0.725	U	0.261	pCi/L	94.2		(0% - 100%)	LXP1	09/15/21	10:27
	Uncertainty	+/-0.306		+/-0.223							
QC1204900899 LCS											
Radium-226	26.9			24.4	pCi/L		90.5	(75%-125%)		09/15/21	10:27
	Uncertainty			+/-1.51							
QC1204900896 MB											
Radium-226			U	0.250	pCi/L					09/15/21	10:27
	Uncertainty			+/-0.262							
QC1204900898 554098009 MS											
Radium-226	134	0.725		146	pCi/L		108	(75%-125%)		09/15/21	10:27
	Uncertainty	+/-0.306		+/-8.18							

Notes:

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

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported

QC Summary

Workorder: **553997**

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

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

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 2169339 Check-list

This check-list was completed on 24-SEP-21 by Kate Gellatly

This batch was reviewed by Kenshalla Oston on 23-SEP-21 and Nat Long on 23-SEP-21.

Batch ID:	**Product:**	**Description:** Gas Flow Radium 228
2169339	GFC28RAL	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 and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **2169339**
Analyst: Jasmine Conley (JXC9)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 5
Instrument: ASP−33005595

Due Dates for Lab: 23−SEP−2021 **Package: 25−SEP−2021** **SDG: 27−SEP−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204900894	Radium−228 SPIKE	1965−B	.1	mL
MS	1204900895	Radium−228 SPIKE	1965−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	553997001	07−SEP−2021	3	300.7	300.7	09/13/21 13:16	09/22/21 10:40
2	553997002	07−SEP−2021	3	300.1	300.1	09/13/21 13:16	09/22/21 10:40
3	553997003	07−SEP−2021	3	301.9	301.9	09/13/21 13:16	09/22/21 10:40
4	553997004	07−SEP−2021	3	300.3	300.3	09/13/21 13:16	09/22/21 10:40
5	553997005	07−SEP−2021	3	301	301	09/13/21 13:16	09/22/21 10:40
6	553997006	07−SEP−2021	3	300.6	300.6	09/13/21 13:16	09/22/21 10:40
7	554098001	07−SEP−2021	3	300	300	09/13/21 13:16	09/22/21 10:40
8	554098002	07−SEP−2021	3	301.7	301.7	09/13/21 13:16	09/22/21 10:40
9	554098003	07−SEP−2021	3	300.3	300.3	09/13/21 13:16	09/22/21 10:40
10	554098004	07−SEP−2021	3	301.8	301.8	09/13/21 13:16	09/22/21 10:40
11	554098005	07−SEP−2021	3	301.3	301.3	09/13/21 13:16	09/22/21 10:40
12	554098006	07−SEP−2021	3	300.5	300.5	09/13/21 13:16	09/22/21 10:40
13	554098007	07−SEP−2021	3	300.6	300.6	09/13/21 13:16	09/22/21 10:40
14	554098008	07−SEP−2021	3	301.3	301.3	09/13/21 13:16	09/22/21 10:40
15	554098009	07−SEP−2021	3	300.3	300.3	09/13/21 13:16	09/22/21 10:40
16	1204900892 MB	07−SEP−2021	3		302.3	09/13/21 13:16	09/22/21 10:40
17	1204900893 DUP (554098008)	07−SEP−2021	3	302.3	302.3	09/13/21 13:16	09/22/21 10:40
18	1204900895 MS (554098008)	07−SEP−2021	3	150.3	150.3	09/13/21 13:16	09/22/21 10:40
19	1204900894 LCS	07−SEP−2021	3		302.3	09/13/21 13:16	09/22/21 10:40

Reagent/Solvent Lot ID	Description	Amount
WORK 1951−B	Barium−133	.1 mL
WORK 1951−B	Barium−133	.2 mL
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL
REGNT 3301783	Barium Carrier Ra228 REG	1 mL
REGNT 3304359.1	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 3304867.1	RGF−Hydrofluoric Acid	4 mL
REGNT 3318677	RGF−50% Potassium Carbonate	2 mL
REGNT 3321027	RGF−1M Citric Acid	5 mL
REGNT 3321613	RGF−Neodymium Subtrate	5 mL
REGNT 3326262	RGF−1.5M Ammonium Sulfate	10 mL
REGNT 3328530	Lot #DGA0023	2 g
REGNT 3331304	2M HCL	20 mL
REGNT 3333114.9	Concentrated HNO3 (16M)	5 mL
REGNT 3334094	RGF−7M Nitric Acid	25 mL

Comments:
Pipet Id: RAD−GFC−1795419
Data Entry Date2: 07−SEP−2021 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 1951-B
Tracer Exp Date : 9/16/2022
Tracer Volume Added: 0.10

Batch : 2169339
Analyst : JAS02031
Prep Date : 9/7/2021
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

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

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	553997001.1	0.3007	1.8471E-05	8/24/2021 14:06	387.5	2.93%	346.8	3.10%	0.1	0.000200
2	553997002.1	0.3001	1.8461E-05	8/24/2021 12:36	387.5	2.93%	329.3	3.18%	0.1	0.000200
3	553997003.1	0.3019	1.8491E-05	8/24/2021 10:51	387.5	2.93%	318.0	3.24%	0.1	0.000200
4	553997004.1	0.3003	1.8464E-05	8/24/2021 9:16	387.5	2.93%	328.6	3.18%	0.1	0.000200
5	553997005.1	0.3010	1.8476E-05	8/24/2021 10:51	387.5	2.93%	337.4	3.14%	0.1	0.000200
6	553997006.1	0.3006	1.8469E-05	8/24/2021 8:20	387.5	2.93%	507.3	2.56%	0.2	0.000200
7	554098001.1	0.3000	1.8459E-05	7/27/2021 9:40	387.5	2.93%	320.3	3.23%	0.1	0.000200
8	554098002.1	0.3017	1.8488E-05	7/27/2021 10:27	387.5	2.93%	383.6	2.95%	0.1	0.000200
9	554098003.1	0.3003	1.8464E-05	7/27/2021 11:31	387.5	2.93%	324.4	3.21%	0.1	0.000200
10	554098004.1	0.3018	1.8489E-05	7/27/2021 12:22	387.5	2.93%	343.8	3.11%	0.1	0.000200
11	554098005.1	0.3013	1.8481E-05	7/27/2021 13:30	387.5	2.93%	359.6	3.04%	0.1	0.000200
12	554098006.1	0.3005	1.8468E-05	7/27/2021 14:21	387.5	2.93%	355.0	3.06%	0.1	0.000200
13	554098007.1	0.3006	1.8469E-05	7/27/2021 15:27	387.5	2.93%	355.6	3.06%	0.1	0.000200
14	554098008.1	0.3013	1.8481E-05	7/27/2021 15:38	387.5	2.93%	374.6	2.98%	0.1	0.000200
15	554098009.1	0.3003	1.8464E-05	7/27/2021 12:00	387.5	2.93%	349.3	3.09%	0.1	0.000200
16	1204900892.1	0.3023	1.8498E-05	9/7/2021 0:00	387.5	2.93%	333.6	3.16%	0.1	0.000200
17	1204900893.1	0.3023	1.8498E-05	7/27/2021 15:38	387.5	2.93%	343.8	3.11%	0.1	0.000200
18	1204900895.1	0.1503	1.4049E-05	7/27/2021 15:38	387.5	2.93%	318.3	3.24%	0.1	0.000200
19	1204900894.1	0.3023	1.8498E-05	9/7/2021 0:00	387.5	2.93%	333.9	3.16%	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

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	8D	60	4	105	1.750	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.990	0.767	1.000	1.057	89.5%	2.15%
2	9A	60	1	42	0.700	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.990	0.767	1.000	1.057	85.0%	2.18%
3	9D	60	3	54	0.900	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.990	0.767	1.000	1.057	82.1%	2.20%
4	10A	60	4	39	0.650	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.990	0.767	1.000	1.057	84.8%	2.18%
5	10B	60	3	93	1.550	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.990	0.767	1.000	1.057	87.1%	2.17%
6	10C	60	9	81	1.350	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.990	0.767	1.000	1.057	65.5%	1.95%
7	10D	60	3	24	0.400	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.981	0.767	1.000	1.057	82.7%	2.20%
8	11A	60	1	43	0.717	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.981	0.768	1.000	1.057	99.0%	2.10%
9	11C	60	3	36	0.600	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.981	0.768	1.000	1.057	83.7%	2.19%
10	11D	60	4	55	0.917	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.981	0.768	1.000	1.057	88.7%	2.16%
11	12B	60	5	87	1.450	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.981	0.767	1.000	1.057	92.8%	2.13%
12	12C	60	7	97	1.617	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.981	0.767	1.000	1.057	91.6%	2.14%
13	12D	60	7	103	1.717	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.981	0.767	1.000	1.057	91.8%	2.14%
14	13A	60	2	58	0.967	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.981	0.767	1.000	1.057	96.7%	2.11%
15	13B	60	3	55	0.917	9/22/2021 13:01	9/13/2021 13:16	9/22/2021 10:40	0.981	0.767	1.000	1.057	90.1%	2.15%
16	13D	60	11	41	0.683	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.995	0.768	1.000	1.057	86.1%	2.17%
17	14B	60	5	76	1.267	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.981	0.768	1.000	1.057	88.7%	2.16%
18	14C	60	6	876	14.600	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.981	0.768	1.000	1.057	82.1%	2.20%
19	14D	60	6	833	13.883	9/22/2021 13:00	9/13/2021 13:16	9/22/2021 10:40	0.995	0.768	1.000	1.057	86.2%	2.17%

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	6/1/2021	5/31/2022	0.6443	0.00609	1.602	9/17/2021 18:18	500
2	PIC	6/1/2021	5/31/2022	0.6471	0.00758	0.670	9/17/2021 18:18	500
3	PIC	6/1/2021	5/31/2022	0.6629	0.02610	0.994	9/17/2021 18:19	500
4	PIC	6/1/2021	5/31/2022	0.6569	0.00651	0.600	9/17/2021 18:19	500
5	PIC	6/1/2021	5/31/2022	0.6263	0.00652	1.118	9/17/2021 18:19	500
6	PIC	6/1/2021	5/31/2022	0.6487	0.00638	0.970	9/17/2021 18:19	500
7	PIC	6/1/2021	5/31/2022	0.6472	0.00557	0.454	9/17/2021 18:19	500
8	PIC	6/1/2021	5/31/2022	0.6604	0.01317	0.754	9/17/2021 18:12	500
9	PIC	6/1/2021	5/31/2022	0.6428	0.01278	0.578	9/17/2021 18:12	500
10	PIC	6/1/2021	5/31/2022	0.6567	0.01068	0.812	9/17/2021 18:12	500
11	PIC	6/1/2021	5/31/2022	0.6654	0.01114	1.326	9/17/2021 18:12	500
12	PIC	6/1/2021	5/31/2022	0.6611	0.01666	1.778	9/17/2021 18:12	500
13	PIC	6/1/2021	5/31/2022	0.6663	0.01845	1.302	9/17/2021 18:12	500
14	PIC	6/1/2021	5/31/2022	0.6689	0.00714	0.819	9/17/2021 18:12	1000
15	PIC	6/1/2021	5/31/2022	0.6628	0.00967	1.123	9/17/2021 18:12	1000
16	PIC	6/1/2021	5/31/2022	0.6574	0.01144	0.679	9/17/2021 18:12	1000
17	PIC	6/1/2021	5/31/2022	0.6514	0.01028	1.297	9/17/2021 18:12	1000
18	PIC	6/1/2021	5/31/2022	0.6590	0.01828	1.153	9/17/2021 18:12	1000
19	PIC	6/1/2021	5/31/2022	0.6457	0.00738	1.065	9/17/2021 18:12	1000

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 : 1965-B
Spike Exp Date : 8/22/2022
Spike Activity (dpm/ml): 341.54
Spike Volume Added: 0.10

LCS S/N : 1965-B
LCS Exp Date : 8/22/2022
LCS Activity (dpm/ml): 341.54
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	1.4566	1.0284	3	2.2375	**0.5350**	121.59%	0.1480	0.1799	1.2748	1.2819		SAMPLE				
2	0.9899	0.6989	3	1.5877	**0.1140**	380.16%	0.0300	0.1140	0.8492	0.8497		SAMPLE				
3	1.2119	0.8556	3	1.9021	**-0.3589**	138.70%	-0.0940	0.1303	0.9754	0.9756		SAMPLE				
4	0.9244	0.6526	3	1.4927	**0.1874**	219.40%	0.0500	0.1097	0.8060	0.8074		SAMPLE				
5	1.2859	0.9078	3	2.0067	**1.6503**	38.85%	0.4320	0.1675	1.2545	1.3218		SAMPLE				
6	1.5407	1.0878	3	2.4212	**1.8674**	41.19%	0.3800	0.1563	1.5058	1.5774		SAMPLE				
7	0.8463	0.5975	3	1.3923	**-0.2131**	161.19%	-0.0540	0.0870	0.6730	0.6732		SAMPLE				
8	0.8861	0.6256	3	1.4114	**-0.1197**	310.68%	-0.0373	0.1160	0.7287	0.7288		SAMPLE				
9	0.9468	0.6684	3	1.5325	**0.0861**	480.11%	0.0220	0.1056	0.8099	0.8101		SAMPLE				
10	1.0316	0.7283	3	1.6364	**0.3764**	124.23%	0.1047	0.1300	0.9164	0.9213		SAMPLE				
11	1.2460	0.8797	3	1.9293	**0.4215**	132.09%	0.1240	0.1638	1.0910	1.0962		SAMPLE				
12	1.4752	1.0415	3	2.2567	**-0.5607**	108.28%	-0.1613	0.1746	1.1896	1.1897		SAMPLE				
13	1.2499	0.8825	3	1.9370	**1.4269**	42.70%	0.4147	0.1767	1.1916	1.2458		SAMPLE				
14	0.9099	0.6424	3	1.4471	**0.4794**	88.14%	0.1477	0.1301	0.8280	0.8367		SAMPLE				
15	1.1574	0.8171	3	1.8106	**-0.7277**	62.11%	-0.2063	0.1281	0.8852	0.8853		SAMPLE				
16	0.9298	0.6565	3	1.4951	**0.0158**	2535.09%	0.0043	0.1099	0.7845	0.7847		MB				
17	1.2761	0.9010	3	1.9828	**-0.1098**	493.50%	-0.0303	0.1497	1.0616	1.0617	554098008.1	DUP	* 0.0%			
18	2.5836	1.8240	3	4.0365	**104.4721**	4.66%	13.4470	0.4945	7.5294	27.6620	554098008.1	MS			103.7666	100.7%
19	1.1847	0.8364	3	1.8582	**47.5158**	4.41%	12.8183	0.4821	3.5029	12.5017		LCS			50.8922	93.4%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
553997001	8D	60	4	105	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
553997002	9A	60	1	42	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
553997003	9D	60	3	54	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
553997004	10A	60	4	39	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
553997005	10B	60	3	93	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
553997006	10C	60	9	81	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
554098001	10D	60	3	24	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
554098002	11A	60	1	43	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
554098003	11C	60	3	36	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
554098004	11D	60	4	55	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
554098005	12B	60	5	87	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
554098006	12C	60	7	97	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
554098007	12D	60	7	103	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
554098008	13A	60	2	58	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
554098009	13B	60	3	55	9/22/2021 13:01	9/22/2021 14:01	PIC	2169339
1204900892	13D	60	11	41	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
1204900893	14B	60	5	76	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
1204900895	14C	60	6	876	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339
1204900894	14D	60	6	833	9/22/2021 13:00	9/22/2021 14:00	PIC	2169339

ASSAY 22-Sep-21 10:53:49
Wizard 2480 s/n 46190630
Protocol id 8 Ba-133
Time limit
Count limit
Isotope Ba-133
Protocol date 9/22/2021
Run id. 4208

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	1	1	180	1162.5	387.47	2.93		10:53:49
553997001	2	1	2	180	1040.5	346.76	3.1	89.49	10:57:03
553997002	3	1	3	180	988	329.26	3.18	84.98	11:00:17
553997003	4	1	4	180	954	317.96	3.24	82.06	11:03:31
553997004	5	1	5	180	986	328.6	3.18	84.81	11:06:45
553997005	1	10	1	180	1012.5	337.44	3.14	87.09	11:10:31
553997006	2	10	2	180	1522	507.28	2.56	* 130.92	11:13:44
554098001	3	10	3	180	961	320.28	3.23	82.66	11:16:58
554098002	4	10	4	180	1151	383.63	2.95	99.01	11:20:12
554098003	5	10	5	180	973.5	324.43	3.21	83.73	11:23:27
554098004	1	14	1	180	1031.5	343.79	3.11	88.73	11:27:03
554098005	2	14	2	180	1079	359.63	3.04	92.81	11:30:17
554098006	3	14	3	180	1065	354.96	3.06	91.61	11:33:31
554098007	4	14	4	180	1067	355.63	3.06	91.78	11:36:45
554098008	5	14	5	180	1124	374.62	2.98	96.68	11:39:59
554098009	1	18	1	180	1048	349.26	3.09	90.14	11:43:46
1204900892	2	18	2	180	1001	333.62	3.16	86.10	11:47:00
1204900893	3	18	3	180	1031.5	343.76	3.11	88.72	11:50:14
1204900895	4	18	4	180	955	318.3	3.24	82.15	11:53:28
1204900894	5	18	5	180	1002	333.93	3.16	86.18	11:56:42

END OF ASSAY

* 0.2mL of tracer added
N 9/28/21

Batch #2169339

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 22-Sep-2021

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

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E1	Below	Beta bkg	22-Sep 03:19	60	0.883	1.036	1.928	-4.03
LB4100E2	Above	Beta bkg	22-Sep 03:19	60	3.633	0.950	2.756	+5.92
LB4100E3	Above	Beta bkg	22-Sep 03:19	60	2.017	-1.31E+0	6.766	-0.53
LB4100F2	Above	Beta bkg	22-Sep 03:19	60	251	0.560	1.903	+1,116.22
LB4100F3	Above	Alpha bkg	22-Sep 03:19	60	0.317	-7.68E-2	0.332	+2.77
LB4100G2	Above	Beta bkg	22-Sep 03:19	60	6.717	0.357	2.274	+16.91
LB4100G3	need 2nd	Alpha eff	22-Sep 04:22	5	6666	6620	7779	-2.76
LB4100G3	Above	Beta bkg	22-Sep 03:19	60	8.917	0.810	1.674	+53.30
PIC1A	Above	Alpha bkg	22-Sep 05:40	60	0.317	-1.13E-1	0.365	+2.39
PIC1A	need 2nd	Beta bkg	22-Sep 05:40	60	1.517	-7.65E-1	2.862	+0.77
PIC3D	Below	Beta eff	22-Sep 08:19	5	21538	21620	23280	-3.30
PIC5A	Above	Alpha bkg	22-Sep 05:52	60	0.367	0.035	0.372	+2.91
PIC8A	Below	Alpha XTalk	22-Sep 07:46	5	0.256	0.258	0.290	-3.46
PIC11B	Above	Beta bkg	22-Sep 06:10	60	2.717	0.091	2.193	+4.49
PIC12A	Above	Beta bkg	22-Sep 06:10	60	2.117	-3.61E-1	2.728	+1.81
PIC14A	Above	Alpha bkg	22-Sep 06:18	60	0.317	-5.86E-2	0.314	+3.05

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

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

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

Reviewed by R. Smith - Harmon

Date 9-22-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 2169339**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204900892	MB	JXC9	PIC13D	SEP-22-21 13:00:34	DONE	25mm Filter	01-JUN-21 00:00
1204900893	DUP	JXC9	PIC14B	SEP-22-21 13:00:38	DONE	25mm Filter	01-JUN-21 00:00
1204900895	MS	JXC9	PIC14C	SEP-22-21 13:00:40	DONE	25mm Filter	01-JUN-21 00:00
1204900894	LCS	JXC9	PIC14D	SEP-22-21 13:00:41	DONE	25mm Filter	01-JUN-21 00:00
554098002	SAMPLE	JXC9	PIC11A	SEP-22-21 13:00:46	DONE	25mm Filter	01-JUN-21 00:00
554098003	SAMPLE	JXC9	PIC11C	SEP-22-21 13:00:48	DONE	25mm Filter	01-JUN-21 00:00
554098004	SAMPLE	JXC9	PIC11D	SEP-22-21 13:00:51	DONE	25mm Filter	01-JUN-21 00:00
554098005	SAMPLE	JXC9	PIC12B	SEP-22-21 13:00:55	DONE	25mm Filter	01-JUN-21 00:00
554098006	SAMPLE	JXC9	PIC12C	SEP-22-21 13:00:58	DONE	25mm Filter	01-JUN-21 00:00
554098007	SAMPLE	JXC9	PIC12D	SEP-22-21 13:01:02	DONE	25mm Filter	01-JUN-21 00:00
553997001	SAMPLE	JXC9	PIC8D	SEP-22-21 13:01:06	DONE	25mm Filter	01-JUN-21 00:00
554098008	SAMPLE	JXC9	PIC13A	SEP-22-21 13:01:06	DONE	25mm Filter	01-JUN-21 00:00
553997002	SAMPLE	JXC9	PIC9A	SEP-22-21 13:01:10	DONE	25mm Filter	01-JUN-21 00:00
554098009	SAMPLE	JXC9	PIC13B	SEP-22-21 13:01:10	DONE	25mm Filter	01-JUN-21 00:00
553997003	SAMPLE	JXC9	PIC9D	SEP-22-21 13:01:15	DONE	25mm Filter	01-JUN-21 00:00
553997004	SAMPLE	JXC9	PIC10A	SEP-22-21 13:01:20	DONE	25mm Filter	01-JUN-21 00:00
553997005	SAMPLE	JXC9	PIC10B	SEP-22-21 13:01:24	DONE	25mm Filter	01-JUN-21 00:00
553997006	SAMPLE	JXC9	PIC10C	SEP-22-21 13:01:28	DONE	25mm Filter	01-JUN-21 00:00
554098001	SAMPLE	JXC9	PIC10D	SEP-22-21 13:01:32	DONE	25mm Filter	01-JUN-21 00:00

Lucas Cell Raw Data

Batch 2169340 Check-list

This check-list was completed on 15-SEP-21 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 15-SEP-21 and Lyndsey Pace on 15-SEP-21.

Batch ID: 2169340

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 and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−226 in Liquid

Batch ID: **2169340**
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL−RAD−A−008 REV# 15
Instrument: ASP−33005595

Due Dates for Lab: 18−SEP−2021 **Package: 25−SEP−2021** **SDG: 20−SEP−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204900899	Radium−226 SPIKE	1715−E	.1	mL
MS	1204900898	Radium−226 SPIKE	1715−E	.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	553997001	07−SEP−2021	1	500.5	500.5	09/08/21 08:50	104	09/15/21 05:35	09/15/21 08:38	3	31
2	553997002	07−SEP−2021	1	500.9	500.9	09/08/21 08:50	205	09/15/21 05:35	09/15/21 08:38	6	23
3	553997003	07−SEP−2021	1	501.5	501.5	09/08/21 08:50	302	09/15/21 05:35	09/15/21 08:38	3	13
4	553997004	07−SEP−2021	1	501.3	501.3	09/08/21 08:50	402	09/15/21 05:35	09/15/21 08:38	2	10
5	553997005	07−SEP−2021	1	502	502	09/08/21 08:50	503	09/15/21 05:35	09/15/21 08:38	2	21
6	553997006	07−SEP−2021	1	500.8	500.8	09/08/21 08:50	606	09/15/21 05:35	09/15/21 08:38	2	21
7	554020001	07−SEP−2021	1	500.5	500.5	09/08/21 08:50	708	09/15/21 05:35	09/15/21 08:38	1	6
8	554098001	07−SEP−2021	1	501.6	501.6	09/08/21 08:50	804	09/15/21 05:35	09/15/21 08:38	3	16
9	554098002	07−SEP−2021	1	500.6	500.6	09/08/21 08:50	106	09/15/21 06:20	09/15/21 09:21	5	15
10	554098003	07−SEP−2021	1	500	500	09/08/21 08:50	202	09/15/21 06:20	09/15/21 09:21	4	16
11	554098004	07−SEP−2021	1	500.1	500.1	09/08/21 08:50	305	09/15/21 06:20	09/15/21 09:21	1	14
12	554098005	07−SEP−2021	1	499.9	499.9	09/08/21 08:50	401	09/15/21 06:20	09/15/21 09:21	2	29
13	554098006	07−SEP−2021	1	500	500	09/08/21 08:50	501	09/15/21 06:20	09/15/21 09:21	2	21
14	554098007	07−SEP−2021	1	500.7	500.7	09/08/21 08:50	601	09/15/21 06:20	09/15/21 09:21	6	28
15	554098008	07−SEP−2021	1	500.8	500.8	09/08/21 08:50	701	09/15/21 06:20	09/15/21 09:21	4	26
16	554098009	07−SEP−2021	1	500.7	500.7	09/08/21 08:50	801	09/15/21 06:20	09/15/21 09:21	2	27
17	1204900896 MB	07−SEP−2021	1		502	09/08/21 08:50	102	09/15/21 07:00	09/15/21 10:27	7	16
18	1204900897 DUP (554098009)	07−SEP−2021	1	501.7	501.7	09/08/21 08:50	307	09/15/21 07:00	09/15/21 10:27	6	17
19	1204900898 MS (554098009)	07−SEP−2021	1	100.9	100.9	09/08/21 08:50	502	09/15/21 07:00	09/15/21 10:27	7	1239
20	1204900899 LCS	07−SEP−2021	1		502	09/08/21 08:50	802	09/15/21 07:00	09/15/21 10:27	4	1009

Reagent/Solvent Lot ID	Description	Amount

Comments:
Spike Pipet ID: RAD−RA226−2766953
Bkg Count Time: 30 Minutes
Sample Count Time: 30 Minutes
Data Entry Date2: 07−SEP−2021 00:00

Radium-226 Liquid

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

Batch : 2169340
Analyst : LIN01615
Prep Date : 9/7/2021
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					Count Raw Data							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	553997001.1	0.5005	2.0258E-05	8/24/2021 14:06	104	30	31	1.033	3	0.100	30	1.5790
2	553997002.1	0.5009	2.0260E-05	8/24/2021 12:36	205	30	23	0.767	6	0.200	30	1.6810
3	553997003.1	0.5015	2.0262E-05	8/24/2021 10:51	302	30	13	0.433	3	0.100	30	1.6180
4	553997004.1	0.5013	2.0261E-05	8/24/2021 9:16	402	30	10	0.333	2	0.067	30	1.8830
5	553997005.1	0.5020	2.0264E-05	8/24/2021 10:51	503	30	21	0.700	2	0.067	30	1.9420
6	553997006.1	0.5008	2.0259E-05	8/24/2021 8:20	606	30	21	0.700	2	0.067	30	1.8560
7	554020001.1	0.5005	2.0258E-05	8/24/2021 10:00	708	30	6	0.200	1	0.033	30	1.7700
8	554098001.1	0.5016	2.0262E-05	7/27/2021 9:40	804	30	16	0.533	3	0.100	30	1.4740
9	554098002.1	0.5006	2.0258E-05	7/27/2021 10:27	106	30	15	0.500	5	0.167	30	1.4690
10	554098003.1	0.5000	2.0256E-05	7/27/2021 11:31	202	30	16	0.533	4	0.133	30	1.7020
11	554098004.1	0.5001	2.0256E-05	7/27/2021 12:22	305	30	14	0.467	1	0.033	30	1.8640
12	554098005.1	0.4999	2.0255E-05	7/27/2021 13:30	401	30	29	0.967	2	0.067	30	1.8400
13	554098006.1	0.5000	2.0256E-05	7/27/2021 14:21	501	30	21	0.700	2	0.067	30	1.9100
14	554098007.1	0.5007	2.0259E-05	7/27/2021 15:27	601	30	28	0.933	6	0.200	30	1.9010
15	554098008.1	0.5008	2.0259E-05	7/27/2021 15:38	701	30	26	0.867	4	0.133	30	1.5950
16	554098009.1	0.5007	2.0259E-05	7/27/2021 12:00	801	30	27	0.900	2	0.067	30	1.4860
17	1204900896.1	0.5020	2.0264E-05	9/7/2021 0:00	102	30	16	0.533	7	0.233	30	1.5460
18	1204900897.1	0.5017	2.0263E-05	7/27/2021 12:00	307	30	17	0.567	6	0.200	30	1.8160
19	1204900898.1	0.1009	1.1425E-05	7/27/2021 12:00	502	30	1239	41.300	7	0.233	30	1.8100
20	1204900899.1	0.5020	2.0264E-05	9/7/2021 0:00	802	30	1009	33.633	4	0.133	30	1.7740

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			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
0.800%	5/2/2021	4/30/2022	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
2.800%	8/1/2021	7/31/2022	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
9.600%	1/1/2021	12/31/2021	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
9.400%	2/1/2021	1/31/2022	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
4.800%	6/1/2021	5/31/2022	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
4.100%	7/1/2021	6/30/2022	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
7.100%	11/1/2020	10/31/2021	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
3.700%	4/1/2021	3/31/2022	9/8/2021 8:50	9/15/2021 5:35	9/15/2021 8:38	0.712	0.977	1.002	1.000
4.200%	5/2/2021	4/30/2022	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
4.100%	8/1/2021	7/31/2022	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
7.600%	1/1/2021	12/31/2021	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
6.400%	2/1/2021	1/31/2022	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
4.300%	6/1/2021	5/31/2022	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
5.300%	7/1/2021	6/30/2022	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
3.400%	11/1/2020	10/31/2021	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
1.000%	4/1/2021	3/31/2022	9/8/2021 8:50	9/15/2021 6:20	9/15/2021 9:21	0.714	0.977	1.002	1.000
2.800%	5/2/2021	4/30/2022	9/8/2021 8:50	9/15/2021 7:00	9/15/2021 10:27	0.715	0.974	1.002	1.000
2.100%	1/1/2021	12/31/2021	9/8/2021 8:50	9/15/2021 7:00	9/15/2021 10:27	0.715	0.974	1.002	1.000
9.900%	6/1/2021	5/31/2022	9/8/2021 8:50	9/15/2021 7:00	9/15/2021 10:27	0.715	0.974	1.002	1.000
2.000%	4/1/2021	3/31/2022	9/8/2021 8:50	9/15/2021 7:00	9/15/2021 10:27	0.715	0.974	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-E
Spike Exp Date : 5/21/2022
Spike Activity (dpm/ml): 300.13
Spike Volume Added: 0.10

LCS S/N : 1715-E
LCS Exp Date : 5/21/2022
LCS Activity (dpm/ml): 300.13
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	0.1562	0.1103	1	0.3026	**0.7661**	20.84%	0.9333	0.1944	0.3127	0.3319		SAMPLE				
2	0.2073	0.1463	1	0.3697	**0.4366**	31.80%	0.5667	0.1795	0.2711	0.2793		SAMPLE				
3	0.1521	0.1074	1	0.2947	**0.2665**	41.14%	0.3333	0.1333	0.2089	0.2183		SAMPLE				
4	0.1068	0.0754	1	0.2195	**0.1833**	44.31%	0.2667	0.1155	0.1555	0.1613		SAMPLE				
5	0.1034	0.0730	1	0.2125	**0.4214**	25.69%	0.6333	0.1599	0.2085	0.2208		SAMPLE				
6	0.1084	0.0765	1	0.2229	**0.4420**	25.57%	0.6333	0.1599	0.2187	0.2306		SAMPLE				
7	0.0804	0.0568	1	0.1868	**0.1220**	53.39%	0.1667	0.0882	0.1266	0.1289		SAMPLE				
8	0.1669	0.1179	1	0.3234	**0.3802**	33.73%	0.4333	0.1453	0.2499	0.2573		SAMPLE				
9	0.2161	0.1526	1	0.3932	**0.2933**	44.92%	0.3333	0.1491	0.2571	0.2617		SAMPLE				
10	0.1670	0.1179	1	0.3119	**0.3042**	37.49%	0.4000	0.1491	0.2222	0.2278		SAMPLE				
11	0.0762	0.0538	1	0.1771	**0.3008**	30.75%	0.4333	0.1291	0.1757	0.1864		SAMPLE				
12	0.1093	0.0772	1	0.2247	**0.6332**	21.59%	0.9000	0.1856	0.2559	0.2831		SAMPLE				
13	0.1053	0.0743	1	0.2164	**0.4291**	25.60%	0.6333	0.1599	0.2123	0.2241		SAMPLE				
14	0.1829	0.1291	1	0.3263	**0.4986**	27.03%	0.7333	0.1944	0.2590	0.2737		SAMPLE				
15	0.1780	0.1256	1	0.3323	**0.5941**	25.13%	0.7333	0.1826	0.2899	0.3049		SAMPLE				
16	0.1351	0.0954	1	0.2777	**0.7248**	21.56%	0.8333	0.1795	0.3060	0.3237		SAMPLE				
17	0.2426	0.1713	1	0.4260	**0.2504**	53.36%	0.3000	0.1599	0.2616	0.2644		MB				
18	0.1913	0.1351	1	0.3413	**0.2608**	43.65%	0.3667	0.1599	0.2228	0.2262	554098009.1	DUP	94.2%			
19	1.0310	0.7279	1	1.8105	**145.6933**	10.31%	41.0667	1.1766	8.1817	36.1725	554098009.1	MS			133.9962	108.2%
20	0.1598	0.1128	1	0.2984	**24.3717**	3.75%	33.5000	1.0609	1.5128	3.9469		LCS			26.9314	90.5%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 15-SEP-2021

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:32	1	1.21E+05	121188	-0.76		
LUCAS2	EFF	06:31	1	1.32E+05	132073	1.23		
LUCAS3	EFF	06:30	1	1.33E+05	132890	-0.17		
LUCAS4	EFF	06:29	1	1.29E+05	128942	2.26		
LUCAS5	EFF	06:26	1	1.30E+05	129616	-0.07		
LUCAS6	EFF	06:25	1	1.30E+05	129863	-1.98		
LUCAS7	EFF	06:24	1	1.32E+05	131944	-0.39		
LUCAS8	EFF	06:22	1	1.20E+05	119856	-1.2		

Reviewed by: Elizabeth Krouse **Date:** 15-SEP-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 2169340**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
553997001	SAMPLE	LXP1	LUCAS1	SEP-15-21 08:38:00	DONE	Lucas Cell	02-MAY-21 00:00
553997002	SAMPLE	LXP1	LUCAS2	SEP-15-21 08:38:00	DONE	Lucas Cell	01-AUG-21 00:00
553997003	SAMPLE	LXP1	LUCAS3	SEP-15-21 08:38:00	DONE	Lucas Cell	01-JAN-21 00:00
553997004	SAMPLE	LXP1	LUCAS4	SEP-15-21 08:38:00	DONE	Lucas Cell	01-FEB-21 00:00
553997005	SAMPLE	LXP1	LUCAS5	SEP-15-21 08:38:00	DONE	Lucas Cell	01-JUN-21 00:01
553997006	SAMPLE	LXP1	LUCAS6	SEP-15-21 08:38:00	DONE	Lucas Cell	01-JUL-21 00:00
554020001	SAMPLE	LXP1	LUCAS7	SEP-15-21 08:38:00	DONE	Lucas Cell	01-NOV-20 00:00
554098001	SAMPLE	LXP1	LUCAS8	SEP-15-21 08:38:00	DONE	Lucas Cell	01-APR-21 00:00
554098002	SAMPLE	LXP1	LUCAS1	SEP-15-21 09:21:00	DONE	Lucas Cell	02-MAY-21 00:00
554098003	SAMPLE	LXP1	LUCAS2	SEP-15-21 09:21:00	DONE	Lucas Cell	01-AUG-21 00:00
554098004	SAMPLE	LXP1	LUCAS3	SEP-15-21 09:21:00	DONE	Lucas Cell	01-JAN-21 00:00
554098005	SAMPLE	LXP1	LUCAS4	SEP-15-21 09:21:00	DONE	Lucas Cell	01-FEB-21 00:00
554098006	SAMPLE	LXP1	LUCAS5	SEP-15-21 09:21:00	DONE	Lucas Cell	01-JUN-21 00:01
554098007	SAMPLE	LXP1	LUCAS6	SEP-15-21 09:21:00	DONE	Lucas Cell	01-JUL-21 00:00
554098008	SAMPLE	LXP1	LUCAS7	SEP-15-21 09:21:00	DONE	Lucas Cell	01-NOV-20 00:00
554098009	SAMPLE	LXP1	LUCAS8	SEP-15-21 09:21:00	DONE	Lucas Cell	01-APR-21 00:00
1204900896	MB	LXP1	LUCAS1	SEP-15-21 10:27:00	DONE	Lucas Cell	02-MAY-21 00:00
1204900897	DUP	LXP1	LUCAS3	SEP-15-21 10:27:00	DONE	Lucas Cell	01-JAN-21 00:00
1204900898	MS	LXP1	LUCAS5	SEP-15-21 10:27:00	DONE	Lucas Cell	01-JUN-21 00:01
1204900899	LCS	LXP1	LUCAS8	SEP-15-21 10:27:00	DONE	Lucas Cell	01-APR-21 00:00

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague ☒ SAME
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S27480 | SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐1 DAY ☐2 DAYS ☐3 DAYS ☒STANDARD ☐OTHER

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☐LEVEL III ☒LEVEL IV ☐EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☐NPDES
Project Locations: ☐Detroit ☐New York ☐Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**	Special Instructions
	8/24/21	1406	S27480.01	GW	2			2					✓	✓	* E903.1 Mod.
	8/24/21	1236	S27480.02	GW	2			2					✓	✓	** E904.0/SW 9320 Mod.
	8/24/21	1051	S27480.03	GW	2			2					✓	✓	
	8/24/21	0916	S27480.04	GW	2			2					✓	✓	Please use calculation product &
	8/24/21	1051	S27480.05	GW	2			2					✓	✓	provide Radium 226/228 combined
	8/24/21	0820	S27480.06 (Field Blank)	Wa	2			2					✓	✓	results on the report
															(No Ice needed)
															** Subcontracted to
															GEL Laboratories, Inc.
															2040 Savage Road
															Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Sam Smith UPS ☐Sampler DATE: 8/25/21 TIME: 1100
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 8/25/21 TIME: 1100
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. | SEAL INTACT YES☐ NO☐ | INITIALS
SEAL NO. | SEAL INTACT YES☐ NO☐ | INITIALS

NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Final Report

Report ID: S28686.01(02)
Generated on 10/29/2021
Replaces report S28686.01(01) generated on 10/01/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S28686.01-S28686.06
Project: Erickson AM MI New Wells 7-10
Collected Date(s): 09/28/2021
Submitted Date/Time: 09/29/2021 10:20
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.
Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S28686.01	MW-7 L109097-01	Groundwater	09/28/21 14:01
S28686.02	MW-8 L109097-02	Groundwater	09/28/21 12:43
S28686.03	MW-9 L109097-03	Groundwater	09/28/21 11:06
S28686.04	MW-10 L109097-04	Groundwater	09/28/21 09:34
S28686.05	Field Dupe MW-9 L109097-05	Groundwater	09/28/21 11:06
S28686.06	Field Blank L109097-06	Water	09/28/21 08:30

Lab Sample ID: S28686.01
Sample Tag: MW-7 L109097-01
Collected Date/Time: 09/28/2021 14:01
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	125ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	09/30/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	09/29/21 11:15	CCM	

Inorganics

Method: E300.0, Run Date: 09/30/21 08:54, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 09/30/21 09:54, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	75	10	0.13	mg/L	10	16887-00-6	
Sulfate	191	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 09/29/21 20:10, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	588	20	2	mg/L	2		

Method: SM2540D, Run Date: 10/01/21 12:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 09/30/21 13:45, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	108	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 09/29/21 12:33, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.051	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	1.81	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.37	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.097	0.005	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S28686.01 (continued)
Sample Tag: MW-7 L109097-01

Method: E200.8, Run Date: 09/29/21 12:33, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.276	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 09/30/21 14:51, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 10/28/21 14:01, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S28686.02
Sample Tag: MW-8 L109097-02
Collected Date/Time: 09/28/2021 12:43
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	125ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	09/30/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	09/29/21 11:15	CCM	

Inorganics

Method: E300.0, Run Date: 09/30/21 09:04, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	59	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	48	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 09/29/21 20:10, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	414	20	2	mg/L	2		

Method: SM2540D, Run Date: 10/01/21 12:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 09/30/21 13:46, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	86.5	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 09/29/21 12:37, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.026	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.21	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.013	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.013	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S28686.02 (continued)

Sample Tag: MW-8 L109097-02

Method: E200.8, Run Date: 09/29/21 12:37, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 09/30/21 14:53, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 10/28/21 14:01, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S28686.03
Sample Tag: MW-9 L109097-03
Collected Date/Time: 09/28/2021 11:06
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	125ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	09/30/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	09/29/21 11:15	CCM	

Inorganics

Method: E300.0, Run Date: 09/30/21 09:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 09/29/21 20:10, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	246	20	2	mg/L	2		

Method: SM2540D, Run Date: 10/01/21 12:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 09/30/21 13:48, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	71.0	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 09/29/21 12:40, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.014	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S28686.03 (continued)

Sample Tag: MW-9 L109097-03

Method: E200.8, Run Date: 09/29/21 12:40, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 09/30/21 14:54, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 10/28/21 14:01, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S28686.04
Sample Tag: MW-10 L109097-04
Collected Date/Time: 09/28/2021 09:34
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	125ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	09/30/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	09/29/21 11:15	CCM	

Inorganics

Method: E300.0, Run Date: 09/30/21 09:24, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	9	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 09/29/21 20:10, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	376	20	2	mg/L	2		

Method: SM2540D, Run Date: 10/01/21 12:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 09/30/21 13:50, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	113	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 09/29/21 12:43, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.041	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S28686.04 (continued)

Sample Tag: MW-10 L109097-04

Method: E200.8, Run Date: 09/29/21 12:43, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 09/30/21 14:56, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 10/28/21 14:01, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S28686.05
Sample Tag: Field Dupe MW-9 L109097-05
Collected Date/Time: 09/28/2021 11:06
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	125ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	09/30/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	09/29/21 11:15	CCM	

Inorganics

Method: E300.0, Run Date: 09/30/21 09:34, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 09/29/21 20:10, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	244	20	2	mg/L	2		

Method: SM2540D, Run Date: 10/01/21 12:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 09/30/21 13:51, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	71.5	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 09/29/21 12:46, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.015	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S28686.05 (continued)

Sample Tag: Field Dupe MW-9 L109097-05

Method: E200.8, Run Date: 09/29/21 12:46, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 09/30/21 15:02, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 10/28/21 14:01, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S28686.06
Sample Tag: Field Blank L109097-06
Collected Date/Time: 09/28/2021 08:30
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	125ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	09/30/21 10:30	JRH	
Metal Digestion	Completed	SW3015A	09/29/21 11:15	CCM	

Inorganics

Method: E300.0, Run Date: 09/30/21 09:44, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 09/29/21 20:10, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		

Method: SM2540D, Run Date: 10/01/21 12:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 09/30/21 13:44, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 09/29/21 12:26, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S28686.06 (continued)

Sample Tag: Field Blank L109097-06

Method: E200.8, Run Date: 09/29/21 12:26, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 09/30/21 15:03, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 10/28/21 14:01, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID: S28686
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI New Wells 7-10
Submitted: 09/29/2021 10:20 Login User: SRS

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 2.1
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL UPS# 1Z4664770361274756
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S28686 Submitted: 09/29/2021 10:20

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 09/29/2021 10:36 SRS

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S28686.01	125ml Plastic HNO3	<2			
S28686.01	1L Plastic HNO3	<2			
S28686.01	1L Plastic HNO3	<2			
S28686.02	125ml Plastic HNO3	<2			
S28686.02	1L Plastic HNO3	<2			
S28686.02	1L Plastic HNO3	<2			
S28686.03	125ml Plastic HNO3	<2			
S28686.03	1L Plastic HNO3	<2			
S28686.03	1L Plastic HNO3	<2			
S28686.04	125ml Plastic HNO3	<2			
S28686.04	1L Plastic HNO3	<2			
S28686.04	1L Plastic HNO3	<2			
S28686.05	125ml Plastic HNO3	<2			
S28686.05	1L Plastic HNO3	<2			
S28686.05	1L Plastic HNO3	<2			
S28686.06	125ml Plastic HNO3	<2			
S28686.06	1L Plastic HNO3	<2			
S28686.06	1L Plastic HNO3	<2			

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI New Wells 7-10
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☒ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES

Project Locations: ☐ Detroit ☐ New York ☐ Other

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Special Instructions
286880.01	09/28/21	1401	MW-7 L109097-01	GW	5	3		2					✓	✓	✓	✓	✓	Metals to analyse:
.02	09/28/21	1243	MW-8 L109097-02	GW	5	3		2					✓	✓	✓	✓	✓	B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03	09/28/21	1106	MW-9 L109097-03	GW	5	3		2					✓	✓	✓	✓	✓	Co, Li, Hg, Mo, Pb, Se, Tl,
.04	09/28/21	0934	MW-10 L109097-04	GW	5	3		2					✓	✓	✓	✓	✓	Fe, Cu, Ni, Ag, V, Zn
.05	09/28/21	1106	Field Dupe MW-9 L109097-05	GW	5	3		2					✓	✓	✓	✓	✓	Please send a preliminary report
.06	09/28/21	0830	Field Blank L109097-06	DI	5	3		2					✓	✓	✓	✓	✓	

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] Sampler DATE: 9.29.21 TIME: 1020
RECEIVED BY: SIGNATURE/ORGANIZATION: Sam Smith DATE: 9/29/21 TIME: 1020
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO: SEAL INTACT YES ☐ NO ☐ INITIALS:
SEAL NO: SEAL INTACT YES ☐ NO ☐ INITIALS:

NOTES: TEMP. ON ARRIVAL: 2.1

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.0

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

October 26, 2021

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 557427
SDG: S28686

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 01, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4523.

Sincerely,

Grace Bodiford

Grace Bodiford for
Samuel Hogan
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S28686
Work Order: 557427

October 26, 2021

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on October 01, 2021 for analysis. 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.

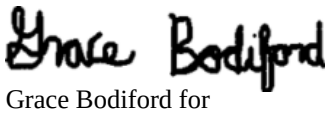
Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
557427001	S28686.01
557427002	S28686.02
557427003	S28686.03
557427004	S28686.04
557427005	S28686.05
557427006	S28686.06 (Field Blank)

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Grace Bodiford for
Samuel Hogan
Project Manager

Chain of Custody and Supporting Documentation

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

557407

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague SAME: ☒
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S28686 SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐1 DAY ☐2 DAYS ☐3 DAYS ☒STANDARD ☐OTHER

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☐LEVEL III ☒LEVEL IV ☐EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☐NPDES
Project Locations: ☐Detroit ☐New York ☐Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**	Special Instructions
	9/28/21	1401	S28686.01	GW	2			2					✓	✓	* E903.1 Mod.
	9/28/21	1243	S28686.02	GW	2			2					✓	✓	** E904.0/SW 9320 Mod.
	9/28/21	1106	S28686.03	GW	2			2					✓	✓	
	9/28/21	0934	S28686.04	GW	2			2					✓	✓	Please use calculation product &
	9/28/21	1106	S28686.05	GW	2			2					✓	✓	provide Radium 226/228 combined
	9/28/21	0830	S28686.06 (Field Blank)	Wa	2			2					✓	✓	results on the report
															(No Ice needed)
															** Subcontracted to
															GEL Laboratories, Inc.
															2040 Savage Road
															Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Sam Smith ☐Sampler	DATE 9/29/21	TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION	UPS	DATE 9/29/21	TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE 10-1-21	TIME 1000

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	Grace Bodiford	DATE 10-1-21	TIME 1000

SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS
SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS

NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

GEL Laboratories LLC

SH

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	**SDG/AR/COC/Work Order:** 557427
Received By: DC	**Date Received:** 10-1-21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground (UPS) Field Services Courier Other 1Z466477 0361274756

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?		X	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?		X	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		X	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		X	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	N/A	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 (None) Other: *all temperatures are recorded in Celsius TEMP: 4.6
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR Le-21 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):

PM (or PMA) review: Initials NRG Date 10/4/21 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 26 October 2021

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122021−36
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S28686
Work Order #: 557427

Product: **GFPC Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2181317

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

GEL Sample ID#	Client Sample Identification
557427001	S28686.01
557427002	S28686.02
557427003	S28686.03
557427004	S28686.04
557427005	S28686.05
557427006	S28686.06 (Field Blank)
1204923920	Method Blank (MB)
1204923921	557483002(NonSDG) Sample Duplicate (DUP)
1204923922	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.

Technical Information

Recounts
Sample 557427002 (S28686.02) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: **Lucas Cell, Ra226, Liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2181313

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

GEL Sample ID#	Client Sample Identification
557427001	S28686.01
557427002	S28686.02
557427003	S28686.03

557427004	S28686.04
557427005	S28686.05
557427006	S28686.06 (Field Blank)
1204923907	Method Blank (MB)
1204923908	557483001(NonSDG) Sample Duplicate (DUP)
1204923909	557483001(NonSDG) Matrix Spike (MS)
1204923910	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, 1204923909 (Non SDG 557483001MS), 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

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

Qualifier Definition Report
for

MERI001 Merit Laboratories, Inc.

Client SDG: S28686 GEL Work Order: 557427

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: Kenshalla Oston **Name: Kenshalla Oston**

Date: 28 OCT 2021 **Title: Analyst I**

Sample Data Summary

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

Certificate of Analysis

Report Date: October 28, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S28686.01
Sample ID: 557427001
Matrix: Ground Water
Collect Date: 28-SEP-21 14:01
Receive Date: 01-OCT-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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		2.49	+/-1.10	1.54	3.00	pCi/L			JXC9	10/13/21	0851	2181317	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		3.32	+/-1.15			pCi/L		1	AEA	10/26/21	1418	2181322	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.829	+/-0.351	0.398	1.00	pCi/L			LXP1	10/26/21	1017	2181313	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			86.8	(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

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

Certificate of Analysis

Report Date: October 28, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S28686.02	Project:	MERI00120
Sample ID:	557427002	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	28-SEP-21 12:43		
Receive Date:	01-OCT-21		
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	0.469	+/-1.10	1.96	3.00	pCi/L			JXC9	10/13/21	1040	2181317	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.697	+/-1.12			pCi/L		1	AEA	10/26/21	1418	2181322	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.228	+/-0.216	0.339	1.00	pCi/L			LXP1	10/26/21	1017	2181313	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			84.5	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: October 28, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S28686.03
Sample ID: 557427003
Matrix: Ground Water
Collect Date: 28-SEP-21 11:06
Receive Date: 01-OCT-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.453	+/-0.717	1.25	3.00	pCi/L			JXC9	10/13/21	0851	2181317	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.25	+/-0.777			pCi/L		1	AEA	10/26/21	1418	2181322	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.797	+/-0.300	0.210	1.00	pCi/L			LXP1	10/26/21	1017	2181313	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			89.6	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: October 28, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S28686.04
Sample ID: 557427004
Matrix: Ground Water
Collect Date: 28-SEP-21 09:34
Receive Date: 01-OCT-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	-0.0760	+/-1.28	2.34	3.00	pCi/L			JXC9	10/13/21	0851	2181317	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.701	+/-1.31			pCi/L		1	AEA	10/26/21	1418	2181322	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.701	+/-0.303	0.336	1.00	pCi/L			LXP1	10/26/21	1017	2181313	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			81.7	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: October 28, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S28686.05	Project:	MERI00120
Sample ID:	557427005	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	28-SEP-21 11:06		
Receive Date:	01-OCT-21		
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	0.846	+/-1.07	1.82	3.00	pCi/L			JXC9	10/13/21	0851	2181317	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.21	+/-1.11			pCi/L		1	AEA	10/26/21	1418	2181322	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.368	+/-0.288	0.433	1.00	pCi/L			LXP1	10/26/21	1017	2181313	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			84.1	(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: October 28, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S28686.06 (Field Blank)
Sample ID: 557427006
Matrix: Ground Water
Collect Date: 28-SEP-21 08:30
Receive Date: 01-OCT-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	-0.281	+/-1.10	2.06	3.00	pCi/L			JXC9	10/13/21	0851	2181317	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.297	+/-1.12			pCi/L		1	AEA	10/26/21	1418	2181322	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.297	+/-0.202	0.227	1.00	pCi/L			LXP1	10/26/21	1017	2181313	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			89.2	(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

Quality Control Summary

QC Summary

Report Date: October 28, 2021

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **557427**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 2181317										
QC1204923921 557483002 DUP										
Radium-228		3.87		1.94	pCi/L	66.3		(0% - 100%)	JXC9	10/13/21 08:50
	Uncertainty	+/-1.50		+/-1.03						
QC1204923922 LCS										
Radium-228	49.5			48.5	pCi/L		98	(75%-125%)		10/13/21 08:51
	Uncertainty			+/-3.32						
QC1204923920 MB										
Radium-228			U	0.548	pCi/L					10/13/21 08:51
	Uncertainty			+/-0.740						
Rad Ra-226										
Batch 2181313										
QC1204923908 557483001 DUP										
Radium-226		1.00		0.704	pCi/L	35.1		(0% - 100%)	LXP1	10/26/21 10:49
	Uncertainty	+/-0.364		+/-0.332						
QC1204923910 LCS										
Radium-226	26.7			25.6	pCi/L		95.6	(75%-125%)		10/26/21 11:21
	Uncertainty			+/-1.66						
QC1204923907 MB										
Radium-226			U	0.260	pCi/L					10/26/21 10:49
	Uncertainty			+/-0.272						
QC1204923909 557483001 MS										
Radium-226	134	1.00		153	pCi/L		113	(75%-125%)		10/26/21 11:21
	Uncertainty	+/-0.364		+/-9.26						

Notes:

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

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded

QC Summary

Workorder: **557427**

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

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

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 2181317 Check-list

This check-list was completed on 15-OCT-21 by Nat Long

This batch was reviewed by Nat Long on 15-OCT-21 and Kenshalla Oston on 19-OCT-21.

Batch ID: 2181317 **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	Yes		
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 relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **2181317**
Analyst: Jasmine Conley (JXC9)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 5
Instrument: LUCAS−C037036045

Due Dates for Lab: 25−OCT−2021 **Package: 27−OCT−2021** **SDG: 29−OCT−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204923922	Radium−228 SPIKE	1965−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	557427001	08−OCT−2021	3	302.31	302.31	10/11/21 13:00	10/13/21 07:10
2	557427002	08−OCT−2021	3	301.38	301.38	10/11/21 13:00	10/13/21 07:10
3	557427003	08−OCT−2021	3	303.84	303.84	10/11/21 13:00	10/13/21 07:10
4	557427004	08−OCT−2021	3	304.03	304.03	10/11/21 13:00	10/13/21 07:10
5	557427005	08−OCT−2021	3	306.3	306.3	10/11/21 13:00	10/13/21 07:10
6	557427006	08−OCT−2021	3	305.03	305.03	10/11/21 13:00	10/13/21 07:10
7	557483001	08−OCT−2021	3	303.08	303.08	10/11/21 13:00	10/13/21 07:10
8	557483002	08−OCT−2021	3	305.35	305.35	10/11/21 13:00	10/13/21 07:10
9	557483003	08−OCT−2021	3	301.17	301.17	10/11/21 13:00	10/13/21 07:10
10	557483004	08−OCT−2021	3	303.13	303.13	10/13/21 07:10	10/15/21 07:54
11	557483005	08−OCT−2021	3	307.92	307.92	10/11/21 13:00	10/13/21 07:10
12	557483006	08−OCT−2021	3	306.09	306.09	10/11/21 13:00	10/13/21 07:10
13	1204923920 MB	08−OCT−2021	3		307.92	10/11/21 13:00	10/13/21 07:10
14	1204923921 DUP (557483002)	08−OCT−2021	3	307.1	307.1	10/11/21 13:00	10/13/21 07:10
15	1204923922 LCS	08−OCT−2021	3		307.92	10/11/21 13:00	10/13/21 07:10

Reagent/Solvent Lot ID	Description	Amount
WORK 1951−B	Barium−133	.1 mL
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL
REGNT 3301783	Barium Carrier Ra228 REG	1 mL
REGNT 3304359.1	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 3304867.1	RGF−Hydrofluoric Acid	4 mL
REGNT 3318677	RGF−50% Potassium Carbonate	2 mL
REGNT 3321027	RGF−1M Citric Acid	5 mL
REGNT 3321613	RGF−Neodymium Subtrate	5 mL
REGNT 3326262	RGF−1.5M Ammonium Sulfate	10 mL
REGNT 3338946.9	Concentrated HNO3 (16M)	5 mL
REGNT 3341860	Lot #DGA0024	2 g
REGNT 3343120	2M HCl	20 mL
REGNT 3347520	RGF−7M Nitric Acid	25 mL

Comments:
Pipet Id: RAD−GFC−1795419
Data Entry Date2: 08−OCT−2021 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 1951-B
Tracer Exp Date : 9/16/2022
Tracer Volume Added: 0.10

Batch : 2181317
Analyst : JAS02031
Prep Date : 10/8/2021
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

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

Sample Characteristics					Tracer Calculations					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	557427001.1	0.3023	1.8498E-05	9/28/2021 14:01	289.5	3.39%	251.1	3.64%	0.1	0.000200
2	557427002.1	0.3014	1.8482E-05	9/28/2021 12:43	289.5	3.39%	244.5	3.69%	0.1	0.000200
3	557427003.1	0.3038	1.8524E-05	9/28/2021 11:06	289.5	3.39%	259.3	3.59%	0.1	0.000200
4	557427004.1	0.3040	1.8527E-05	9/28/2021 9:34	289.5	3.39%	236.6	3.75%	0.1	0.000200
5	557427005.1	0.3063	1.8564E-05	9/28/2021 11:06	289.5	3.39%	243.3	3.70%	0.1	0.000200
6	557427006.1	0.3050	1.8543E-05	9/28/2021 8:30	289.5	3.39%	258.1	3.59%	0.1	0.000200
7	557483001.1	0.3031	1.8511E-05	9/27/2021 9:38	289.5	3.39%	253.0	3.63%	0.1	0.000200
8	557483002.1	0.3054	1.8548E-05	9/27/2021 9:43	289.5	3.39%	235.6	3.76%	0.1	0.000200
9	557483003.1	0.3012	1.8479E-05	9/27/2021 11:17	289.5	3.39%	249.0	3.66%	0.1	0.000200
10	557483004.1	0.3031	1.8512E-05	9/27/2021 12:32	266.6	3.54%	230.1	3.81%	0.1	0.000200
11	557483005.1	0.3079	1.8590E-05	9/28/2021 10:21	289.5	3.39%	270.0	3.51%	0.1	0.000200
12	557483006.1	0.3061	1.8561E-05	9/28/2021 10:26	289.5	3.39%	244.8	3.69%	0.1	0.000200
13	1204923920.1	0.3079	1.8590E-05	10/8/2021 0:00	289.5	3.39%	230.5	3.80%	0.1	0.000200
14	1204923921.1	0.3071	1.8577E-05	9/27/2021 9:43	289.5	3.39%	243.3	3.70%	0.1	0.000200
15	1204923922.1	0.3079	1.8590E-05	10/8/2021 0:00	289.5	3.39%	249.1	3.66%	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

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	5B	60	5	91	1.517	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.827	0.991	1.057	86.8%	2.50%
2	11D	60	7	56	0.933	10/13/2021 10:40	10/11/2021 13:00	10/13/2021 7:10	0.995	0.674	0.991	1.057	84.5%	2.52%
3	5D	60	5	40	0.667	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.827	0.991	1.057	89.6%	2.48%
4	6A	60	9	101	1.683	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.826	0.991	1.057	81.7%	2.54%
5	6B	60	6	77	1.283	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.826	0.991	1.057	84.1%	2.52%
6	6C	60	6	88	1.467	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.826	0.991	1.057	89.2%	2.48%
7	7C	60	7	110	1.833	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.826	0.991	1.057	87.4%	2.50%
8	8D	60	3	148	2.467	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.826	0.991	1.057	81.4%	2.55%
9	9A	60	10	77	1.283	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.995	0.826	0.991	1.057	86.0%	2.51%
10	12B	60	9	156	2.600	10/15/2021 9:49	10/13/2021 7:10	10/15/2021 7:54	0.994	0.805	0.996	1.057	86.3%	2.62%
11	9C	60	11	40	0.667	10/13/2021 8:52	10/11/2021 13:00	10/13/2021 7:10	0.995	0.826	0.991	1.057	93.3%	2.46%
12	12D	60	10	117	1.950	10/13/2021 10:40	10/11/2021 13:00	10/13/2021 7:10	0.995	0.673	0.991	1.057	84.6%	2.52%
13	10D	60	3	35	0.583	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.998	0.827	0.991	1.057	79.6%	2.56%
14	11A	60	5	80	1.333	10/13/2021 8:50	10/11/2021 13:00	10/13/2021 7:10	0.995	0.827	0.991	1.057	84.0%	2.52%
15	11D	60	5	919	15.317	10/13/2021 8:51	10/11/2021 13:00	10/13/2021 7:10	0.998	0.827	0.991	1.057	86.1%	2.51%

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	6/1/2021	5/31/2022	0.6506	0.00426	0.788	10/8/2021 18:36	500
2	PIC	6/1/2021	5/31/2022	0.6567	0.01068	0.824	10/8/2021 18:30	500
3	PIC	6/1/2021	5/31/2022	0.6476	0.00925	0.530	10/8/2021 18:36	500
4	PIC	6/1/2021	5/31/2022	0.6392	0.02228	1.704	10/8/2021 18:32	500
5	PIC	6/1/2021	5/31/2022	0.6370	0.00851	1.046	10/8/2021 18:33	500
6	PIC	6/1/2021	5/31/2022	0.6368	0.01970	1.550	10/8/2021 18:34	500
7	PIC	6/1/2021	5/31/2022	0.6553	0.00790	0.560	10/8/2021 18:33	500
8	PIC	6/1/2021	5/31/2022	0.6443	0.00609	1.406	10/8/2021 18:33	500
9	PIC	6/1/2021	5/31/2022	0.6471	0.00758	0.724	10/8/2021 18:33	500
10	PIC	6/1/2021	5/31/2022	0.6654	0.01114	0.864	10/8/2021 18:30	500
11	PIC	6/1/2021	5/31/2022	0.6408	0.00584	0.546	10/8/2021 18:34	500
12	PIC	6/1/2021	5/31/2022	0.6663	0.01845	1.534	10/8/2021 18:30	500
13	PIC	6/1/2021	5/31/2022	0.6472	0.00557	0.434	10/8/2021 18:35	500
14	PIC	6/1/2021	5/31/2022	0.6604	0.01317	0.766	10/8/2021 18:30	500
15	PIC	6/1/2021	5/31/2022	0.6567	0.01068	0.824	10/8/2021 18:30	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

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1965-B
LCS Exp Date : 8/22/2022
LCS Activity (dpm/ml): 338.06
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	0.9671	0.6828	3	1.5366	**2.4937**	22.63%	0.7287	0.1639	1.0992	1.2679		SAMPLE				
2	1.2393	0.8750	3	1.9643	**0.4689**	120.00%	0.1093	0.1312	1.1025	1.1089		SAMPLE				
3	0.7681	0.5423	3	1.2502	**0.4529**	80.77%	0.1367	0.1103	0.7166	0.7258		SAMPLE				
4	1.5282	1.0789	3	2.3417	**-0.0760**	858.30%	-0.0207	0.1774	1.2785	1.2786		SAMPLE				
5	1.1599	0.8189	3	1.8160	**0.8456**	64.62%	0.2373	0.1532	1.0700	1.0914		SAMPLE				
6	1.3370	0.9440	3	2.0566	**-0.2811**	199.18%	-0.0833	0.1660	1.0974	1.0975		SAMPLE				
7	0.8026	0.5666	3	1.3017	**4.2897**	14.22%	1.2733	0.1780	1.1752	1.6020		SAMPLE				
8	1.3782	0.9730	3	2.1286	**3.8726**	19.93%	1.0607	0.2096	1.4998	1.7931		SAMPLE				
9	0.9451	0.6673	3	1.5090	**1.9516**	27.14%	0.5593	0.1511	1.0335	1.1460		SAMPLE				
10	1.0153	0.7168	3	1.6052	**5.9566**	12.55%	1.7360	0.2123	1.4276	2.0832		SAMPLE				
11	0.7476	0.5278	3	1.2146	**0.3835**	91.58%	0.1207	0.1105	0.6882	0.6950		SAMPLE				
12	1.6393	1.1573	3	2.5226	**1.7296**	45.44%	0.4160	0.1886	1.5369	1.5994		SAMPLE				
13	0.7691	0.5430	3	1.2694	**0.5477**	68.96%	0.1493	0.1029	0.7397	0.7527		MB				
14	0.9545	0.6739	3	1.5190	**1.9436**	27.32%	0.5673	0.1541	1.0349	1.1472	557483002.1	DUP	66.3%			
15	0.9664	0.6823	3	1.5319	**48.4699**	4.44%	14.4927	0.5069	3.3226	12.7619		LCS			49.4548	98.0%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
557427001	5B	60	5	91	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557427002	11D	60	7	56	10/13/2021 10:40	10/13/2021 11:40	PIC	2181317
557427003	5D	60	5	40	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557427004	6A	60	9	101	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557427005	6B	60	6	77	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557427006	6C	60	6	88	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557483001	7C	60	7	110	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557483002	8D	60	3	148	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557483003	9A	60	10	77	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
557483004	12B	60	9	156	10/15/2021 9:49	10/15/2021 10:49	PIC	2181317
557483005	9C	60	11	40	10/13/2021 8:52	10/13/2021 9:52	PIC	2181317
557483006	12D	60	10	117	10/13/2021 10:40	10/13/2021 11:40	PIC	2181317
1204923920	10D	60	3	35	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317
1204923921	11A	60	5	80	10/13/2021 8:50	10/13/2021 9:50	PIC	2181317
1204923922	11D	60	5	919	10/13/2021 8:51	10/13/2021 9:51	PIC	2181317

ASSAY 13-Oct-21 7:43:09
Wizard 2480 s/n 46190630
Protocol id 9 Ba-133_1
Time limit
Count limit
Isotope Ba-133_1
Protocol date 10/13/2021
Run id. 4267

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	92	1	180	868.5	289.47	3.39		07:43:09
557427001	2	92	2	180	753.5	251.12	3.64	86.75	07:46:23
557427002	3	92	3	180	733.5	244.47	3.69	84.45	07:49:36
557427003	4	92	4	180	778	259.28	3.59	89.57	07:52:50
557427004	5	92	5	180	710	236.62	3.75	81.74	07:56:05
557427005	1	17	1	180	730	243.3	3.7	84.05	07:59:50
557427006	2	17	2	180	774.5	258.14	3.59	89.18	08:03:04
557483001	3	17	3	180	759	252.95	3.63	87.38	08:06:17
557483002	4	17	4	180	707	235.64	3.76	81.40	08:09:31
557483003	5	17	5	180	747	248.97	3.66	86.01	08:12:46
M 10/15/21 ~~557483004~~	~~1~~	~~14~~	~~1~~	~~180~~	~~737.5~~	~~245.8~~	~~3.68~~	~~84.91~~	~~08:16:21~~
557483005	2	14	2	180	810	269.95	3.51	93.26	08:19:35
557483006	3	14	3	180	734.5	244.79	3.69	84.56	08:22:49
1204923920	4	14	4	180	691.5	230.48	3.8	79.62	08:26:03
1204923921	5	14	5	180	730	243.28	3.7	84.04	08:29:17
1204923922	1	10	1	180	747.5	249.11	3.66	86.06	08:33:01

END OF ASSAY

ASSAY		15-Oct-21	9:49:46								
Wizard 2480 s/n 46190630											
Protocol		id		8	Ba-133						
Time		limit									
Count		limit									
Isotope		Ba-133									
Protocol		date	10/15/2021								
Run		id.		4278							
Samp_ID		POS		RACK		BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF			1		95	1	180	800	266.61	3.54		09:49:46
	557483004		2		95	2	180	690.5	230.13	3.81	86.32	09:53:00
END		OF		ASSAY							

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 13-Oct-2021

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

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	13-Oct 03:27	60	2.133	1.252	3.246	-0.35
LB4100F2	Above	Beta bkg	13-Oct 03:27	60	39.767	0.421	2.116	+136.25
LB4100F3	need 2nd	Alpha bkg	13-Oct 03:27	60	0.150	-7.68E-2	0.332	+0.33
LB4100G1	need 2nd	Alpha XTalk	13-Oct 04:36	5	0.257	0.102	0.423	-0.11
LB4100G1	need 2nd	Beta bkg	13-Oct 03:28	60	1.250	0.372	1.688	+1.00
LB4100G1	need 2nd	Beta eff	13-Oct 04:43	5	15236	12940	18300	-0.43
LB4100G1	need 2nd	Beta XTalk	13-Oct 04:43	5	4.73E-4	1.56E-4	7.25E-4	+0.34
LB4100G2	Above	Beta bkg	13-Oct 03:28	60	6.333	0.357	2.274	+15.71
LB4100G3	Below	Alpha eff	13-Oct 04:36	5	6444	6620	7779	-3.91
LB4100G3	Above	Beta bkg	13-Oct 03:28	60	8.783	0.810	1.674	+52.37
PIC1A	Above	Alpha bkg	13-Oct 05:49	60	0.350	-1.13E-1	0.365	+2.81
PIC1A	need 2nd	Beta bkg	13-Oct 05:49	60	1.683	-7.65E-1	2.862	+1.05
PIC1D	Above	Alpha bkg	13-Oct 05:49	60	0.467	-9.94E-2	0.351	+4.53
PIC1D	need 2nd	Beta bkg	13-Oct 05:49	60	0.667	0.160	1.305	-0.34
PIC2B	Above	Alpha bkg	13-Oct 04:47	60	0.317	-8.76E-2	0.330	+2.81
PIC2B	Above	Beta bkg	13-Oct 04:47	60	3.167	-2.01E-1	1.568	+8.42
PIC4D	Above	Beta bkg	13-Oct 05:56	60	3.850	0.232	1.952	+9.62
PIC8C	Below	Beta eff	13-Oct 04:58	5	25632	25670	26680	-3.22
PIC11B	need 2nd	Alpha bkg	13-Oct 06:22	60	0.233	-2.88E-2	0.356	+1.08
PIC11B	Above	Beta bkg	13-Oct 06:22	60	2.300	0.091	2.193	+3.31
PIC11C	Above	Alpha bkg	13-Oct 05:16	60	0.417	-8.02E-2	0.310	+4.64
PIC11C	Below	Alpha eff	13-Oct 05:01	5	8436	8523	10020	-3.35
PIC12A	need 2nd	Beta bkg	13-Oct 05:17	60	2.000	-3.61E-1	2.728	+1.59
PIC12A	Below	Beta eff	13-Oct 05:09	5	35553	35650	37790	-3.27
PIC12C	Above	Alpha bkg	13-Oct 06:24	60	0.317	-4.32E-2	0.395	+1.93
PIC12C	Above	Beta bkg	13-Oct 06:24	60	2.567	0.024	2.905	+2.30
PIC14C	Above	Alpha XTalk	13-Oct 06:28	5	0.332	0.269	0.328	+3.42

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

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

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

Reviewed by R. Beil - Hanson

Date 10-13-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 2181317**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204923921	DUP	JXC9	PIC11A	OCT-13-21 08:50:59	DONE	25mm Filter	01-JUN-21 00:00
1204923920	MB	JXC9	PIC10D	OCT-13-21 08:51:02	DONE	25mm Filter	01-JUN-21 00:00
1204923922	LCS	JXC9	PIC11D	OCT-13-21 08:51:06	DONE	25mm Filter	01-JUN-21 00:00
557427001	SAMPLE	JXC9	PIC5B	OCT-13-21 08:51:12	DONE	25mm Filter	01-JUN-21 00:00
557427003	SAMPLE	JXC9	PIC5D	OCT-13-21 08:51:24	DONE	25mm Filter	01-JUN-21 00:00
557427004	SAMPLE	JXC9	PIC6A	OCT-13-21 08:51:28	DONE	25mm Filter	01-JUN-21 00:00
557427005	SAMPLE	JXC9	PIC6B	OCT-13-21 08:51:33	DONE	25mm Filter	01-JUN-21 00:00
557427006	SAMPLE	JXC9	PIC6C	OCT-13-21 08:51:36	DONE	25mm Filter	01-JUN-21 00:00
557483001	SAMPLE	JXC9	PIC7C	OCT-13-21 08:51:42	DONE	25mm Filter	01-JUN-21 00:00
557483002	SAMPLE	JXC9	PIC8D	OCT-13-21 08:51:47	DONE	25mm Filter	01-JUN-21 00:00
557483003	SAMPLE	JXC9	PIC9A	OCT-13-21 08:51:53	DONE	25mm Filter	01-JUN-21 00:00
557483005	SAMPLE	JXC9	PIC9C	OCT-13-21 08:52:02	DONE	25mm Filter	01-JUN-21 00:00
557427002	SAMPLE	JXC9	PIC11D	OCT-13-21 10:40:22	DONE	25mm Filter	01-JUN-21 00:00
557483006	SAMPLE	JXC9	PIC12D	OCT-13-21 10:40:31	DONE	25mm Filter	01-JUN-21 00:00
557483004	SAMPLE	JXC9	PIC12B	OCT-15-21 09:49:12	DONE	25mm Filter	01-JUN-21 00:00

Lucas Cell Raw Data

Batch 2181313 Check-list

This check-list was completed on 26-OCT-21 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 26-OCT-21 and Lyndsey Pace on 26-OCT-21.

Batch ID:	**Product:**	**Description:** Lucas Cell Radium 226
2181313	LUC26RAL	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 and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−226 in Liquid

Batch ID: **2181313**
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL−RAD−A−008 REV# 15
Instrument: LUCAS−C037036045

Due Dates for Lab: 25−OCT−2021 **Package: 27−OCT−2021** **SDG: 29−OCT−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204923910	Radium−226 SPIKE	1715−E	.1	mL
MS	1204923909	Radium−226 SPIKE	1715−E	.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	557427001	11−OCT−2021	1	502.22	502.22	10/20/21 11:10	308	10/26/21 06:18	10/26/21 10:17	6	36
2	557427002	11−OCT−2021	1	500.18	500.18	10/20/21 11:10	402	10/26/21 06:18	10/26/21 10:17	5	14
3	557427003	11−OCT−2021	1	500.6	500.6	10/20/21 11:10	508	10/26/21 06:18	10/26/21 10:17	1	30
4	557427004	11−OCT−2021	1	500.76	500.76	10/20/21 11:10	601	10/26/21 06:18	10/26/21 10:17	5	33
5	557427005	11−OCT−2021	1	505.43	505.43	10/20/21 11:10	707	10/26/21 06:18	10/26/21 10:17	7	20
6	557427006	11−OCT−2021	1	500.91	500.91	10/20/21 11:10	805	10/26/21 06:18	10/26/21 10:17	1	11
7	557483001	11−OCT−2021	1	500.04	500.04	10/20/21 11:10	106	10/26/21 06:53	10/26/21 10:49	1	32
8	557483002	11−OCT−2021	1	500.73	500.73	10/20/21 11:10	204	10/26/21 06:53	10/26/21 10:49	1	25
9	557483003	11−OCT−2021	1	504.11	504.11	10/20/21 11:10	307	10/26/21 06:53	10/26/21 10:49	5	36
10	557483004	11−OCT−2021	1	500.52	500.52	10/20/21 11:10	408	10/26/21 06:53	10/26/21 10:49	8	86
11	557483005	11−OCT−2021	1	500.6	500.6	10/20/21 11:10	504	10/26/21 06:53	10/26/21 10:49	4	18
12	557483006	11−OCT−2021	1	502.83	502.83	10/20/21 11:10	602	10/26/21 06:53	10/26/21 10:49	8	27
13	1204923907 MB	11−OCT−2021	1		505.43	10/20/21 11:10	704	10/26/21 06:53	10/26/21 10:49	7	16
14	1204923908 DUP (557483001)	11−OCT−2021	1	500.15	500.15	10/20/21 11:10	801	10/26/21 06:53	10/26/21 10:49	3	25
15	1204923909 MS (557483001)	11−OCT−2021	1	100.76	100.76	10/20/21 11:10	105	10/26/21 07:27	10/26/21 11:21	3	1053
16	1204923910 LCS	11−OCT−2021	1		505.43	10/20/21 11:10	208	10/26/21 07:27	10/26/21 11:21	4	928

Reagent/Solvent Lot ID	Description	Amount

Comments:
Data Entry Date2: 11−OCT−2021 00:00

Radium-226 Liquid

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

Batch : 2181313
Analyst : LIN01615
Prep Date : 10/11/2021
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	557427001.1	0.5022	2.0265E-05	9/28/2021 14:01	308	30	36	1.200	6	0.200	30	1.7180
2	557427002.1	0.5002	2.0257E-05	9/28/2021 12:43	402	30	14	0.467	5	0.167	30	1.8830
3	557427003.1	0.5006	2.0258E-05	9/28/2021 11:06	508	30	30	1.000	1	0.033	30	1.7330
4	557427004.1	0.5008	2.0259E-05	9/28/2021 9:34	601	30	33	1.100	5	0.167	30	1.9010
5	557427005.1	0.5054	2.0278E-05	9/28/2021 11:06	707	30	20	0.667	7	0.233	30	1.6670
6	557427006.1	0.5009	2.0260E-05	9/28/2021 8:30	805	30	11	0.367	1	0.033	30	1.6030
7	557483001.1	0.5000	2.0256E-05	9/27/2021 9:38	106	30	32	1.067	1	0.033	30	1.4690
8	557483002.1	0.5007	2.0259E-05	9/27/2021 9:43	204	30	25	0.833	1	0.033	30	1.6950
9	557483003.1	0.5041	2.0273E-05	9/27/2021 11:17	307	30	36	1.200	5	0.167	30	1.8160
10	557483004.1	0.5005	2.0258E-05	9/27/2021 12:32	408	30	86	2.867	8	0.267	30	1.8790
11	557483005.1	0.5006	2.0258E-05	9/28/2021 10:21	504	30	18	0.600	4	0.133	30	1.5780
12	557483006.1	0.5028	2.0267E-05	9/28/2021 10:26	602	30	27	0.900	8	0.267	30	1.6150
13	1204923907.1	0.5054	2.0278E-05	10/11/2021 0:00	704	30	16	0.533	7	0.233	30	1.6260
14	1204923908.1	0.5002	2.0256E-05	9/27/2021 9:38	801	30	25	0.833	3	0.100	30	1.4860
15	1204923909.1	0.1008	1.1417E-05	9/27/2021 9:38	105	30	1053	35.100	3	0.100	30	1.6180
16	1204923910.1	0.5054	2.0278E-05	10/11/2021 0:00	208	30	928	30.933	4	0.133	30	1.6950

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			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
9.800%	1/1/2021	12/31/2021	10/20/2021 11:10	10/26/2021 6:18	10/26/2021 10:17	0.650	0.970	1.002	1.000
9.400%	2/1/2021	1/31/2022	10/20/2021 11:10	10/26/2021 6:18	10/26/2021 10:17	0.650	0.970	1.002	1.000
2.600%	6/1/2021	5/31/2022	10/20/2021 11:10	10/26/2021 6:18	10/26/2021 10:17	0.650	0.970	1.002	1.000
5.300%	7/1/2021	6/30/2022	10/20/2021 11:10	10/26/2021 6:18	10/26/2021 10:17	0.650	0.970	1.002	1.000
2.900%	11/1/2020	10/31/2021	10/20/2021 11:10	10/26/2021 6:18	10/26/2021 10:17	0.650	0.970	1.002	1.000
4.700%	4/1/2021	3/31/2022	10/20/2021 11:10	10/26/2021 6:18	10/26/2021 10:17	0.650	0.970	1.002	1.000
4.200%	5/2/2021	4/30/2022	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
7.800%	8/1/2021	7/31/2022	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
2.100%	1/1/2021	12/31/2021	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
5.500%	2/1/2021	1/31/2022	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
8.500%	6/1/2021	5/31/2022	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
3.900%	7/1/2021	6/30/2022	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
2.200%	11/1/2020	10/31/2021	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
1.000%	4/1/2021	3/31/2022	10/20/2021 11:10	10/26/2021 6:53	10/26/2021 10:49	0.652	0.971	1.002	1.000
1.700%	5/2/2021	4/30/2022	10/20/2021 11:10	10/26/2021 7:27	10/26/2021 11:21	0.653	0.971	1.002	1.000
2.600%	8/1/2021	7/31/2022	10/20/2021 11:10	10/26/2021 7:27	10/26/2021 11:21	0.653	0.971	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-E
Spike Exp Date : 5/21/2022
Spike Activity (dpm/ml): 300.12
Spike Volume Added: 0.10

LCS S/N : 1715-E
LCS Exp Date : 5/21/2022
LCS Activity (dpm/ml): 300.12
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	0.2230	0.1574	1	0.3977	**0.8288**	23.72%	1.0000	0.2160	0.3509	0.4035		SAMPLE				
2	0.1865	0.1317	1	0.3392	**0.2278**	49.34%	0.3000	0.1453	0.2162	0.2227		SAMPLE				
3	0.0905	0.0639	1	0.2103	**0.7968**	19.37%	0.9667	0.1856	0.2998	0.3237		SAMPLE				
4	0.1845	0.1303	1	0.3356	**0.7011**	22.64%	0.9333	0.2055	0.3025	0.3272		SAMPLE				
5	0.2466	0.1741	1	0.4331	**0.3678**	40.08%	0.4333	0.1732	0.2881	0.2937		SAMPLE				
6	0.0978	0.0691	1	0.2272	**0.2969**	34.96%	0.3333	0.1155	0.2016	0.2079		SAMPLE				
7	0.1066	0.0753	1	0.2477	**1.0032**	19.00%	1.0333	0.1915	0.3644	0.4007		SAMPLE				
8	0.0923	0.0652	1	0.2143	**0.6722**	22.63%	0.8000	0.1700	0.2799	0.3136		SAMPLE				
9	0.1913	0.1351	1	0.3481	**0.8050**	20.76%	1.0333	0.2134	0.3259	0.3476		SAMPLE				
10	0.2356	0.1663	1	0.4085	**1.9715**	13.59%	2.6000	0.3232	0.4803	0.5974		SAMPLE				
11	0.1983	0.1400	1	0.3703	**0.4213**	34.56%	0.4667	0.1563	0.2766	0.2918		SAMPLE				
12	0.2728	0.1926	1	0.4730	**0.5562**	31.38%	0.6333	0.1972	0.3394	0.3514		SAMPLE				
13	0.2522	0.1780	1	0.4428	**0.2603**	53.33%	0.3000	0.1599	0.2719	0.2747		MB				
14	0.1825	0.1289	1	0.3537	**0.7037**	24.07%	0.7333	0.1764	0.3317	0.3472	557483001.1	DUP	35.1%			
15	0.8301	0.5860	1	1.6084	**152.7149**	3.53%	35.0000	1.0832	9.2636	24.4472	557483001.1	MS			134.1725	113.1%
16	0.1824	0.1288	1	0.3406	**25.5737**	4.20%	30.8000	1.0176	1.6561	4.2507		LCS			26.7475	95.6%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 26-OCT-2021

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	05:58	1	1.20E+05	120024	-1.5		
LUCAS2	EFF	05:59	1	1.29E+05	128979	-1.21		
LUCAS3	EFF	05:56	1	1.31E+05	131206	-2.46		
LUCAS4	EFF	05:54	1	1.27E+05	126973	-1.36		
LUCAS5	EFF	05:52	1	1.28E+05	128486	-1.12		
LUCAS6	EFF	05:51	1	1.30E+05	129652	-2.35		
LUCAS7	EFF	05:49	1	1.31E+05	130666	-0.82		
LUCAS8	EFF	05:47	1	1.29E+05	128574	0.52		

Reviewed by: Lyndsey Pace **Date:** 26-OCT-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 2181313**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
557427001	SAMPLE	LXP1	LUCAS3	OCT-26-21 10:17:00	DONE	Lucas Cell	01-JAN-21 00:00
557427002	SAMPLE	LXP1	LUCAS4	OCT-26-21 10:17:00	DONE	Lucas Cell	01-FEB-21 00:00
557427003	SAMPLE	LXP1	LUCAS5	OCT-26-21 10:17:00	DONE	Lucas Cell	01-JUN-21 00:01
557427004	SAMPLE	LXP1	LUCAS6	OCT-26-21 10:17:00	DONE	Lucas Cell	01-JUL-21 00:00
557427005	SAMPLE	LXP1	LUCAS7	OCT-26-21 10:17:00	DONE	Lucas Cell	01-NOV-20 00:00
557427006	SAMPLE	LXP1	LUCAS8	OCT-26-21 10:17:00	DONE	Lucas Cell	01-APR-21 00:00
557483001	SAMPLE	LXP1	LUCAS1	OCT-26-21 10:49:00	DONE	Lucas Cell	02-MAY-21 00:00
557483002	SAMPLE	LXP1	LUCAS2	OCT-26-21 10:49:00	DONE	Lucas Cell	01-AUG-21 00:00
557483003	SAMPLE	LXP1	LUCAS3	OCT-26-21 10:49:00	DONE	Lucas Cell	01-JAN-21 00:00
557483004	SAMPLE	LXP1	LUCAS4	OCT-26-21 10:49:00	DONE	Lucas Cell	01-FEB-21 00:00
557483005	SAMPLE	LXP1	LUCAS5	OCT-26-21 10:49:00	DONE	Lucas Cell	01-JUN-21 00:01
557483006	SAMPLE	LXP1	LUCAS6	OCT-26-21 10:49:00	DONE	Lucas Cell	01-JUL-21 00:00
1204923907	MB	LXP1	LUCAS7	OCT-26-21 10:49:00	DONE	Lucas Cell	01-NOV-20 00:00
1204923908	DUP	LXP1	LUCAS8	OCT-26-21 10:49:00	DONE	Lucas Cell	01-APR-21 00:00
1204923909	MS	LXP1	LUCAS1	OCT-26-21 11:21:00	DONE	Lucas Cell	02-MAY-21 00:00
1204923910	LCS	LXP1	LUCAS2	OCT-26-21 11:21:00	DONE	Lucas Cell	01-AUG-21 00:00

Analytical Laboratory Report

Final Report

Report ID: S29975.01(02)
Generated on 12/06/2021
Replaces report S29975.01(01) generated on 11/05/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S29975.01-S29975.06
Project: Erickson AM MI New Wells 7-10
Collected Date(s): 11/02/2021
Submitted Date/Time: 11/03/2021 09:03
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.
Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S29975.01	MW-7 L111016-01	Groundwater	11/02/21 14:29
S29975.02	MW-8 L111016-02	Groundwater	11/02/21 13:09
S29975.03	MW-9 L111016-03	Groundwater	11/02/21 11:34
S29975.04	MW-10 L111016-04	Groundwater	11/02/21 10:01
S29975.05	Field Dupe MW-9 L111016-05	Groundwater	11/02/21 11:34
S29975.06	Field Blank L111016-06	Water	11/02/21 09:00

Lab Sample ID: S29975.01
Sample Tag: MW-7 L111016-01
Collected Date/Time: 11/02/2021 14:29
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	11/04/21 11:00	JRH	
Metal Digestion	Completed	SW3015A	11/03/21 11:00	CCM	

Inorganics

Method: E300.0, Run Date: 11/04/21 09:23, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 11/04/21 10:24, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	73	10	0.13	mg/L	10	16887-00-6	
Sulfate	212	10	1.0	mg/L	10	14808-79-8	

Method: SM2540C, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	622	20	2	mg/L	2		

Method: SM2540D, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 11/03/21 15:25, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	122	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 11/03/21 12:28, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.005	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.054	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.12	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.49	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.100	0.005	0.00163	mg/L	5	7439-93-2	

Lab Sample ID: S29975.01 (continued)
Sample Tag: MW-7 L111016-01

Method: E200.8, Run Date: 11/03/21 12:28, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Molybdenum	0.276	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 11/04/21 14:47, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 12/03/21 12:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S29975.02
Sample Tag: MW-8 L111016-02
Collected Date/Time: 11/02/2021 13:09
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	11/04/21 11:00	JRH	
Metal Digestion	Completed	SW3015A	11/03/21 11:00	CCM	

Inorganics

Method: E300.0, Run Date: 11/04/21 09:34, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	8	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	16	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	368	20	2	mg/L	2		

Method: SM2540D, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 11/03/21 15:27, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	93.0	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 11/03/21 12:31, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.021	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.08	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.009	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S29975.02 (continued)

Sample Tag: MW-8 L111016-02

Method: E200.8, Run Date: 11/03/21 12:31, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 11/04/21 14:48, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 12/03/21 12:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S29975.03
Sample Tag: MW-9 L111016-03
Collected Date/Time: 11/02/2021 11:34
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	11/04/21 11:00	JRH	
Metal Digestion	Completed	SW3015A	11/03/21 11:00	CCM	

Inorganics

Method: E300.0, Run Date: 11/04/21 09:44, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	252	20	2	mg/L	2		

Method: SM2540D, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 11/03/21 15:28, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	78.0	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 11/03/21 12:34, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.015	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S29975.03 (continued)

Sample Tag: MW-9 L111016-03

Method: E200.8, Run Date: 11/03/21 12:34, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 11/04/21 14:50, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 12/03/21 12:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S29975.04
Sample Tag: MW-10 L111016-04
Collected Date/Time: 11/02/2021 10:01
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	11/04/21 11:00	JRH	
Metal Digestion	Completed	SW3015A	11/03/21 11:00	CCM	

Inorganics

Method: E300.0, Run Date: 11/04/21 09:54, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	17	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	436	20	2	mg/L	2		

Method: SM2540D, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 11/03/21 15:30, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	137	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 11/03/21 12:37, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.044	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.07	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S29975.04 (continued)
Sample Tag: MW-10 L111016-04

Method: E200.8, Run Date: 11/03/21 12:37, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 11/04/21 14:52, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 12/03/21 12:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S29975.05
Sample Tag: Field Dupe MW-9 L111016-05
Collected Date/Time: 11/02/2021 11:34
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	11/04/21 11:00	JRH	
Metal Digestion	Completed	SW3015A	11/03/21 11:00	CCM	

Inorganics

Method: E300.0, Run Date: 11/04/21 10:04, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2540C, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	268	20	2	mg/L	2		

Method: SM2540D, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 11/03/21 15:32, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	80.7	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 11/03/21 12:40, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.016	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	

Lab Sample ID: S29975.05 (continued)

Sample Tag: Field Dupe MW-9 L111016-05

Method: E200.8, Run Date: 11/03/21 12:40, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E245.1, Run Date: 11/04/21 14:54, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 12/03/21 12:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S29975.06
Sample Tag: Field Blank L111016-06
Collected Date/Time: 11/02/2021 09:00
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.8	IR
2	1L Plastic	None	Yes	2.8	IR
1	125ml Plastic	HNO3	Yes	2.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	11/04/21 11:00	JRH	
Metal Digestion	Completed	SW3015A	11/03/21 11:00	CCM	

Inorganics

Method: E300.0, Run Date: 11/04/21 10:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2540C, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		

Method: SM2540D, Run Date: 11/03/21 21:30, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 11/03/21 15:23, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 11/03/21 12:23, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	

Lab Sample ID: S29975.06 (continued)

Sample Tag: Field Blank L111016-06

Method: E200.8, Run Date: 11/03/21 12:23, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E245.1, Run Date: 11/04/21 14:59, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 12/03/21 12:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID: S29975
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI New Wells 7-10
Submitted: 11/03/2021 09:03 Login User: JRM

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 2.8
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL - UPS# 1Z4664770361236314
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S29975 Submitted: 11/03/2021 09:03

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 11/03/2021 09:25 JRM

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S29975.01	125ml Plastic HNO3	<2			
S29975.01	1L Plastic HNO3	<2			
S29975.01	1L Plastic HNO3	<2			
S29975.02	125ml Plastic HNO3	<2			
S29975.02	1L Plastic HNO3	<2			
S29975.02	1L Plastic HNO3	<2			
S29975.03	125ml Plastic HNO3	<2			
S29975.03	1L Plastic HNO3	<2			
S29975.03	1L Plastic HNO3	<2			
S29975.04	125ml Plastic HNO3	<2			
S29975.04	1L Plastic HNO3	<2			
S29975.04	1L Plastic HNO3	<2			
S29975.05	125ml Plastic HNO3	<2			
S29975.05	1L Plastic HNO3	<2			
S29975.05	1L Plastic HNO3	<2			
S29975.06	125ml Plastic HNO3	<2			
S29975.06	1L Plastic HNO3	<2			
S29975.06	1L Plastic HNO3	<2			

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C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI New Wells 7-10
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☒ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES

Project Locations: ☐ Detroit ☐ New York ☐ Other

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Special Instructions
29975.01	11/2/21	1429	MW-7 L111016 -01	GW	5	3		2					✓	✓	✓	✓	✓	Metals to analyse:
.02		1309	MW-8 -02	GW	5	3		2					✓	✓	✓	✓	✓	B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		1134	MW-9 -03	GW	5	3		2					✓	✓	✓	✓	✓	Co, Li, Hg, Mo,Pb,Se, Tl,
.04		1001	MW-10 -04	GW	5	3		2					✓	✓	✓	✓	✓	Fe, Cu, Ni, Ag, V, Zn
.05		1134	Field Dupe MW-9 -05	GW	5	3		2					✓	✓	✓	✓	✓	Please send a preliminary report
.06		0900	Field Blank -06	DI	5	3		2					✓	✓	✓	✓	✓	

		DATE	TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION	Sampler	11-3-21	0903
RECEIVED BY: SIGNATURE/ORGANIZATION		11/3/21	0903
RELINQUISHED BY: SIGNATURE/ORGANIZATION			
RECEIVED BY: SIGNATURE/ORGANIZATION			

RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 2.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

December 01, 2021

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 561280
SDG: S29975

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 05, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4523.

Sincerely,

Grace Bodiford

Grace Bodiford for
Samuel Hogan
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S29975
Work Order: 561280

December 01, 2021

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on November 05, 2021 for analysis. 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.

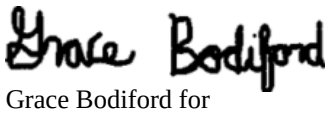
Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
561280001	S29975.01
561280002	S29975.02
561280003	S29975.03
561280004	S29975.04
561280005	S29975.05
561280006	S29975.06 (Field Blank)

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Grace Bodiford for
Samuel Hogan
Project Manager

Chain of Custody and Supporting Documentation

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

561280

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague | ☒ SAME
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S29975 | SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☒ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**
	11/2/21	1429	S29975.01	GW	2			2					✓	✓
	11/2/21	1309	S29975.02	GW	2			2					✓	✓
	11/2/21	1134	S29975.03	GW	2			2					✓	✓
	11/2/21	1001	S29975.04	GW	2			2					✓	✓
	11/2/21	1134	S29975.05	GW	2			2					✓	✓
	11/2/21	0900	S29975.06 (Field Blank)	Wa	2			2					✓	✓

* E903.1 Mod.
** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report

(No Ice needed)

** Subcontracted to
GEL Laboratories, Inc.
2040 Savage Road
Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Johanna Mumm ☐ Sampler	DATE: 11/3/21	TIME: 1700
RECEIVED BY: SIGNATURE/ORGANIZATION: UPS	DATE: 11/3/21	TIME: 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: GEL	DATE: 11/5/21	TIME: 1055

RELINQUISHED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION:	DATE:	TIME:

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

SH

GEL | Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	**SDG/AR/COC/Work Order:** 561-280
Received By: DC	**Date Received:** 11-5-21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground (UPS) Field Services Courier Other 1Z466477036123 6314

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?		X	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?		X	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		X	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		X	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 (None) Other: *all temperatures are recorded in Celsius TEMP: 11°
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR6-21 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):

PM (or PMA) review: Initials GB Date 11/8/21 Page 1 of 1

GL-CHL-SR-001 Rev 7

Laboratory Certifications

List of current GEL Certifications as of 01 December 2021

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122021−36
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S29975
Work Order #: 561280

Product: **GFPC Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2196215

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

GEL Sample ID#	Client Sample Identification
561280001	S29975.01
561280002	S29975.02
561280003	S29975.03
561280004	S29975.04
561280005	S29975.05
561280006	S29975.06 (Field Blank)
1204954201	Method Blank (MB)
1204954202	561280005(S29975.05) Sample Duplicate (DUP)
1204954203	Laboratory Control Sample (LCS)
1204954204	Laboratory Control Sample Duplicate (LCSD)

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

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. 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.

Product: **Lucas Cell, Ra226, Liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2196214

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

GEL Sample ID#	Client Sample Identification
561280001	S29975.01
561280002	S29975.02
561280003	S29975.03
561280004	S29975.04
561280005	S29975.05
561280006	S29975.06 (Field Blank)
1204954196	Method Blank (MB)
1204954197	560777003(NonSDG) Sample Duplicate (DUP)

1204954198	560777003(NonSDG) Matrix Spike (MS)
1204954199	Laboratory Control Sample (LCS)
1204954200	Laboratory Control Sample Duplicate (LCSD)

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
1204954196 (MB)	Radium-226	Result: 0.254 pCi/L > MDA: 0.244 pCi/L <= RDL: 1.00 pCi/L

Miscellaneous Information

Additional Comments
The matrix spike, 1204954198 (Non SDG 560777003MS), 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

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

Qualifier Definition Report
for

MERI001 Merit Laboratories, Inc.

Client SDG: S29975 GEL Work Order: 561280

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: Kenshalla Oston **Name: Kenshalla Oston**

Date: 03 DEC 2021 **Title: Analyst I**

Sample Data Summary

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

Certificate of Analysis

Report Date: December 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID:	S29975.01	Project:	MERI00120
Sample ID:	561280001	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	02-NOV-21 14:29		
Receive Date:	05-NOV-21		
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	0.115	+/-1.13	2.08	3.00	pCi/L			LXB3	11/22/21	0959	2196215	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.781	+/-1.17			pCi/L		1	AEA	12/01/21	0441	2196232	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.666	+/-0.278	0.273	1.00	pCi/L			LXP1	11/30/21	0750	2196214	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			83.5	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: December 3, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S29975.02	Project:	MERI00120
Sample ID:	561280002	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	02-NOV-21 13:09		
Receive Date:	05-NOV-21		
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	1.71	+/-1.36	2.20	3.00	pCi/L			LXB3	11/22/21	0959	2196215	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.93	+/-1.38			pCi/L		1	AEA	12/01/21	0441	2196232	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.228	+/-0.248	0.409	1.00	pCi/L			LXP1	11/30/21	0750	2196214	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			91.7	(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

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

Certificate of Analysis

Report Date: December 3, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S29975.03
Sample ID: 561280003
Matrix: Ground Water
Collect Date: 02-NOV-21 11:34
Receive Date: 05-NOV-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	-0.0915	+/-0.571	1.16	3.00	pCi/L			LXB3	11/22/21	0959	2196215	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.177	+/-0.594			pCi/L		1	AEA	12/01/21	0441	2196232	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.177	+/-0.164	0.226	1.00	pCi/L			LXP1	11/30/21	0822	2196214	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			90.6	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: December 3, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S29975.04	Project:	MERI00120
Sample ID:	561280004	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	02-NOV-21 10:01		
Receive Date:	05-NOV-21		
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	0.225	+/-0.743	1.35	3.00	pCi/L			LXB3	11/22/21	0959	2196215	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.605	+/-0.783			pCi/L		1	AEA	12/01/21	0441	2196232	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.381	+/-0.249	0.340	1.00	pCi/L			LXP1	11/30/21	0822	2196214	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			97.7	(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: December 3, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S29975.05	Project:	MERI00120
Sample ID:	561280005	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	02-NOV-21 11:34		
Receive Date:	05-NOV-21		
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	0.483	+/-0.847	1.49	3.00	pCi/L			LXB3	11/22/21	0959	2196215	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.02	+/-0.897			pCi/L		1	AEA	12/01/21	0441	2196232	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.534	+/-0.296	0.384	1.00	pCi/L			LXP1	11/30/21	0822	2196214	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			92.9	(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

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Certificate of Analysis

Report Date: December 3, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S29975.06 (Field Blank)	Project:	MERI00120
Sample ID:	561280006	Client ID:	MERI001
Matrix:	Water		
Collect Date:	02-NOV-21 09:00		
Receive Date:	05-NOV-21		
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	0.202	+/-1.22	2.20	3.00	pCi/L			LXB3	11/22/21	0959	2196215	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.321	+/-1.23			pCi/L		1	AEA	12/01/21	0441	2196232	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.119	+/-0.168	0.293	1.00	pCi/L			LXP1	11/30/21	0822	2196214	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			87.2	(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

Quality Control Summary

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

QC Summary

Report Date: December 3, 2021

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **561280**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 2196215										
QC1204954202 561280005 DUP										
Radium-228	U	0.483	U	0.591	pCi/L	N/A		N/A	LXB3	11/22/21 10:00
	Uncertainty	+/-0.847		+/-0.813						
QC1204954203 LCS										
Radium-228	47.2			44.4	pCi/L		93.9	(75%-125%)		11/22/21 10:00
	Uncertainty			+/-3.44						
QC1204954204 LCSD										
Radium-228	47.2			40.1	pCi/L	10.2	84.8	(0%-20%)		11/22/21 10:00
	Uncertainty			+/-2.82						
QC1204954201 MB										
Radium-228			U	0.896	pCi/L					11/22/21 09:59
	Uncertainty			+/-1.14						
Rad Ra-226										
Batch 2196214										
QC1204954197 560777003 DUP										
Radium-226		2.06		2.15	pCi/L	4.09		(0%-20%)	LXP1	11/30/21 08:22
	Uncertainty	+/-0.477		+/-0.510						
QC1204954199 LCS										
Radium-226	26.6			23.4	pCi/L		88	(75%-125%)		11/30/21 08:22
	Uncertainty			+/-1.63						
QC1204954200 LCSD										
Radium-226	26.6			21.3	pCi/L	9.69	79.8	(0%-20%)		11/30/21 08:53
	Uncertainty			+/-1.58						
QC1204954196 MB										
Radium-226				0.254	pCi/L					11/30/21 08:22
	Uncertainty			+/-0.187						
QC1204954198 560777003 MS										
Radium-226	132	2.06		113	pCi/L		83.6	(75%-125%)		11/30/21 08:22
	Uncertainty	+/-0.477		+/-7.52						

Notes:

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

The Qualifiers in this report are defined as follows:

QC Summary

Workorder: **561280**

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

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

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 2196215 Check-list

This check-list was completed on 24-NOV-21 by Angela Johnson

This batch was reviewed by Angela Johnson on 24-NOV-21 and Kenshalla Oston on 24-NOV-21.

Batch ID:	**Product:**	**Description:** Gas Flow Radium 228
2196215	GFC28RAL	GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
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 relative percent differences and/or error (RPD/RER) between the LCS and the LCSD recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **2196215**
Analyst: Lois Buist (LXB3)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 5
Instrument: GFC−B742840386

Due Dates for Lab: 30−NOV−2021 **Package: 05−DEC−2021** **SDG: 01−DEC−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204954203	Radium−228 SPIKE	1965−B	.1	mL
LCSD	1204954204	Radium−228 SPIKE	1965−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	560777001	18−NOV−2021	3	301.03	301.03	11/19/21 12:30	11/22/21 07:30
2	560777002	18−NOV−2021	3	307.43	307.43	11/19/21 12:30	11/22/21 07:30
3	560777003	18−NOV−2021	3	293.51	293.51	11/19/21 12:30	11/22/21 07:30
4	560777004	18−NOV−2021	3	291.36	291.36	11/19/21 12:30	11/22/21 07:30
5	560778001	18−NOV−2021	3	295.8	295.8	11/19/21 12:30	11/22/21 07:30
6	560778002	18−NOV−2021	3	292.35	292.35	11/19/21 12:30	11/22/21 07:30
7	561280001	18−NOV−2021	3	297.32	297.32	11/19/21 12:30	11/22/21 07:30
8	561280002	18−NOV−2021	3	299.41	299.41	11/19/21 12:30	11/22/21 07:30
9	561280003	18−NOV−2021	3	318.04	318.04	11/19/21 12:30	11/22/21 07:30
10	561280004	18−NOV−2021	3	317.77	317.77	11/19/21 12:30	11/22/21 07:30
11	561280005	18−NOV−2021	3	309.52	309.52	11/19/21 12:30	11/22/21 07:30
12	561280006	18−NOV−2021	3	298.54	298.54	11/19/21 12:30	11/22/21 07:30
13	1204954201 MB	18−NOV−2021	3		318.04	11/19/21 12:30	11/22/21 07:30
14	1204954202 DUP (561280005)	18−NOV−2021	3	300.57	300.57	11/19/21 12:30	11/22/21 07:30
15	1204954203 LCS	18−NOV−2021	3		318.04	11/19/21 12:30	11/22/21 07:30
16	1204954204 LCSD	18−NOV−2021	3		318.04	11/19/21 12:30	11/22/21 07:30

Reagent/Solvent Lot ID	Description	Amount
WORK 1951−C	Barium−133	.1 mL
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL
REGNT 3301783	Barium Carrier Ra228 REG	1 mL
REGNT 3304867.1	RGF−Hydrofluoric Acid	4 mL
REGNT 3318677	RGF−50% Potassium Carbonate	2 mL
REGNT 3353921	RGF−1M Citric Acid	5 mL
REGNT 3354444	RGF−Neodymium Subtrate	5 mL
REGNT 3357238	RGF−7M Nitric Acid	25 mL
REGNT 3357922	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 3360651	Lot #DGA0025	2 g
REGNT 3364100	2M HCl	20 mL
REGNT 3364305.2	Concentrated HNO3 (16M)	5 mL
REGNT 3365600	RGF−1.5M Ammonium Sulfate	10 mL

Comments:
Pipet Id: RAD−GFC−1795419
Data Entry Date2: 18−NOV−2021 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 1951-C
Tracer Exp Date : 9/16/2022
Tracer Volume Added: 0.10

Batch : 2196215
Analyst : LOI02092
Prep Date : 11/18/2021
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

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

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	560777001.1	0.3010	1.8477E-05	10/26/2021 10:45	192.5	4.16%	122.2	5.22%	0.1	0.000200
2	560777002.1	0.3074	1.8582E-05	10/26/2021 12:44	192.5	4.16%	174.8	4.37%	0.1	0.000200
3	560777003.1	0.2935	1.8346E-05	10/26/2021 13:38	192.5	4.16%	146.8	4.76%	0.1	0.000200
4	560777004.1	0.2914	1.8307E-05	10/26/2021 14:33	192.5	4.16%	186.3	4.23%	0.1	0.000200
5	560778001.1	0.2958	1.8386E-05	10/28/2021 10:05	192.5	4.16%	178.5	4.32%	0.1	0.000200
6	560778002.1	0.2924	1.8325E-05	10/28/2021 11:10	192.5	4.16%	179.3	4.31%	0.1	0.000200
7	561280001.1	0.2973	1.8413E-05	11/2/2021 14:29	192.5	4.16%	160.7	4.55%	0.1	0.000200
8	561280002.1	0.2994	1.8449E-05	11/2/2021 13:09	192.5	4.16%	176.5	4.35%	0.1	0.000200
9	561280003.1	0.3180	1.8747E-05	11/2/2021 11:34	192.5	4.16%	174.3	4.37%	0.1	0.000200
10	561280004.1	0.3178	1.8743E-05	11/2/2021 10:01	192.5	4.16%	188.1	4.21%	0.1	0.000200
11	561280005.1	0.3095	1.8616E-05	11/2/2021 11:34	192.5	4.16%	178.8	4.32%	0.1	0.000200
12	561280006.1	0.2985	1.8434E-05	11/2/2021 9:00	192.5	4.16%	167.8	4.46%	0.1	0.000200
13	1204954201.1	0.3180	1.8747E-05	11/18/2021 0:00	192.5	4.16%	170.8	4.42%	0.1	0.000200
14	1204954202.1	0.3006	1.8469E-05	11/2/2021 11:34	192.5	4.16%	177.5	4.33%	0.1	0.000200
15	1204954203.1	0.3180	1.8747E-05	11/18/2021 0:00	192.5	4.16%	166.7	4.47%	0.1	0.000200
16	1204954204.1	0.3180	1.8747E-05	11/18/2021 0:00	192.5	4.16%	195.8	4.13%	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

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	1A	60	8	95	1.583	11/22/2021 9:58	11/19/2021 12:30	11/22/2021 7:30	0.991	0.756	0.999	1.057	63.5%	3.35%
2	1B	60	13	78	1.300	11/22/2021 9:58	11/19/2021 12:30	11/22/2021 7:30	0.991	0.756	0.999	1.057	90.8%	3.03%
3	1C	60	5	78	1.300	11/22/2021 9:58	11/19/2021 12:30	11/22/2021 7:30	0.991	0.756	0.999	1.057	76.3%	3.17%
4	1D	60	10	71	1.183	11/22/2021 9:58	11/19/2021 12:30	11/22/2021 7:30	0.991	0.756	0.999	1.057	96.8%	2.98%
5	2A	60	10	79	1.317	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.992	0.756	0.999	1.057	92.7%	3.01%
6	2B	60	6	60	1.000	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.992	0.756	0.999	1.057	93.2%	3.01%
7	2C	60	19	67	1.117	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.993	0.755	0.999	1.057	83.5%	3.10%
8	2D	60	14	116	1.933	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.993	0.755	0.999	1.057	91.7%	3.02%
9	3B	60	5	23	0.383	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.993	0.755	0.999	1.057	90.6%	3.03%
10	3C	60	3	47	0.783	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.993	0.755	0.999	1.057	97.7%	2.97%
11	3D	60	4	49	0.817	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.993	0.755	0.999	1.057	92.9%	3.01%
12	4A	60	10	90	1.500	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.993	0.755	0.999	1.057	87.2%	3.06%
13	4B	60	5	91	1.517	11/22/2021 9:59	11/19/2021 12:30	11/22/2021 7:30	0.999	0.754	0.999	1.057	88.7%	3.05%
14	4C	60	12	48	0.800	11/22/2021 10:00	11/19/2021 12:30	11/22/2021 7:30	0.993	0.754	0.999	1.057	92.2%	3.02%
15	4D	60	56	785	13.083	11/22/2021 10:00	11/19/2021 12:30	11/22/2021 7:30	0.999	0.754	0.999	1.057	86.6%	3.07%
16	5A	60	22	835	13.917	11/22/2021 10:00	11/19/2021 12:30	11/22/2021 7:30	0.999	0.754	0.999	1.057	102%	2.94%

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	6/1/2021	5/31/2022	0.6325	0.00738	0.950	11/21/2021 7:27	500
2	PIC	6/1/2021	5/31/2022	0.6409	0.00711	0.462	11/21/2021 7:27	500
3	PIC	6/1/2021	5/31/2022	0.6524	0.00847	0.634	11/21/2021 7:27	500
4	PIC	6/1/2021	5/31/2022	0.6466	0.00692	0.606	11/21/2021 7:27	500
5	PIC	6/1/2021	5/31/2022	0.6321	0.01914	0.692	11/21/2021 7:27	500
6	PIC	6/1/2021	5/31/2022	0.6248	0.02111	0.710	11/21/2021 7:27	500
7	PIC	6/1/2021	5/31/2022	0.6380	0.01274	1.088	11/21/2021 7:27	500
8	PIC	6/1/2021	5/31/2022	0.6254	0.00745	1.472	11/21/2021 7:28	500
9	PIC	6/1/2021	5/31/2022	0.6428	0.01614	0.410	11/21/2021 7:28	500
10	PIC	6/1/2021	5/31/2022	0.6497	0.00988	0.712	11/21/2021 7:28	500
11	PIC	6/1/2021	5/31/2022	0.6259	0.02297	0.680	11/21/2021 7:28	500
12	PIC	6/1/2021	5/31/2022	0.6543	0.01123	1.446	11/21/2021 7:28	500
13	PIC	6/1/2021	5/31/2022	0.6421	0.01519	1.260	11/21/2021 7:28	500
14	PIC	6/1/2021	5/31/2022	0.6681	0.00889	0.628	11/21/2021 7:28	500
15	PIC	6/1/2021	5/31/2022	0.6156	0.00773	1.202	11/21/2021 7:28	500
16	PIC	6/1/2021	5/31/2022	0.6571	0.00851	0.460	11/21/2021 7:28	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 : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1965-B
LCS Exp Date : 8/22/2022
LCS Activity (dpm/ml): 333.52
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	1.6323	1.1524	3	2.5678	**3.3317**	26.78%	0.6333	0.1682	1.7342	1.9348		SAMPLE					
2	0.7687	0.5427	3	1.2630	**2.9771**	18.20%	0.8380	0.1503	1.0466	1.2945		SAMPLE					
3	1.1036	0.7792	3	1.7760	**2.8997**	22.98%	0.6660	0.1514	1.2924	1.4915		SAMPLE					
4	0.8642	0.6101	3	1.3947	**2.0134**	25.25%	0.5773	0.1447	0.9890	1.1149		SAMPLE					
5	0.9710	0.6855	3	1.5544	**2.2905**	24.71%	0.6247	0.1527	1.0977	1.2469		SAMPLE					
6	1.0023	0.7077	3	1.6022	**1.0837**	46.52%	0.2900	0.1345	0.9850	1.0241		SAMPLE					
7	1.3316	0.9401	3	2.0807	**0.1150**	502.96%	0.0287	0.1442	1.1332	1.1336		SAMPLE					
8	1.4288	1.0087	3	2.2024	**1.7066**	40.77%	0.4613	0.1875	1.3597	1.4281		SAMPLE					
9	0.6994	0.4938	3	1.1591	**-0.0915**	318.41%	-0.0267	0.0849	0.5710	0.5712		SAMPLE					
10	0.8459	0.5972	3	1.3519	**0.2246**	168.72%	0.0713	0.1203	0.7427	0.7449		SAMPLE					
11	0.9270	0.6545	3	1.4855	**0.4826**	89.61%	0.1367	0.1224	0.8469	0.8561		SAMPLE					
12	1.4287	1.0087	3	2.2040	**0.2015**	309.29%	0.0540	0.1670	1.2217	1.2228		SAMPLE					
13	1.2473	0.8806	3	1.9358	**0.8959**	65.05%	0.2567	0.1667	1.1407	1.1638		MB					
14	0.8664	0.6117	3	1.3951	**0.5907**	70.29%	0.1720	0.1208	0.8131	0.8270	561280005.1	DUP	*	0.0%			
15	1.3029	0.9198	3	2.0263	**44.3530**	5.06%	11.8813	0.4695	3.4354	11.8686		LCS				47.2376	93.9%
16	0.6427	0.4537	3	1.0563	**40.0561**	4.72%	13.4567	0.4826	2.8154	10.6217		LCSD		10.2%		47.2376	84.8%

ASSAY 22-Nov-21 7:55:50
Wizard 2480 s/n 46190630
Protocol id 8 Ba-133
Time limit
Count limit
Isotope Ba-133
Protocol date 11/22/2021
Run id. 4383

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	93	1	180	577.5	192.47	4.16		07:55:50
560777001	2	93	2	180	366.5	122.15	5.22	63.46	07:59:04
560777002	3	93	3	180	524.5	174.81	4.37	90.82	08:02:18
560777003	4	93	4	180	440.5	146.8	4.76	76.27	08:05:32
560777004	5	93	5	180	559	186.3	4.23	96.79	08:08:46
560778001	1	21	1	180	535.5	178.48	4.32	92.73	08:12:31
560778002	2	21	2	180	538	179.3	4.31	93.16	08:15:44
561280001	3	21	3	180	482	160.65	4.55	83.47	08:18:59
561280002	4	21	4	180	529.5	176.47	4.35	91.69	08:22:12
561280003	5	21	5	180	523	174.3	4.37	90.56	08:25:27
561280004	1	11	1	180	564.5	188.11	4.21	97.73	08:29:03
561280005	2	11	2	180	536.5	178.8	4.32	92.90	08:32:17
561280006	3	11	3	180	503.5	167.81	4.46	87.19	08:35:31
1204954201	4	11	4	180	512.5	170.8	4.42	88.74	08:38:45
1204954202	5	11	5	180	532.5	177.47	4.33	92.21	08:41:59
1204954203	1	12	1	180	500	166.65	4.47	86.58	08:45:46
1204954204	2	12	2	180	587.5	195.8	4.13	101.73	08:49:00

END OF ASSAY

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
560777001	1A	60	8	95	11/22/2021 9:58	11/22/2021 10:58	PIC	2196215
560777002	1B	60	13	78	11/22/2021 9:58	11/22/2021 10:58	PIC	2196215
560777003	1C	60	5	78	11/22/2021 9:58	11/22/2021 10:58	PIC	2196215
560777004	1D	60	10	71	11/22/2021 9:58	11/22/2021 10:58	PIC	2196215
560778001	2A	60	10	79	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
560778002	2B	60	6	60	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
561280001	2C	60	19	67	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
561280002	2D	60	14	116	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
561280003	3B	60	5	23	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
561280004	3C	60	3	47	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
561280005	3D	60	4	49	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
561280006	4A	60	10	90	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
1204954201	4B	60	5	91	11/22/2021 9:59	11/22/2021 10:59	PIC	2196215
1204954202	4C	60	12	48	11/22/2021 10:00	11/22/2021 11:00	PIC	2196215
1204954203	4D	60	56	785	11/22/2021 10:00	11/22/2021 11:00	PIC	2196215
1204954204	5A	60	22	835	11/22/2021 10:00	11/22/2021 11:00	PIC	2196215

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 22-Nov-2021

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

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	need 2nd	Alpha XTalk	22-Nov 06:44	5	0.472	0.303	0.532	+1.44
LB4100E2	Above	Beta bkg	22-Nov 04:44	60	2.167	1.283	3.234	-0.28
LB4100E2	Above	Beta XTalk	22-Nov 06:51	5	6.07E-4	1.09E-4	5.24E-4	+4.19
LB4100E4	need 2nd	Alpha eff	22-Nov 06:44	5	9682	9271	10370	-0.76
LB4100E4	Above	Alpha XTalk	22-Nov 06:44	5	0.265	0.227	0.265	+3.02
LB4100F3	Above	Alpha bkg	22-Nov 04:44	60	0.333	-8.21E-2	0.542	+1.00
LB4100G1	Above	Alpha XTalk	22-Nov 06:50	5	0.473	0.102	0.423	+3.94
LB4100G1	Above	Beta bkg	22-Nov 04:45	60	62.817	0.372	1.688	+281.60
LB4100G2	need 2nd	Alpha eff	22-Nov 06:50	5	10160	9696	12850	-2.12
LB4100G2	Above	Beta bkg	22-Nov 04:45	60	2.867	0.357	2.274	+4.86
LB4100G3	need 2nd	Alpha eff	22-Nov 06:50	5	6894	6620	7779	-1.58
LB4100G3	Above	Beta bkg	22-Nov 04:45	60	5.650	0.810	1.674	+30.61
LB4100G3	Above	Beta XTalk	22-Nov 07:03	5	4.33E-4	7.49E-5	4.02E-4	+3.58
PIC8A	Above	Beta eff	22-Nov 05:20	5	56514	51700	54770	+6.41
PIC12A	need 2nd	Alpha eff	22-Nov 05:24	5	9631	9621	10270	-2.91
PIC12A	Above	Alpha XTalk	22-Nov 05:24	5	0.354	0.287	0.320	+8.94
PIC12A	Below	Beta eff	22-Nov 05:36	5	32724	35650	37790	-11.20
PIC14A	Above	Alpha bkg	22-Nov 03:45	60	0.350	-5.86E-2	0.314	+3.58

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

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

G5400W1W	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1X	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1Y	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1Z	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

Reviewed by _____

Date 11/22/21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 2196215**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
560777001	SAMPLE	LXB3	PIC1A	NOV-22-21 09:58:36	DONE	25mm Filter	01-JUN-21 00:00
560777002	SAMPLE	LXB3	PIC1B	NOV-22-21 09:58:41	DONE	25mm Filter	01-JUN-21 00:00
560777003	SAMPLE	LXB3	PIC1C	NOV-22-21 09:58:50	DONE	25mm Filter	01-JUN-21 00:00
560777004	SAMPLE	LXB3	PIC1D	NOV-22-21 09:58:50	DONE	25mm Filter	01-JUN-21 00:00
560778001	SAMPLE	LXB3	PIC2A	NOV-22-21 09:59:04	DONE	25mm Filter	01-JUN-21 00:00
560778002	SAMPLE	LXB3	PIC2B	NOV-22-21 09:59:08	DONE	25mm Filter	01-JUN-21 00:00
561280001	SAMPLE	LXB3	PIC2C	NOV-22-21 09:59:17	DONE	25mm Filter	01-JUN-21 00:00
561280002	SAMPLE	LXB3	PIC2D	NOV-22-21 09:59:25	DONE	25mm Filter	01-JUN-21 00:00
561280003	SAMPLE	LXB3	PIC3B	NOV-22-21 09:59:30	DONE	25mm Filter	01-JUN-21 00:00
561280004	SAMPLE	LXB3	PIC3C	NOV-22-21 09:59:38	DONE	25mm Filter	01-JUN-21 00:00
561280005	SAMPLE	LXB3	PIC3D	NOV-22-21 09:59:42	DONE	25mm Filter	01-JUN-21 00:00
561280006	SAMPLE	LXB3	PIC4A	NOV-22-21 09:59:50	DONE	25mm Filter	01-JUN-21 00:00
1204954201	MB	LXB3	PIC4B	NOV-22-21 09:59:58	DONE	25mm Filter	01-JUN-21 00:00
1204954202	DUP	LXB3	PIC4C	NOV-22-21 10:00:02	DONE	25mm Filter	01-JUN-21 00:00
1204954203	LCS	LXB3	PIC4D	NOV-22-21 10:00:09	DONE	25mm Filter	01-JUN-21 00:00
1204954204	LCSD	LXB3	PIC5A	NOV-22-21 10:00:13	DONE	25mm Filter	01-JUN-21 00:00

Lucas Cell Raw Data

Batch 2196214 Check-list

This check-list was completed on 30-NOV-21 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 30-NOV-21 and Lyndsey Pace on 30-NOV-21.

Batch ID: 2196214 **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?		No	
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the LCS and the LCSD recoveries within the acceptance limits?	Yes		
11	Were the matrix spike (MS/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: **2196214**
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL−RAD−A−008 REV# 15
Instrument: SP−C018367602

Due Dates for Lab: 29−NOV−2021 **Package: 05−DEC−2021** **SDG: 01−DEC−2021**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204954199	Radium−226 SPIKE	1715−G	.1	mL
LCSD	1204954200	Radium−226 SPIKE	1715−G	.1	mL
MS	1204954198	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	560777001	19−NOV−2021	1	502.51	502.51	11/23/21 10:30	102	11/30/21 04:58	11/30/21 07:50	2	74
2	560777002	19−NOV−2021	1	501.31	501.31	11/23/21 10:30	207	11/30/21 04:58	11/30/21 07:50	5	61
3	560777003	19−NOV−2021	1	502.31	502.31	11/23/21 10:30	304	11/30/21 04:58	11/30/21 07:50	8	93
4	560777004	19−NOV−2021	1	501.11	501.11	11/23/21 10:30	401	11/30/21 04:58	11/30/21 07:50	6	52
5	560778001	19−NOV−2021	1	502.21	502.21	11/23/21 10:30	501	11/30/21 04:58	11/30/21 07:50	3	52
6	560778002	19−NOV−2021	1	501.71	501.71	11/23/21 10:30	601	11/30/21 04:58	11/30/21 07:50	1	32
7	561280001	19−NOV−2021	1	500.71	500.71	11/23/21 10:30	705	11/30/21 04:58	11/30/21 07:50	3	30
8	561280002	19−NOV−2021	1	501.21	501.21	11/23/21 10:30	806	11/30/21 04:58	11/30/21 07:50	8	17
9	561280003	19−NOV−2021	1	501.01	501.01	11/23/21 10:30	106	11/30/21 05:30	11/30/21 08:22	1	7
10	561280004	19−NOV−2021	1	502.71	502.71	11/23/21 10:30	202	11/30/21 05:30	11/30/21 08:22	5	20
11	561280005	19−NOV−2021	1	502.81	502.81	11/23/21 10:30	302	11/30/21 05:30	11/30/21 08:22	6	26
12	561280006	19−NOV−2021	1	503.31	503.31	11/23/21 10:30	406	11/30/21 05:30	11/30/21 08:22	4	9
13	1204954196 MB	19−NOV−2021	1		503.31	11/23/21 10:30	505	11/30/21 05:30	11/30/21 08:22	2	12
14	1204954197 DUP (560777003)	19−NOV−2021	1	501.31	501.31	11/23/21 10:30	602	11/30/21 05:30	11/30/21 08:22	7	87
15	1204954198 MS (560777003)	19−NOV−2021	1	101.31	101.31	11/23/21 10:30	704	11/30/21 05:30	11/30/21 08:22	8	887
16	1204954199 LCS	19−NOV−2021	1		503.31	11/23/21 10:30	801	11/30/21 05:30	11/30/21 08:22	8	815
17	1204954200 LCSD	19−NOV−2021	1		503.31	11/23/21 10:30	101	11/30/21 06:01	11/30/21 08:53	3	707

Reagent/Solvent Lot ID	Description	Amount

Comments:
Data Entry Date2: 19−NOV−2021 00:00

Radium-226 Liquid

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

Batch : 2196214
Analyst : LIN01615
Prep Date : 11/19/2021
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	560777001.1	0.5025	2.0266E-05	10/26/2021 10:45	102	30	74	2.467	2	0.067	30	1.5460
2	560777002.1	0.5013	2.0261E-05	10/26/2021 12:44	207	30	61	2.033	5	0.167	30	1.9320
3	560777003.1	0.5023	2.0265E-05	10/26/2021 13:38	304	30	93	3.100	8	0.267	30	1.7870
4	560777004.1	0.5011	2.0260E-05	10/26/2021 14:33	401	30	52	1.733	6	0.200	30	1.8400
5	560778001.1	0.5022	2.0265E-05	10/28/2021 10:05	501	30	52	1.733	3	0.100	30	1.9100
6	560778002.1	0.5017	2.0263E-05	10/28/2021 11:10	601	30	32	1.067	1	0.033	30	1.9010
7	561280001.1	0.5007	2.0259E-05	11/2/2021 14:29	705	30	30	1.000	3	0.100	30	1.7610
8	561280002.1	0.5012	2.0261E-05	11/2/2021 13:09	806	30	17	0.567	8	0.267	30	1.7130
9	561280003.1	0.5010	2.0260E-05	11/2/2021 11:34	106	30	7	0.233	1	0.033	30	1.4690
10	561280004.1	0.5027	2.0267E-05	11/2/2021 10:01	202	30	20	0.667	5	0.167	30	1.7020
11	561280005.1	0.5028	2.0267E-05	11/2/2021 11:34	302	30	26	0.867	6	0.200	30	1.6180
12	561280006.1	0.5033	2.0269E-05	11/2/2021 9:00	406	30	9	0.300	4	0.133	30	1.8120
13	1204954196.1	0.5033	2.0269E-05	11/19/2021 0:00	505	30	12	0.400	2	0.067	30	1.6950
14	1204954197.1	0.5013	2.0261E-05	10/26/2021 13:38	602	30	87	2.900	7	0.233	30	1.6150
15	1204954198.1	0.1013	1.1450E-05	10/26/2021 13:38	704	30	887	29.567	8	0.267	30	1.6710
16	1204954199.1	0.5033	2.0269E-05	11/19/2021 0:00	801	30	815	27.167	8	0.267	30	1.4860
17	1204954200.1	0.5033	2.0269E-05	11/19/2021 0:00	101	30	707	23.567	3	0.100	30	1.4260

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 De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
2.800%	5/2/2021	4/30/2022	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
9.200%	8/1/2021	7/31/2022	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
3.300%	1/1/2021	12/31/2021	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
6.400%	2/1/2021	1/31/2022	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
4.300%	6/1/2021	5/31/2022	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
5.300%	7/1/2021	6/30/2022	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
3.000%	11/1/2021	10/31/2022	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
1.500%	4/1/2021	3/31/2022	11/23/2021 10:30	11/30/2021 4:58	11/30/2021 7:50	0.707	0.979	1.002	1.000
4.200%	5/2/2021	4/30/2022	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
4.100%	8/1/2021	7/31/2022	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
9.600%	1/1/2021	12/31/2021	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
6.500%	2/1/2021	1/31/2022	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
9.600%	6/1/2021	5/31/2022	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
3.900%	7/1/2021	6/30/2022	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
8.000%	11/1/2021	10/31/2022	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
1.000%	4/1/2021	3/31/2022	11/23/2021 10:30	11/30/2021 5:30	11/30/2021 8:22	0.708	0.979	1.002	1.000
2.400%	5/2/2021	4/30/2022	11/23/2021 10:30	11/30/2021 6:01	11/30/2021 8:53	0.709	0.979	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 : 9/15/2022
Spike Activity (dpm/ml): 297.60
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/15/2022
LCS Activity (dpm/ml): 297.60
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	0.1305	0.0921	1	0.2682	**2.0155**	12.43%	2.4000	0.2906	0.4783	0.5707		SAMPLE				
2	0.1654	0.1168	1	0.3010	**1.2574**	17.18%	1.8667	0.2708	0.3575	0.4606		SAMPLE				
3	0.2258	0.1594	1	0.3915	**2.0594**	12.28%	2.8333	0.3350	0.4772	0.5778		SAMPLE				
4	0.1904	0.1344	1	0.3396	**1.0850**	17.75%	1.5333	0.2539	0.3521	0.4087		SAMPLE				
5	0.1294	0.0914	1	0.2507	**1.1109**	15.73%	1.6333	0.2472	0.3296	0.3783		SAMPLE				
6	0.0751	0.0530	1	0.1745	**0.7069**	19.27%	1.0333	0.1915	0.2567	0.2859		SAMPLE				
7	0.1408	0.0994	1	0.2728	**0.6659**	21.49%	0.9000	0.1915	0.2777	0.2965		SAMPLE				
8	0.2361	0.1667	1	0.4093	**0.2280**	55.58%	0.3000	0.1667	0.2482	0.2505		SAMPLE				
9	0.0972	0.0686	1	0.2258	**0.1770**	47.33%	0.2000	0.0943	0.1635	0.1662		SAMPLE				
10	0.1870	0.1320	1	0.3401	**0.3806**	33.58%	0.5000	0.1667	0.2487	0.2565		SAMPLE				
11	0.2154	0.1521	1	0.3842	**0.5337**	29.87%	0.6667	0.1886	0.2959	0.3218		SAMPLE				
12	0.1569	0.1108	1	0.2929	**0.1190**	72.40%	0.1667	0.1202	0.1682	0.1698		SAMPLE				
13	0.1186	0.0837	1	0.2438	**0.2545**	38.63%	0.3333	0.1247	0.1866	0.1962		MB				
14	0.2338	0.1651	1	0.4106	**2.1454**	12.73%	2.6667	0.3232	0.5096	0.6185	560777003.1	DUP	4.1%			
15	1.1953	0.8439	1	2.0725	**112.7325**	8.69%	29.3000	0.9972	7.5202	25.1758	560777003.1	MS			132.3234	83.6%
16	0.2705	0.1910	1	0.4691	**23.4259**	3.69%	26.9000	0.9563	1.6322	3.7828		LCS			26.6343	88.0%
17	0.1724	0.1217	1	0.3340	**21.2617**	4.48%	23.4667	0.8882	1.5773	3.5927		LCSD	9.7%		26.6343	79.8%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 30-NOV-2021

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:27	1	1.20E+05	120101	-1.45		
LUCAS2	EFF	06:26	1	1.30E+05	130080	-0.34		
LUCAS3	EFF	06:25	1	1.31E+05	131444	-2.13		
LUCAS4	EFF	06:24	1	1.27E+05	126985	-1.34		
LUCAS5	EFF	06:23	1	1.29E+05	128659	-0.96		
LUCAS6	EFF	06:21	1	1.31E+05	130778	-0.36		
LUCAS7	EFF	06:20	1	1.31E+05	131394	-0.92		
LUCAS8	EFF	06:19	1	1.23E+05	122676	-0.64		

Reviewed by: Lyndsey Pace **Date:** 30-NOV-21

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 2196214**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
560777001	SAMPLE	LXP1	LUCAS1	NOV-30-21 07:50:00	DONE	Lucas Cell	02-MAY-21 00:00
560777002	SAMPLE	LXP1	LUCAS2	NOV-30-21 07:50:00	DONE	Lucas Cell	01-AUG-21 00:00
560777003	SAMPLE	LXP1	LUCAS3	NOV-30-21 07:50:00	DONE	Lucas Cell	01-JAN-21 00:00
560777004	SAMPLE	LXP1	LUCAS4	NOV-30-21 07:50:00	DONE	Lucas Cell	01-FEB-21 00:00
560778001	SAMPLE	LXP1	LUCAS5	NOV-30-21 07:50:00	DONE	Lucas Cell	01-JUN-21 00:01
560778002	SAMPLE	LXP1	LUCAS6	NOV-30-21 07:50:00	DONE	Lucas Cell	01-JUL-21 00:00
561280001	SAMPLE	LXP1	LUCAS7	NOV-30-21 07:50:00	DONE	Lucas Cell	01-NOV-21 00:00
561280002	SAMPLE	LXP1	LUCAS8	NOV-30-21 07:50:00	DONE	Lucas Cell	01-APR-21 00:00
561280003	SAMPLE	LXP1	LUCAS1	NOV-30-21 08:22:00	DONE	Lucas Cell	02-MAY-21 00:00
561280004	SAMPLE	LXP1	LUCAS2	NOV-30-21 08:22:00	DONE	Lucas Cell	01-AUG-21 00:00
561280005	SAMPLE	LXP1	LUCAS3	NOV-30-21 08:22:00	DONE	Lucas Cell	01-JAN-21 00:00
561280006	SAMPLE	LXP1	LUCAS4	NOV-30-21 08:22:00	DONE	Lucas Cell	01-FEB-21 00:00
1204954196	MB	LXP1	LUCAS5	NOV-30-21 08:22:00	DONE	Lucas Cell	01-JUN-21 00:01
1204954197	DUP	LXP1	LUCAS6	NOV-30-21 08:22:00	DONE	Lucas Cell	01-JUL-21 00:00
1204954198	MS	LXP1	LUCAS7	NOV-30-21 08:22:00	DONE	Lucas Cell	01-NOV-21 00:00
1204954199	LCS	LXP1	LUCAS8	NOV-30-21 08:22:00	DONE	Lucas Cell	01-APR-21 00:00
1204954200	LCSD	LXP1	LUCAS1	NOV-30-21 08:53:00	DONE	Lucas Cell	02-MAY-21 00:00

Analytical Laboratory Report

Final Report

Report ID: S31034.01(02)
Generated on 01/06/2022
Replaces report S31034.01(01) generated on 12/10/2021

Report to

Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S31034.01-S31034.06
Project: Erickson AM MI New Wells 7-10
Collected Date(s): 12/07/2021
Submitted Date/Time: 12/08/2021 09:38
Sampled by: Marc Wahrer
P.O. #:

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.
Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
SM2540C	Standard Method 2540 C 2011
SM2540D	Standard Method 2540 D 2011
SW3015A	SW 846 Method 3015A Revision 1 February 2007

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S31034.01	MW-7 L112020-01	Groundwater	12/07/21 14:25
S31034.02	MW-8 L112020-02	Groundwater	12/07/21 13:04
S31034.03	MW-9 L112020-03	Groundwater	12/07/21 11:22
S31034.04	MW-10 L112020-04	Groundwater	12/07/21 09:51
S31034.05	Field Dupe MW-9 L112020-05	Groundwater	12/07/21 11:22
S31034.06	Field Blank L112020-06	Water	12/07/21 08:50

Lab Sample ID: S31034.01
Sample Tag: MW-7 L112020-01
Collected Date/Time: 12/07/2021 14:25
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.8	IR
2	1L Plastic	None	Yes	4.8	IR
1	125ml Plastic	HNO3	Yes	4.8	IR
1	125ml Plastic	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/09/21 09:30	JRH	
Metal Digestion	Completed	SW3015A	12/09/21 10:30	CCM	

Inorganics

Method: SM2540C, Run Date: 12/08/21 20:50, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	634	20	2	mg/L	2		

Method: SM2540D, Run Date: 12/09/21 11:55, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 12/09/21 15:33, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	126	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 12/09/21 11:55, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.056	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.19	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.50	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.100	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.293	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Lab Sample ID: S31034.01 (continued)
Sample Tag: MW-7 L112020-01

Method: E245.1, Run Date: 12/09/21 13:49, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/06/22 12:14, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

Method: , Run Date: 12/13/21 15:30, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project (Replicate 01)*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S31034.02
Sample Tag: MW-8 L112020-02
Collected Date/Time: 12/07/2021 13:04
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.8	IR
2	1L Plastic	None	Yes	4.8	IR
1	125ml Plastic	HNO3	Yes	4.8	IR
1	125ml Plastic	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/09/21 09:30	JRH	
Metal Digestion	Completed	SW3015A	12/09/21 10:30	CCM	

Inorganics

Method: SM2540C, Run Date: 12/08/21 20:50, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	370	20	2	mg/L	2		

Method: SM2540D, Run Date: 12/09/21 11:55, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	2	3	1	mg/L	1.00		b

Metals

Method: E200.8, Run Date: 12/09/21 15:35, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	98.5	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 12/09/21 12:00, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.021	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.02	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.006	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

b-Value detected less than reporting limit, but greater than MDL

Lab Sample ID: S31034.02 (continued)

Sample Tag: MW-8 L112020-02

Method: E245.1, Run Date: 12/09/21 13:51, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/06/22 12:14, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

Method: , Run Date: 12/13/21 15:30, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project (Replicate 01)*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S31034.03
Sample Tag: MW-9 L112020-03
Collected Date/Time: 12/07/2021 11:22
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.8	IR
2	1L Plastic	None	Yes	4.8	IR
1	125ml Plastic	HNO3	Yes	4.8	IR
1	125ml Plastic	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/09/21 09:30	JRH	
Metal Digestion	Completed	SW3015A	12/09/21 10:30	CCM	

Inorganics

Method: SM2540C, Run Date: 12/08/21 20:50, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	244	20	2	mg/L	2		

Method: SM2540D, Run Date: 12/09/21 11:55, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 12/09/21 15:36, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	76.6	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 12/09/21 12:04, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.014	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.009	0.005	0.000730	mg/L	5	7440-66-6	

Lab Sample ID: S31034.03 (continued)

Sample Tag: MW-9 L112020-03

Method: E245.1, Run Date: 12/09/21 13:53, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/06/22 12:14, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

Method: , Run Date: 12/13/21 15:30, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project (Replicate 01)*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S31034.04
Sample Tag: MW-10 L112020-04
Collected Date/Time: 12/07/2021 09:51
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.8	IR
2	1L Plastic	None	Yes	4.8	IR
1	125ml Plastic	HNO3	Yes	4.8	IR
1	125ml Plastic	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/09/21 09:30	JRH	
Metal Digestion	Completed	SW3015A	12/09/21 10:30	CCM	

Inorganics

Method: SM2540C, Run Date: 12/08/21 20:50, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	428	20	2	mg/L	2		

Method: SM2540D, Run Date: 12/09/21 11:55, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 12/09/21 15:38, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	128	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 12/09/21 12:07, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.043	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Lab Sample ID: S31034.04 (continued)
Sample Tag: MW-10 L112020-04

Method: E245.1, Run Date: 12/09/21 13:55, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/06/22 12:14, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

Method: , Run Date: 12/13/21 15:30, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project (Replicate 01)*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S31034.05
Sample Tag: Field Dupe MW-9 L112020-05
Collected Date/Time: 12/07/2021 11:22
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.8	IR
2	1L Plastic	None	Yes	4.8	IR
1	125ml Plastic	HNO3	Yes	4.8	IR
1	125ml Plastic	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/09/21 09:30	JRH	
Metal Digestion	Completed	SW3015A	12/09/21 10:30	CCM	

Inorganics

Method: SM2540C, Run Date: 12/08/21 20:50, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	246	20	2	mg/L	2		

Method: SM2540D, Run Date: 12/09/21 11:55, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 12/09/21 15:39, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	75.8	0.50	0.0435	mg/L	5	7440-70-2	

Method: E200.8, Run Date: 12/09/21 12:10, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.015	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Lab Sample ID: S31034.05 (continued)

Sample Tag: Field Dupe MW-9 L112020-05

Method: E245.1, Run Date: 12/09/21 13:56, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/06/22 12:14, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

Method: , Run Date: 12/13/21 15:30, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project (Replicate 01)*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S31034.06
Sample Tag: Field Blank L112020-06
Collected Date/Time: 12/07/2021 08:50
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	4.8	IR
2	1L Plastic	None	Yes	4.8	IR
1	125ml Plastic	HNO3	Yes	4.8	IR
1	125ml Plastic	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/09/21 09:30	JRH	
Metal Digestion	Completed	SW3015A	12/09/21 10:30	CCM	

Inorganics

Method: SM2540C, Run Date: 12/08/21 20:50, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	20	2	mg/L	2		

Method: SM2540D, Run Date: 12/09/21 11:55, Analyst: ASB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1.00		

Metals

Method: E200.8, Run Date: 12/09/21 15:31, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	

Method: E200.8, Run Date: 12/09/21 11:51, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Lab Sample ID: S31034.06 (continued)

Sample Tag: Field Blank L112020-06

Method: E245.1, Run Date: 12/09/21 13:58, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/06/22 12:14, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project*	Completed				1		O

Method: , Run Date: 12/13/21 15:30, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Misc. Special Project (Replicate 01)*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID: S31034
Client: BWL01 (Board of Water & Light)
Project: Erickson AM MI New Wells 7-10
Submitted: 12/08/2021 09:38 Login User: JRM

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.8
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[X] Yes	[ ] No	[ ] N/A	Subcontracting needed? Subcontacted to:	GEL
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S31034 Submitted: 12/08/2021 09:38

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 12/08/2021 10:08 JRM

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S31034.01	125ml Plastic HNO3	<2			
S31034.01	1L Plastic HNO3	<2			
S31034.01	1L Plastic HNO3	<2			
S31034.02	125ml Plastic HNO3	<2			
S31034.02	1L Plastic HNO3	<2			
S31034.02	1L Plastic HNO3	<2			
S31034.03	125ml Plastic HNO3	<2			
S31034.03	1L Plastic HNO3	<2			
S31034.03	1L Plastic HNO3	<2			
S31034.04	125ml Plastic HNO3	<2			
S31034.04	1L Plastic HNO3	<2			
S31034.04	1L Plastic HNO3	<2			
S31034.05	125ml Plastic HNO3	<2			
S31034.05	1L Plastic HNO3	<2			
S31034.05	1L Plastic HNO3	<2			
S31034.06	125ml Plastic HNO3	<2			
S31034.06	1L Plastic HNO3	<2			
S31034.06	1L Plastic HNO3	<2			

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Jennifer Caporale
COMPANY: Lansing Board of Water and Light
ADDRESS: PO Box 13007 48901-3007
CITY: Lansing STATE: Mi ZIP CODE: 48901
PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Kelly Gleason ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS: Kelly.Gleason@lbwl.com

PROJECT NO./NAME: Erickson AM MI New Wells 7-10
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Marc Wahrer

TURNAROUND TIME REQUIRED ☐ 1 DAY ☒ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER ASAP

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☒ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☒ NPDES

Project Locations: ☐ Detroit ☐ New York ☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	Total Metals	F- undisstiled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS
31034.01	12/07/21	1425	MW-7 L112020-01	GW	5	3		2					✓	✓	✓	✓	✓
.02	12/07/21	1304	MW-8 L112020-02	GW	5	3		2					✓	✓	✓	✓	✓
.03	12/07/21	1122	MW-9 L112020-03	GW	5	3		2					✓	✓	✓	✓	✓
.04	12/07/21	0951	MW-10 L112020-04	GW	5	3		2					✓	✓	✓	✓	✓
.05	12/07/21	1122	Field Dupe MW-9 L112020-05	GW	5	3		2					✓	✓	✓	✓	✓
.06	12/07/21	0850	Field Blank L112020-06	DI	5	3		2					✓	✓	✓	✓	✓

Metals to analyse:
B, Ca, Sb, As, Ba, Be, Cd, Cr,
Co, Li, Hg, Mo, Pb, Se, Tl,
Fe, Cu, Ni, Ag, V, Zn
Please send a preliminary report

RELINQUISHED BY: SIGNATURE/ORGANIZATION (Sampler)	DATE 12-8-21	TIME 0938	
RECEIVED BY: SIGNATURE/ORGANIZATION Johanna Murray	DATE 12/8/21	TIME 0938	
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	NOTES: TEMP. ON ARRIVAL 4.8
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

December 10, 2021

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 564472
SDG: S31034-1

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 09, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4523.

Sincerely,

Grace Bodiford

Grace Bodiford for
Samuel Hogan
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S31034-1
Work Order: 564472

December 10, 2021

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on December 09, 2021 for analysis. 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.

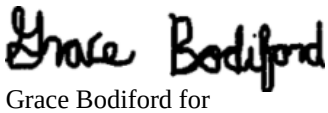
Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
564472001	S31034.01
564472002	S31034.02
564472003	S31034.03
564472004	S31034.04
564472005	S31034.05
564472006	S31034.06 (Field Blank)

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: General Chemistry.



Grace Bodiford for
Samuel Hogan
Project Manager

Chain of Custody and Supporting Documentation

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

564472

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | FAX NO.: | P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com | QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague | ☒ SAME
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing | STATE: MI | ZIP CODE: 48823
PHONE NO.: 517-332-0167 | E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S31034 | SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☒ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**		Fluoride 300.0 2-day TAT	Sulfate 300.0 2-day TAT	Chloride 300.0 2-day TAT			
	12/7/21	1425	S31034.01	GW	3	1		2					✓	✓		✓	✓	✓			
	12/7/21	1304	S31034.02	GW	3	1		2					✓	✓		✓	✓	✓			
	12/7/21	1122	S31034.03	GW	3	1		2					✓	✓		✓	✓	✓			
	12/7/21	0951	S31034.04	GW	3	1		2					✓	✓		✓	✓	✓			
	12/7/21	1122	S31034.05	GW	3	1		2					✓	✓		✓	✓	✓			
	12/7/21	0850	S31034.06 (Field Blank)	Wa	3	1		2					✓	✓		✓	✓	✓			

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other
Special Instructions

* E903.1 Mod.
** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report

(Ice for IC)
** Subcontracted to
GEL Laboratories, Inc.
2040 Savage Road
Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Johnnie Murray ☑ Sampler	DATE 12/18/21	TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION	UPS	DATE 12/18/21	TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE 12-9-21	TIME 1010

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

SH

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	**SDG/AR/COC/Work Order:** S34-H68 / 372472
Received By: DC	**Date Received:** 12-9-21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground (UPS) Field Services Courier Other 1Z4664770163258621

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?		X	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?		X	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
D) Did the client designate samples are hazardous?		X	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		X	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 None Other: *all temperatures ~~are recorded~~ in Celsius TEMP: 6°
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR6-21 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):

PM (or PMA) review: Initials GB Date 12/13/21 Page 1 of 1

GL-CHL-SR-001 Rev 7

Laboratory Certifications

List of current GEL Certifications as of 10 December 2021

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122021−36
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

General Chem Analysis

Case Narrative

General Chemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S31034-1
Work Order #: 564472

Product: **Ion Chromatography**
Analytical Method: EPA 300.0
Analytical Procedure: GL-GC-E-086 REV# 29
Analytical Batch: 2206301

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

GEL Sample ID#	Client Sample Identification
564472001	S31034.01
564472002	S31034.02
564472003	S31034.03
564472004	S31034.04
564472005	S31034.05
564472006	S31034.06 (Field Blank)
1204975549	Method Blank (MB)
1204975550	Laboratory Control Sample (LCS)
1204975565	564470001(NonSDG) Sample Duplicate (DUP)
1204975566	564470001(NonSDG) Post Spike (PS)

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.

Technical Information

Sample Dilutions
The following sample 564472001 (S31034.01) was diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	564472 001
Chloride	10X
Sulfate	20X

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

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

Qualifier Definition Report
for

MERI001 Merit Laboratories, Inc.

Client SDG: S31034-1 GEL Work Order: 564472

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria
J Value is estimated
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: Aubrey Kingsbury**

Date: 13 DEC 2021 **Title: Data Validator**

Sample Data Summary

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

Certificate of Analysis

Report Date: December 13, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S31034.01	Project:	MERI00120
Sample ID:	564472001	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	07-DEC-21 14:25		
Receive Date:	09-DEC-21		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid "As Received"												
Fluoride		0.338	0.0330	0.100	mg/L		1	HXC1	12/09/21	1500	2206301	1
Chloride		72.2	0.670	2.00	mg/L		10	HXC1	12/10/21	0930	2206301	2
Sulfate		203	2.66	8.00	mg/L		20	HXC1	12/10/21	1133	2206301	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 300.0	
3	EPA 300.0	

Notes:

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: December 13, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S31034.02	Project:	MERI00120
Sample ID:	564472002	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	07-DEC-21 13:04		
Receive Date:	09-DEC-21		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid "As Received"												
Chloride		4.45	0.0670	0.200	mg/L		1	HXC1	12/09/21	1530	2206301	1
Fluoride	J	0.0587	0.0330	0.100	mg/L		1					
Sulfate		13.8	0.133	0.400	mg/L		1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 300.0	

Notes:

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: December 13, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S31034.03	Project:	MERI00120
Sample ID:	564472003	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	07-DEC-21 11:22		
Receive Date:	09-DEC-21		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid "As Received"												
Chloride		1.11	0.0670	0.200	mg/L		1	HXC1	12/09/21	1601	2206301	1
Fluoride	U	ND	0.0330	0.100	mg/L		1					
Sulfate		3.58	0.133	0.400	mg/L		1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 300.0	

Notes:

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: December 13, 2021

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S31034.04	Project:	MERI00120
Sample ID:	564472004	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	07-DEC-21 09:51		
Receive Date:	09-DEC-21		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid "As Received"												
Chloride		1.03	0.0670	0.200	mg/L		1	HXC1	12/09/21	1632	2206301	1
Fluoride	J	0.0660	0.0330	0.100	mg/L		1					
Sulfate		14.5	0.133	0.400	mg/L		1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 300.0	

Notes:

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: December 13, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S31034.05
Sample ID: 564472005
Matrix: Ground Water
Collect Date: 07-DEC-21 11:22
Receive Date: 09-DEC-21
Collector: Client

Project: MERI00120
Client ID: MERI001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid "As Received"												
Chloride		1.07	0.0670	0.200	mg/L		1	HXC1	12/09/21	1703	2206301	1
Fluoride	U	ND	0.0330	0.100	mg/L		1					
Sulfate		3.52	0.133	0.400	mg/L		1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 300.0	

Notes:

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: December 13, 2021

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S31034.06 (Field Blank)
Sample ID: 564472006
Matrix: Ground Water
Collect Date: 07-DEC-21 08:50
Receive Date: 09-DEC-21
Collector: Client

Project: MERI00120
Client ID: MERI001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid "As Received"												
Chloride	U	ND	0.0670	0.200	mg/L		1	HXC1	12/09/21	1733	2206301	1
Fluoride	U	ND	0.0330	0.100	mg/L		1					
Sulfate	U	ND	0.133	0.400	mg/L		1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 300.0	

Notes:

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 Summary

QC Summary

Report Date: December 13, 2021

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **564472**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 2206301										
QC1204975565 564470001 DUP										
Chloride	U	ND	U	ND	mg/L	N/A			HXC1	12/09/21 21:09
Fluoride	U	ND	U	ND	mg/L	N/A				
Sulfate	U	ND	U	ND	mg/L	N/A				
QC1204975550 LCS										
Chloride	5.00			4.59	mg/L		91.8	(90%-110%)		12/10/21 04:52
Fluoride	2.50			2.36	mg/L		94.5	(90%-110%)		
Sulfate	10.0			9.44	mg/L		94.4	(90%-110%)		
QC1204975549 MB										
Chloride			U	ND	mg/L					12/10/21 04:21
Fluoride			U	ND	mg/L					
Sulfate			U	ND	mg/L					
QC1204975566 564470001 PS										
Chloride	5.00	U ND		4.61	mg/L		92.2	(90%-110%)		12/09/21 21:40
Fluoride	2.50	U ND		2.33	mg/L		93.3	(90%-110%)		
Sulfate	10.0	U ND		9.51	mg/L		95.1	(90%-110%)		

Notes:

The Qualifiers in this report are defined as follows:

QC Summary

Workorder: 564472

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

<	Result is less than value reported
>	Result is greater than value reported
B	The target analyte was detected in the associated blank.
E	General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
H	Analytical holding time was exceeded
J	See case narrative for an explanation
J	Value is estimated
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Per section 9.3.4.1 of Method 1664 Revision B, due to matrix spike recovery issues, this result may not be reported or used for regulatory compliance purposes.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Z	Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
d	5-day BOD--The 2:1 depletion requirement was not met for this sample
e	5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes
h	Preparation or preservation holding time was exceeded

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.

Instrument QC Data Summary

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Report Run On: 13-DEC-2021 04:41

GEL Laboratories LLC
Contract: MERI00120
SDG #: S31034-1

Ion Chromatography
Method: EPA 300.0
Instrument: DIONEX ICS-3000 Ion Chromatograph (IC7)

Parmname: Chloride Concentration Units:mg/L

Sample Type	Run Date	Data File	Result	Nominal	Recovery	Limits	Within Limits
ICV	**09-DEC-2021 10:53:00**	**211209**	**4.6042**	**5**	**92.1**	**(90%-110%)**	**Yes**
CCV	09-DEC-2021 13:58:00	211209	7.1183	7.5	94.9	(90%-110%)	Yes
CCV	09-DEC-2021 20:08:00	211209	4.5526	5	91.1	(90%-110%)	Yes
CCV	10-DEC-2021 02:18:00	211209	7.1623	7.5	95.5	(90%-110%)	Yes
CCV	10-DEC-2021 08:28:00	211209	4.6117	5	92.2	(90%-110%)	Yes
CCV	10-DEC-2021 12:04:00	211209	7.1583	7.5	95.4	(90%-110%)	Yes

Sample Type	Run Date	Data File	Result	Limits	Within Limits
ICB	**09-DEC-2021 11:24:00**	**211209**	**0**	**0.2**	**Yes**
CCB	09-DEC-2021 14:29:00	211209	0	0.2	Yes
CCB	09-DEC-2021 20:39:00	211209	0	0.2	Yes
CCB	10-DEC-2021 02:49:00	211209	0	0.2	Yes
CCB	10-DEC-2021 08:59:00	211209	0	0.2	Yes
CCB	10-DEC-2021 12:35:00	211209	0	0.2	Yes

Parmname: Fluoride Concentration Units:mg/L

Sample Type	Run Date	Data File	Result	Nominal	Recovery	Limits	Within Limits
ICV	**09-DEC-2021 10:53:00**	**211209**	**2.331**	**2.5**	**93.2**	**(90%-110%)**	**Yes**
CCV	09-DEC-2021 13:58:00	211209	3.6193	3.75	96.5	(90%-110%)	Yes
CCV	09-DEC-2021 20:08:00	211209	2.3493	2.5	94	(90%-110%)	Yes
CCV	10-DEC-2021 02:18:00	211209	3.6934	3.75	98.5	(90%-110%)	Yes
CCV	10-DEC-2021 08:28:00	211209	2.3611	2.5	94.4	(90%-110%)	Yes
CCV	10-DEC-2021 12:04:00	211209	3.6477	3.75	97.3	(90%-110%)	Yes

Sample Type	Run Date	Data File	Result	Limits	Within Limits
ICB	**09-DEC-2021 11:24:00**	**211209**	**0**	**0.1**	**Yes**
CCB	09-DEC-2021 14:29:00	211209	0	0.1	Yes
CCB	09-DEC-2021 20:39:00	211209	0	0.1	Yes
CCB	10-DEC-2021 02:49:00	211209	0	0.1	Yes
CCB	10-DEC-2021 08:59:00	211209	0	0.1	Yes
CCB	10-DEC-2021 12:35:00	211209	0	0.1	Yes

Parmname: Sulfate Concentration Units:mg/L

Sample Type	Run Date	Data File	Result	Nominal	Recovery	Limits	Within Limits
ICV	**09-DEC-2021 10:53:00**	**211209**	**9.4625**	**10**	**94.6**	**(90%-110%)**	**Yes**
CCV	09-DEC-2021 13:58:00	211209	14.4522	15	96.3	(90%-110%)	Yes
CCV	09-DEC-2021 20:08:00	211209	9.3851	10	93.9	(90%-110%)	Yes

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Report Run On: 13-DEC-2021 04:41

GEL Laboratories LLC

Contract: MERI00120

SDG #: S31034-1

Ion Chromatography

Method: EPA 300.0

Instrument: DIONEX ICS-3000 Ion Chromatograph (IC7)

Parmname: Sulfate Concentration Units:mg/L

Sample Type	Run Date	Data File	Result	Nominal	Recovery	Limits	Within Limits
CCV	10-DEC-2021 02:18:00	211209	14.52	15	96.8	(90%-110%)	Yes
CCV	10-DEC-2021 08:28:00	211209	9.4314	10	94.3	(90%-110%)	Yes
CCV	10-DEC-2021 12:04:00	211209	14.4947	15	96.6	(90%-110%)	Yes

Sample Type	Run Date	Data File	Result	Limits	Within Limits
ICB	**09-DEC-2021 11:24:00**	**211209**	**0**	**0.4**	**Yes**
CCB	09-DEC-2021 14:29:00	211209	0	0.4	Yes
CCB	09-DEC-2021 20:39:00	211209	0	0.4	Yes
CCB	10-DEC-2021 02:49:00	211209	0	0.4	Yes
CCB	10-DEC-2021 08:59:00	211209	0	0.4	Yes
CCB	10-DEC-2021 12:35:00	211209	0	0.4	Yes

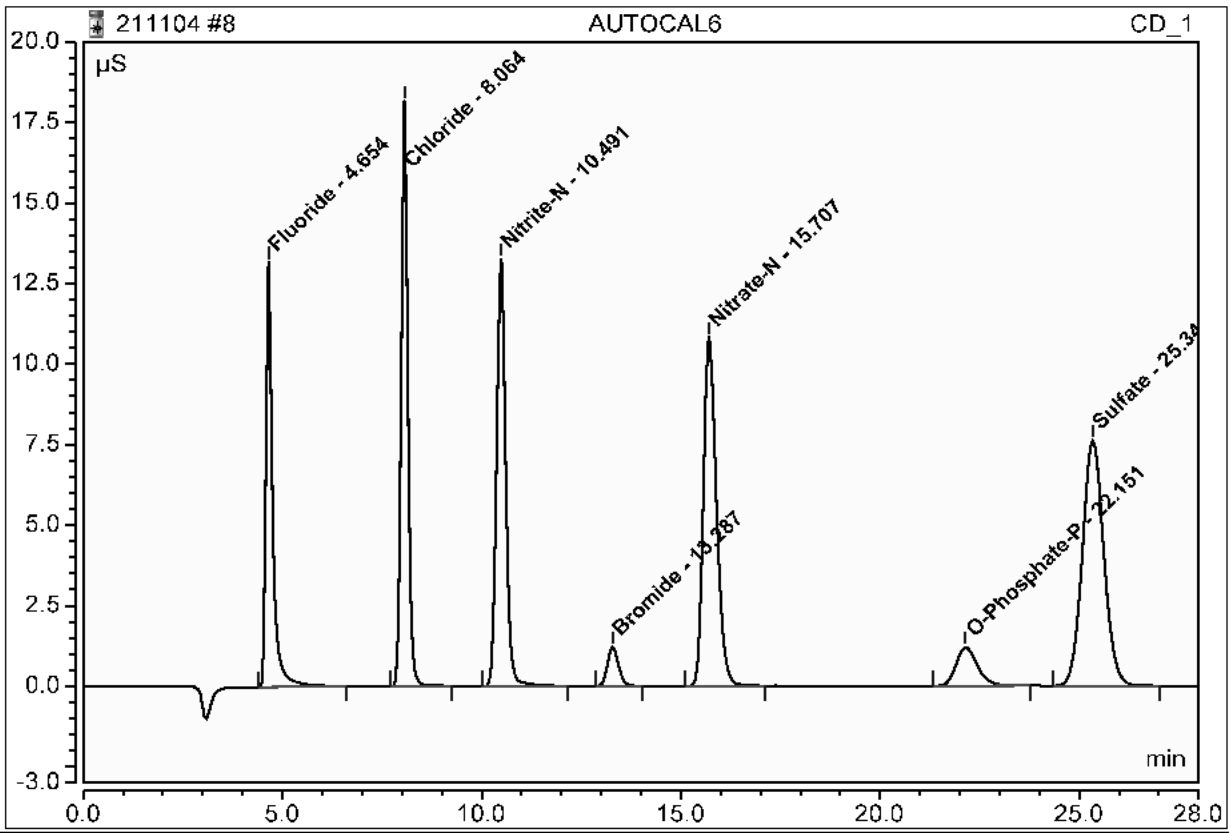
Ion Chromatography
Raw Data

This is runlog for Sequence 211104.seq for IC7

Sample ID	Run Time	Batch	Dilution	Dataset	Analyst
ICAL-06	11/04/21 15:28		1	211104	LXA2
ICAL-05	11/04/21 15:58		1	211104	LXA2
ICAL-04	11/04/21 16:29		1	211104	LXA2
ICAL-03	11/04/21 17:00		1	211104	LXA2
ICAL-02	11/04/21 17:30		1	211104	LXA2
ICAL-01	11/04/21 18:01		1	211104	LXA2
ICAL-06	11/04/21 15:28		1	211104	LXA2
ICAL-05	11/04/21 15:58		1	211104	LXA2
ICAL-04	11/04/21 16:29		1	211104	LXA2
ICAL-03	11/04/21 17:00		1	211104	LXA2
ICAL-02	11/04/21 17:30		1	211104	LXA2
ICAL-01	11/04/21 18:01		1	211104	LXA2
ICV	11/04/21 18:32		1	211104	LXA2
CCB	11/04/21 19:03		1	211104	LXA2
1204948920	11/04/21 19:34	2193848	1	211104	LXA2
1204948921	11/04/21 20:05	2193848	1	211104	LXA2
561103011	11/04/21 20:35	2193848	1	211104	LXA2
1204948922	11/04/21 21:06	2193848	1	211104	LXA2
1204948923	11/04/21 21:37	2193848	1	211104	LXA2
561103012	11/04/21 22:08	2193848	1	211104	LXA2
561103013	11/04/21 22:39	2193848	1	211104	LXA2
561103014	11/04/21 23:10	2193848	1	211104	LXA2
561103015	11/04/21 23:41	2193848	1	211104	LXA2

8 AUTOCAL6

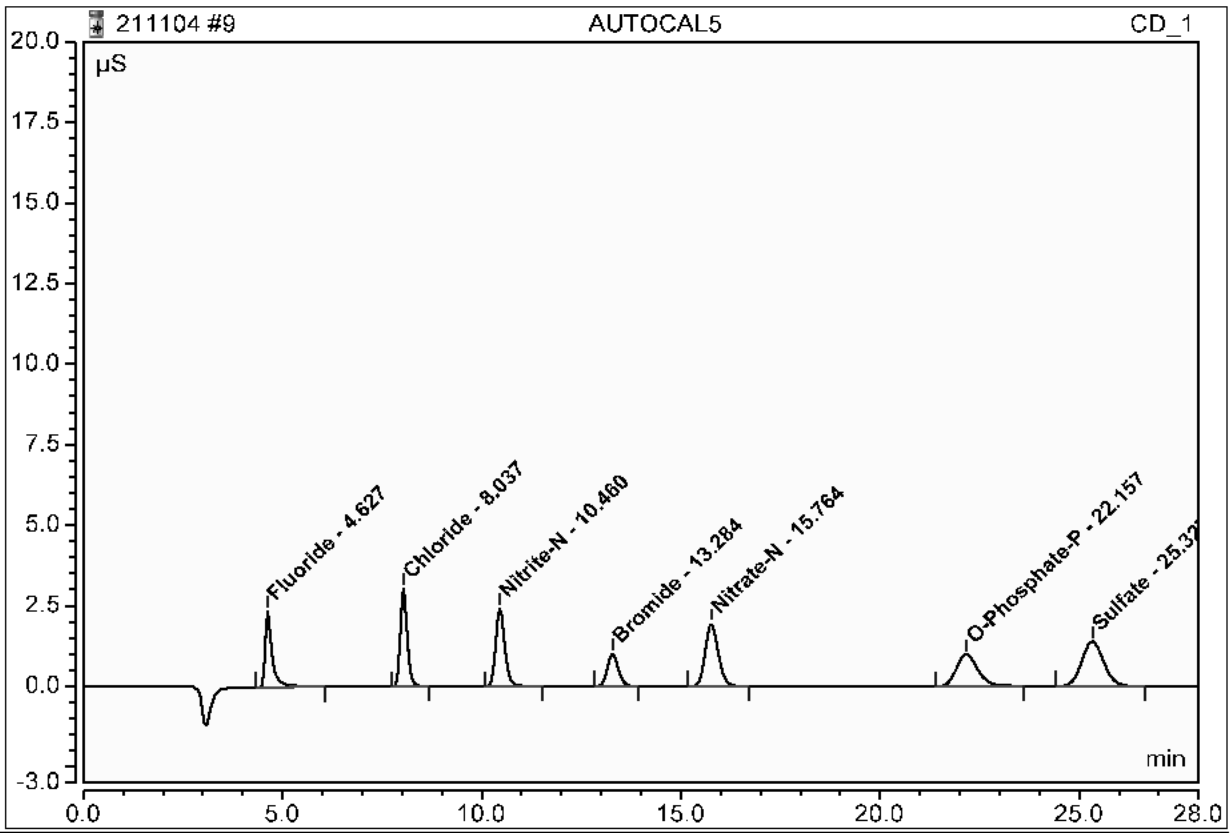
Sample Name:	**AUTOCAL6**	*Injection Volume:*	**50.0**
Vial Number:	**1**	*Channel:*	**CD_1**
Sample Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**11/4/2021 15:28**	Analyst:	**LXA2**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.65	Fluoride	5.0000	5.0100		2.55433	13.08
2	8.06	Chloride	10.0000	10.0355		3.46803	17.76
3	10.49	Nitrite-N	5.0000	5.0111		3.49816	17.91
4	13.29	Bromide	3.0000	3.0113		0.39064	2.00
5	15.71	Nitrate-N	5.0000	5.0138		4.12050	21.10
6	22.15	O-Phosphate-P	3.0000	3.0022		0.74639	3.82
7	25.34	Sulfate	20.0000	20.0441		4.75435	24.34
Total:				51.1279	0.000	19.532	100.00

9 AUTOCAL5

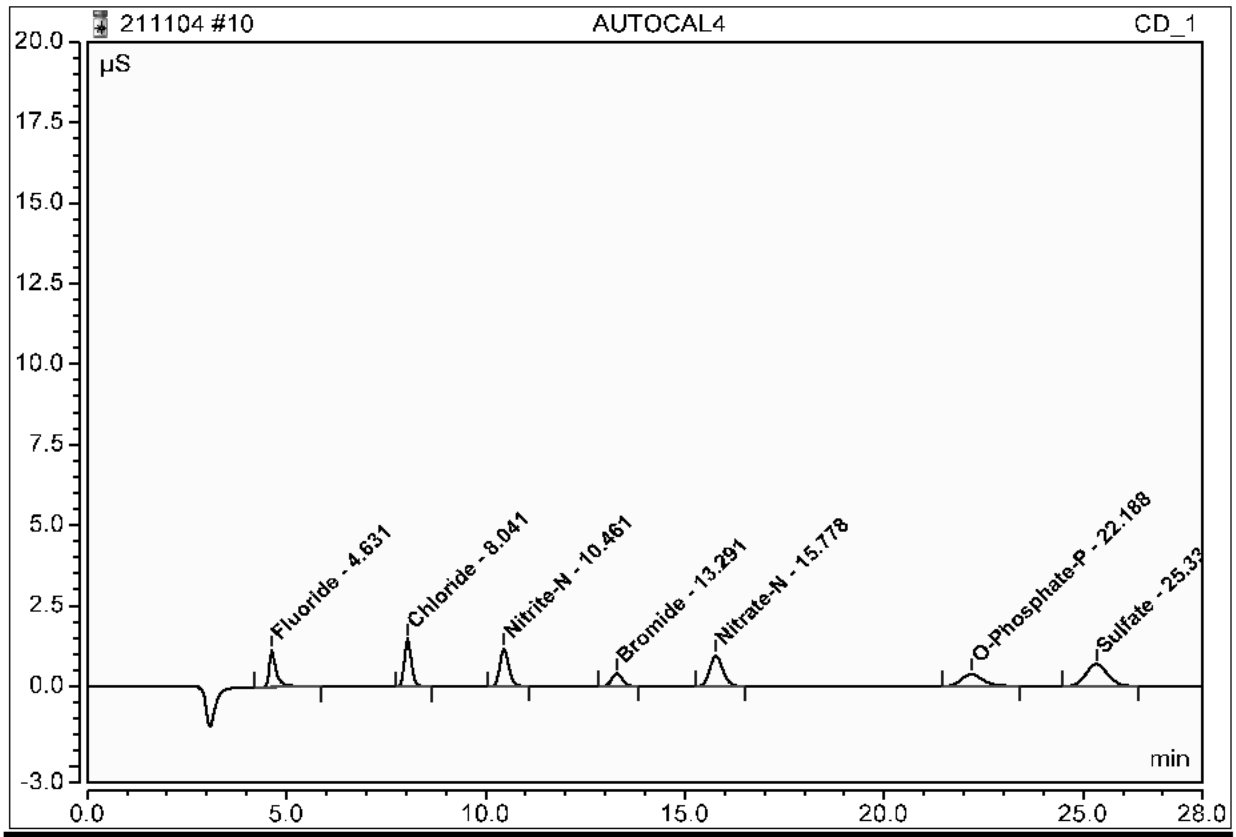
Sample Name:	**AUTOCAL5**	*Injection Volume:*	**50.0**
Vial Number:	**2**	*Channel:*	**CD_1**
Sample Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**11/4/2021 15:58**	Analyst:	**LXA2**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.63	Fluoride	1.0000	0.9507		0.48005	11.17
2	8.04	Chloride	2.0000	1.8207		0.60526	14.08
3	10.46	Nitrite-N	1.0000	0.9477		0.64232	14.94
4	13.28	Bromide	2.5000	2.4851		0.32193	7.49
5	15.76	Nitrate-N	1.0000	0.9314		0.74352	17.30
6	22.16	O-Phosphate-P	2.5000	2.4987		0.61883	14.40
7	25.33	Sulfate	4.0000	3.7861		0.88650	20.62
Total:				13.4205	0.000	4.298	100.00

10 AUTOCAL4

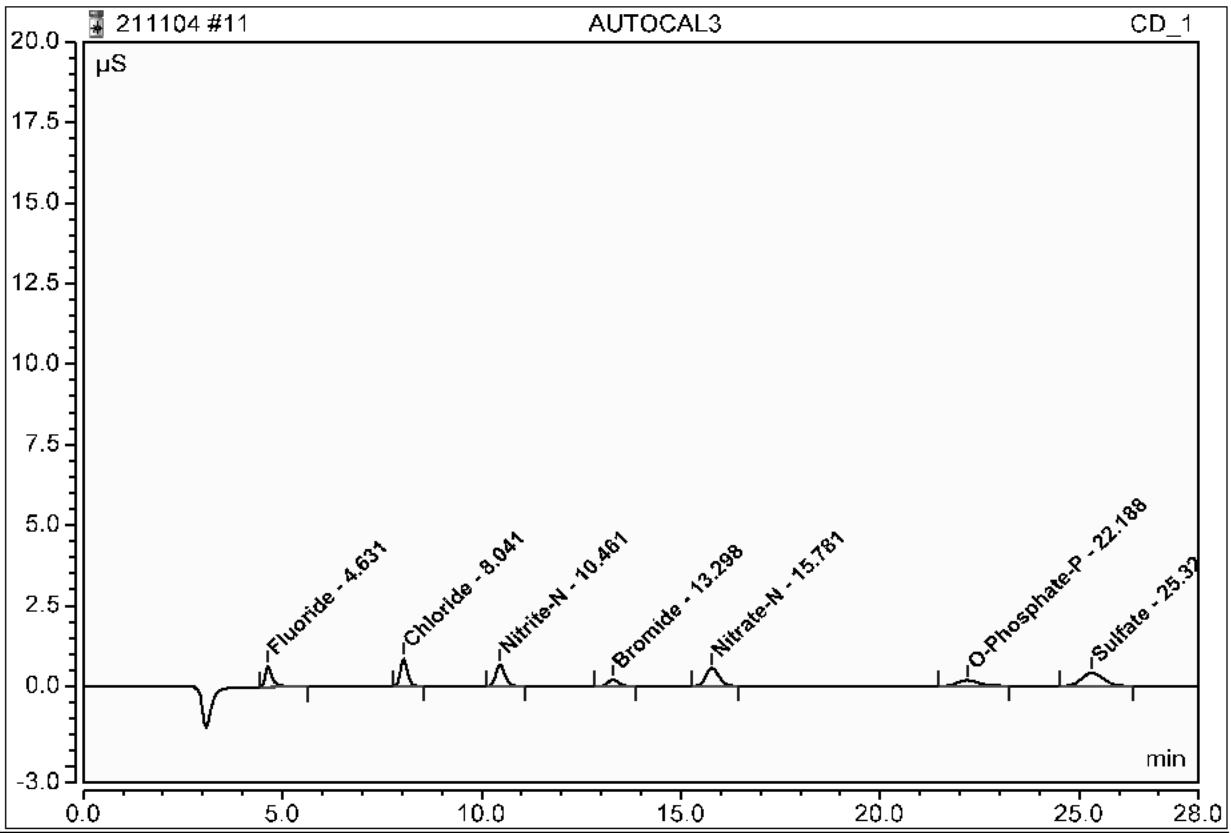
Sample Name:	**AUTOCAL4**	*Injection Volume:*	**50.0**
Vial Number:	**3**	*Channel:*	**CD_1**
Sample Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**11/4/2021 16:29**	Analyst:	**LXA2**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.63	Fluoride	0.5000	0.4780		0.23848	11.91
2	8.04	Chloride	1.0000	0.9367		0.29720	14.84
3	10.46	Nitrite-N	0.5000	0.4690		0.30588	15.28
4	13.29	Bromide	1.0000	0.9971		0.12760	6.37
5	15.78	Nitrate-N	0.5000	0.4703		0.36212	18.08
6	22.19	O-Phosphate-P	1.0000	0.9928		0.23729	11.85
7	25.33	Sulfate	2.0000	1.8834		0.43384	21.67
Total:				6.2274	0.000	2.002	100.00

11 AUTOCAL3

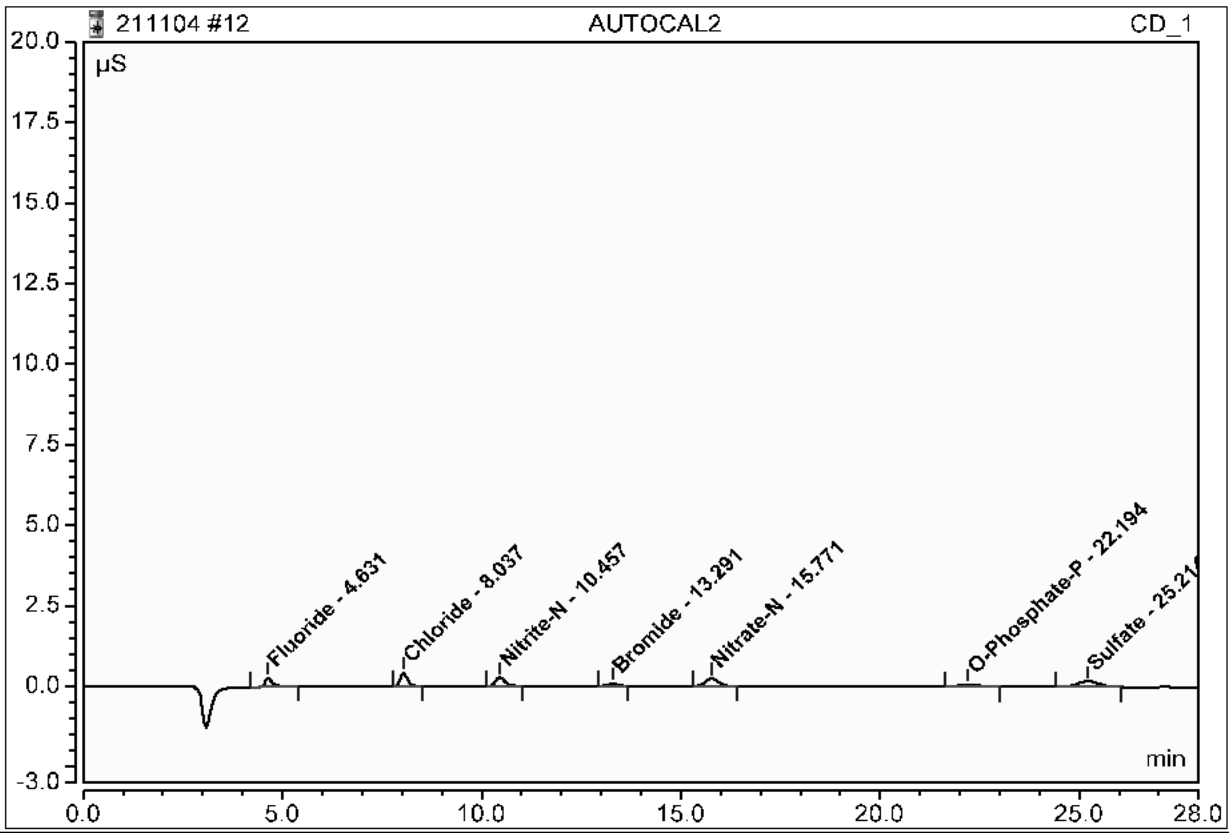
Sample Name:	**AUTOCAL3**	*Injection Volume:*	**50.0**
Vial Number:	**4**	*Channel:*	**CD_1**
Sample Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**11/4/2021 17:00**	Analyst:	**LXA2**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.63	Fluoride	0.2500	0.2790		0.13679	12.00
2	8.04	Chloride	0.5000	0.5859		0.17496	15.34
3	10.46	Nitrite-N	0.2500	0.2848		0.17640	15.47
4	13.30	Bromide	0.5000	0.5166		0.06485	5.69
5	15.78	Nitrate-N	0.2500	0.2895		0.21257	18.64
6	22.19	O-Phosphate-P	0.5000	0.5084		0.11457	10.05
7	25.32	Sulfate	1.0000	1.1532		0.26012	22.81
Total:				3.6175	0.000	1.140	100.00

12 AUTOCAL2

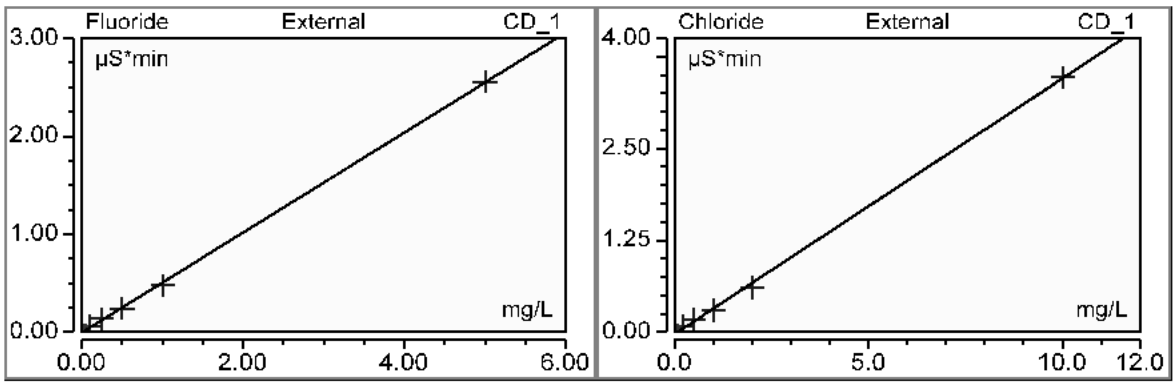
Sample Name:	**AUTOCAL2**	*Injection Volume:*	**50.0**
Vial Number:	**5**	*Channel:*	**CD_1**
Sample Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**11/4/2021 17:30**	Analyst:	**LXA2**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**

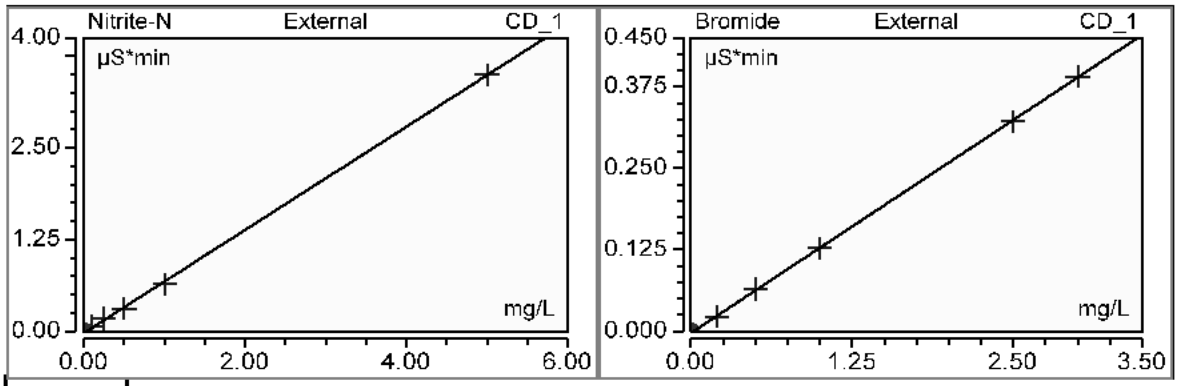


No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.63	Fluoride	0.1000	0.1323		0.06182	12.85
2	8.04	Chloride	0.2000	0.3212		0.08270	17.19
3	10.46	Nitrite-N	0.1000	0.1374		0.07280	15.13
4	13.29	Bromide	0.2000	0.1899		0.02219	4.61
5	15.77	Nitrate-N	0.1000	0.1450		0.09305	19.34
6	22.19	O-Phosphate-P	0.2000	0.1978		0.03587	7.46
7	25.21	Sulfate	0.4000	0.5331		0.11260	23.41
Total:				1.6568	0.000	0.481	100.00

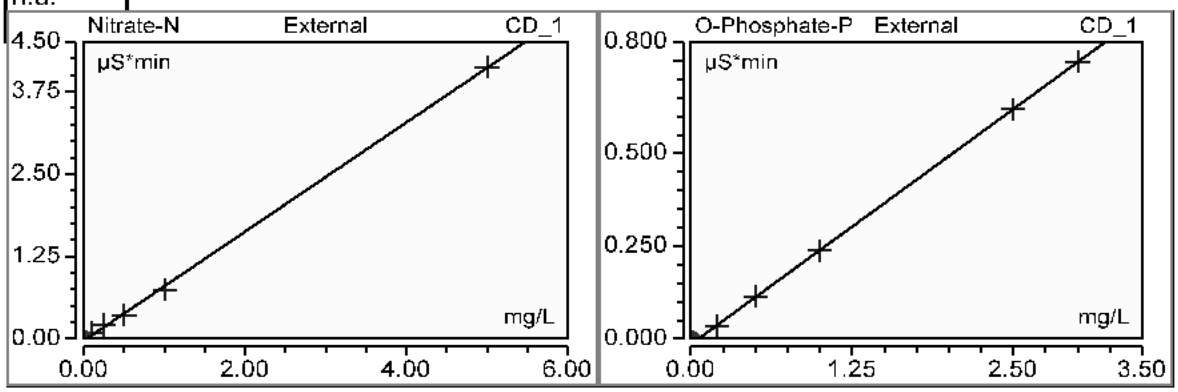
13 AUTOCAL1

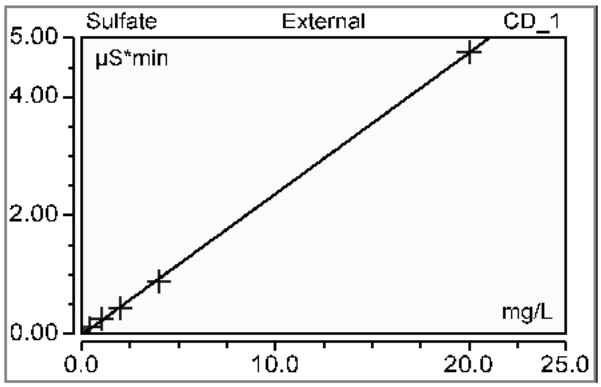
Sample Name:	**AUTOCAL1**	*Injection Volume:*	**50.0**
Vial Number:	**6**	*Channel:*	**CD_1**
Sample Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**11/4/2021 18:01**	Analyst:	**LXA2**
Run Time (min):	**28.00**	Column:	**AS23-211005140;GLGCE086;300;9056**





n.a.

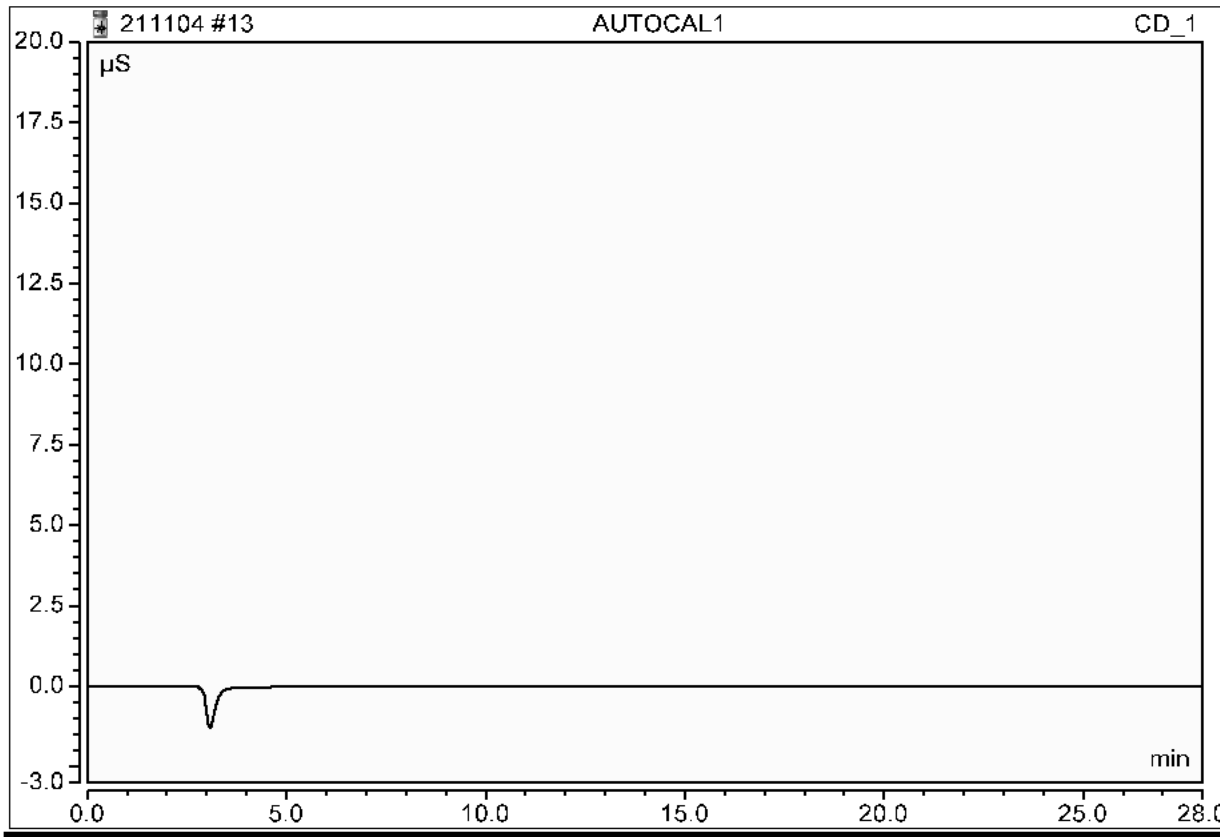




No.	Ret.Time min	Peak Name	Cal.Type	Coeff.Det. %	Offset	Slope	Curve
n.a.	n.a.	Fluoride	n, WithOffs	99.9711	-0.0058	0.5110	0.0000
n.a.	n.a.	Chloride	n, WithOffs	99.9123	-0.0292	0.3485	0.0000
n.a.	n.a.	Nitrite-N	n, WithOffs	99.9621	-0.0238	0.7028	0.0000
n.a.	n.a.	Bromide	n, WithOffs	99.9881	-0.0026	0.1306	0.0000
n.a.	n.a.	Nitrate-N	n, WithOffs	99.9447	-0.0269	0.8272	0.0000
n.a.	n.a.	O-Phosphate-P	n, WithOffs	99.9978	-0.0143	0.2534	0.0000
n.a.	n.a.	Sulfate	n, WithOffs	99.9622	-0.0142	0.2379	0.0000
Average:				99.9626	-0.0167	0.4302	0.0000

13 AUTOCAL1

Sample Name:	**AUTOCAL1**	*Injection Volume:*	**50.0**
Vial Number:	**6**	*Channel:*	**CD_1**
Sample Type:	**Calibration Standard**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**11/4/2021 18:01**	Analyst:	**LXA2**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



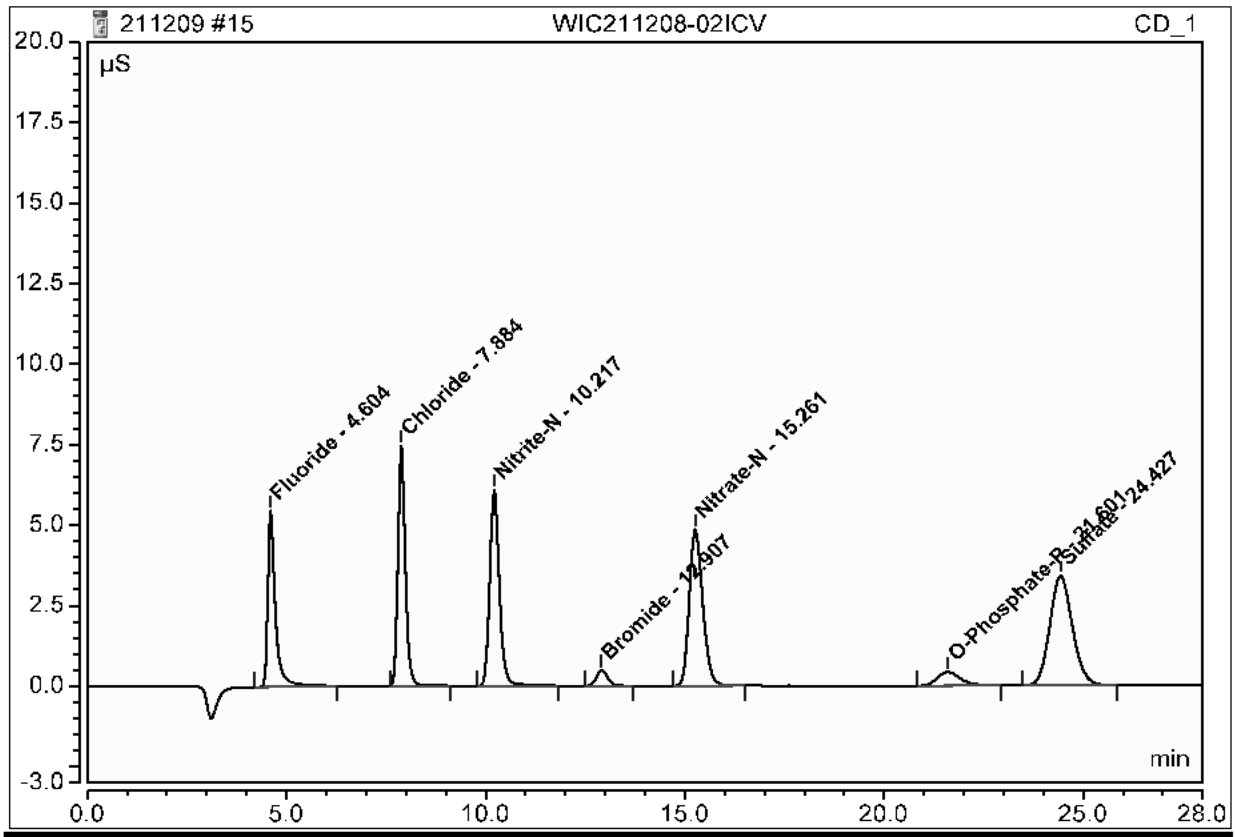
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	0.0000	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

This is runlog for Sequence 211209.seq for IC7

Sample ID	Run Time	Batch	Dilution	Dataset	Analyst
BLK	12/09/21 10:23		1	211209	HXC1
ICV	12/09/21 10:53		1	211209	HXC1
ICB	12/09/21 11:24		1	211209	HXC1
564175002	12/09/21 11:55	2205823	2	211209	HXC1
564282001	12/09/21 12:25	2205823	5	211209	HXC1
1204974626	12/09/21 12:56	2205823	5	211209	HXC1
1204974628	12/09/21 13:27	2205823	5	211209	HXC1
CVH	12/09/21 13:58		1	211209	HXC1
CCB	12/09/21 14:29		1	211209	HXC1
564472001	12/09/21 15:00	2206301	1	211209	HXC1
564472002	12/09/21 15:30	2206301	1	211209	HXC1
564472003	12/09/21 16:01	2206301	1	211209	HXC1
564472004	12/09/21 16:32	2206301	1	211209	HXC1
564472005	12/09/21 17:03	2206301	1	211209	HXC1
564472006	12/09/21 17:33	2206301	1	211209	HXC1
564457009	12/09/21 18:04	2206301	1	211209	HXC1
1204975551	12/09/21 18:35	2206301	1	211209	HXC1
1204975552	12/09/21 19:06	2206301	1	211209	HXC1
564470001	12/09/21 19:37	2206301	1	211209	HXC1
CCV	12/09/21 20:08		1	211209	HXC1
CCB	12/09/21 20:39		1	211209	HXC1
1204975565	12/09/21 21:09	2206301	1	211209	HXC1
1204975566	12/09/21 21:40	2206301	1	211209	HXC1
564470002	12/09/21 22:11	2206301	1	211209	HXC1
564470003	12/09/21 22:42	2206301	1	211209	HXC1
564470004	12/09/21 23:13	2206301	1	211209	HXC1
564470005	12/09/21 23:44	2206301	1	211209	HXC1

15 WIC211208-02ICV

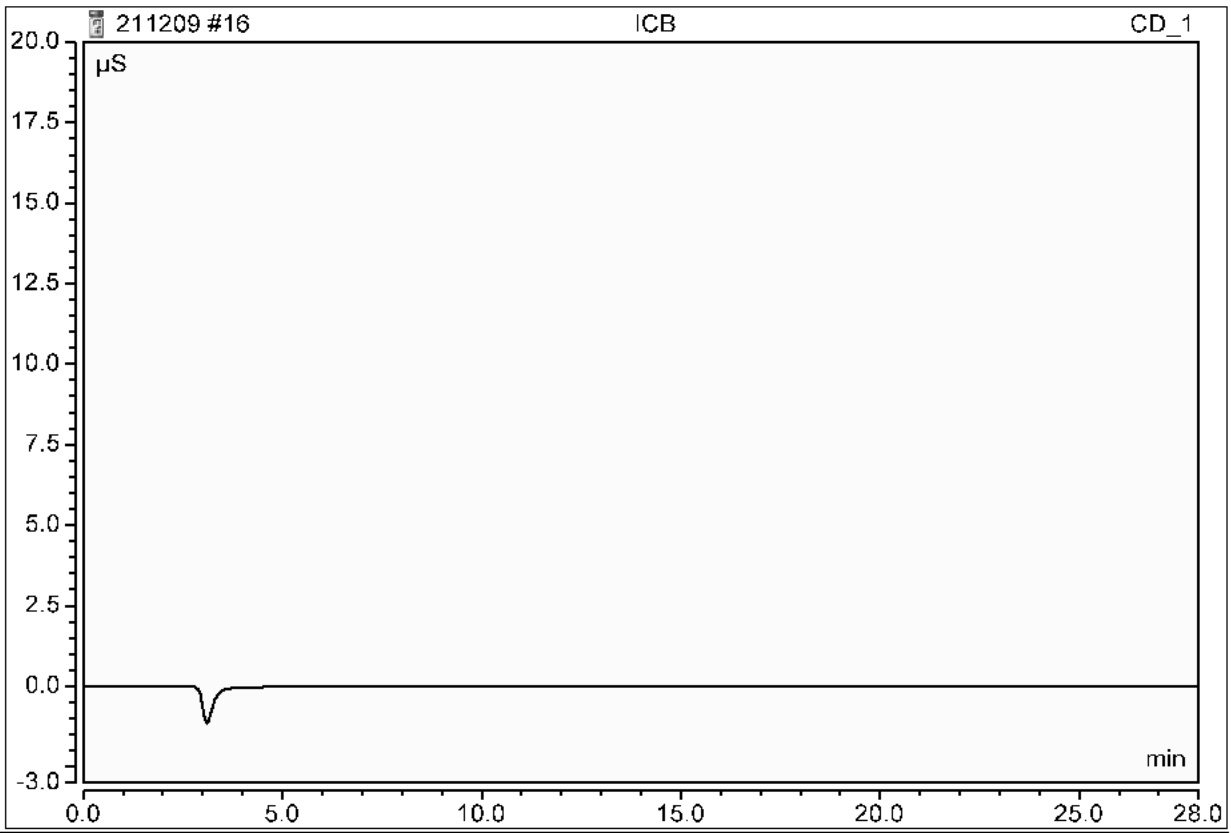
Sample Name:	**WIC211208-02ICV**	*Injection Volume:*	**50.0**
Vial Number:	**2**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 10:53**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.60	Fluoride	n.a.	2.3310		1.18538	13.09
2	7.88	Chloride	n.a.	4.6042		1.57530	17.39
3	10.22	Nitrite-N	n.a.	2.4654		1.70902	18.87
4	12.91	Bromide	n.a.	1.2518		0.16087	1.78
5	15.26	Nitrate-N	n.a.	2.3339		1.90364	21.02
6	21.60	O-Phosphate-P	n.a.	1.1881		0.28676	3.17
7	24.43	Sulfate	n.a.	9.4625		2.23695	24.70
Total:				23.6370	0.000	9.058	100.00

16 ICB

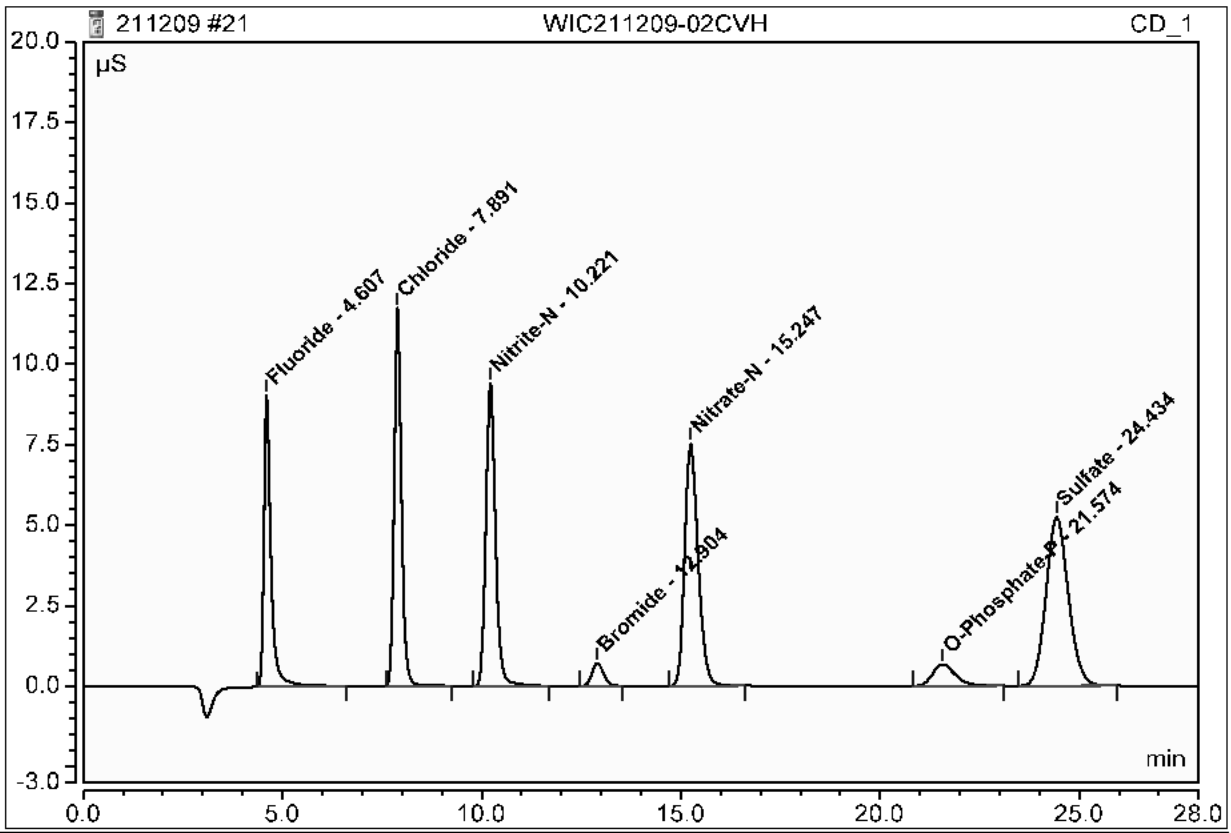
Sample Name:	**ICB**	*Injection Volume:*	**50.0**
Vial Number:	**3**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 11:24**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

21 WIC211209-02CVH

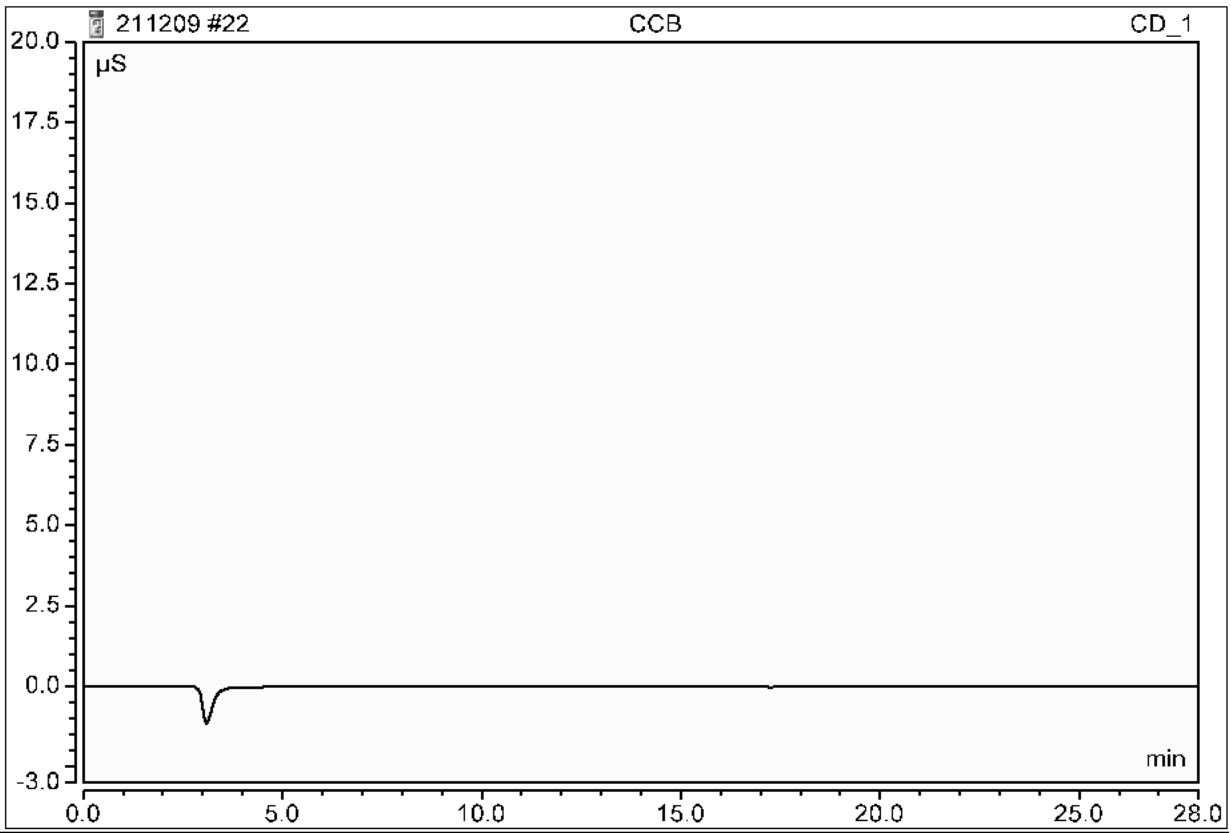
Sample Name:	**WIC211209-02CVH**	*Injection Volume:*	**50.0**
Vial Number:	**8**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 13:58**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.61	Fluoride	n.a.	3.6193		1.84369	13.19
2	7.89	Chloride	n.a.	7.1183		2.45142	17.54
3	10.22	Nitrite-N	n.a.	3.7667		2.62358	18.77
4	12.90	Bromide	n.a.	1.8597		0.24026	1.72
5	15.25	Nitrate-N	n.a.	3.5903		2.94298	21.05
6	21.57	O-Phosphate-P	n.a.	1.8389		0.45166	3.23
7	24.43	Sulfate	n.a.	14.4522		3.42400	24.50
Total:				36.2453	0.000	13.978	100.00

22 CCB

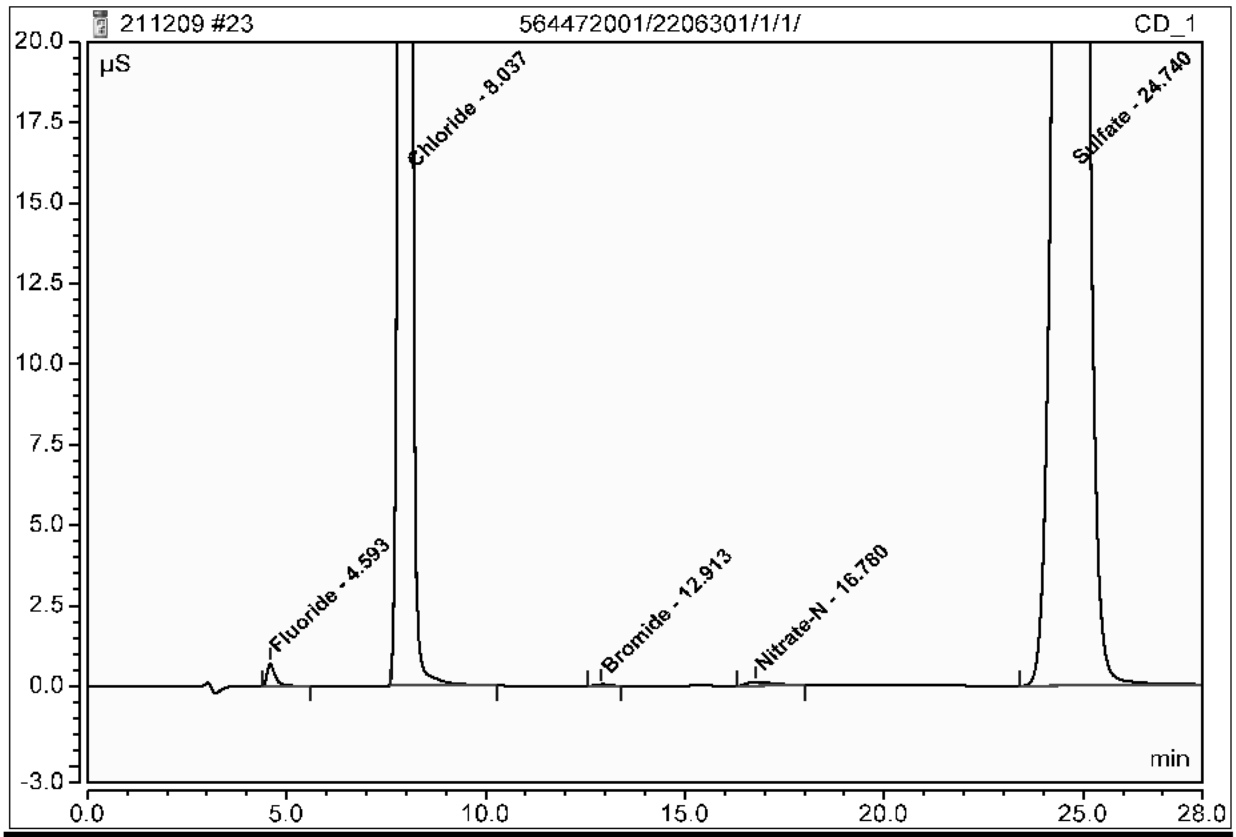
Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**9**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 14:29**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

23 564472001/2206301/1/1/

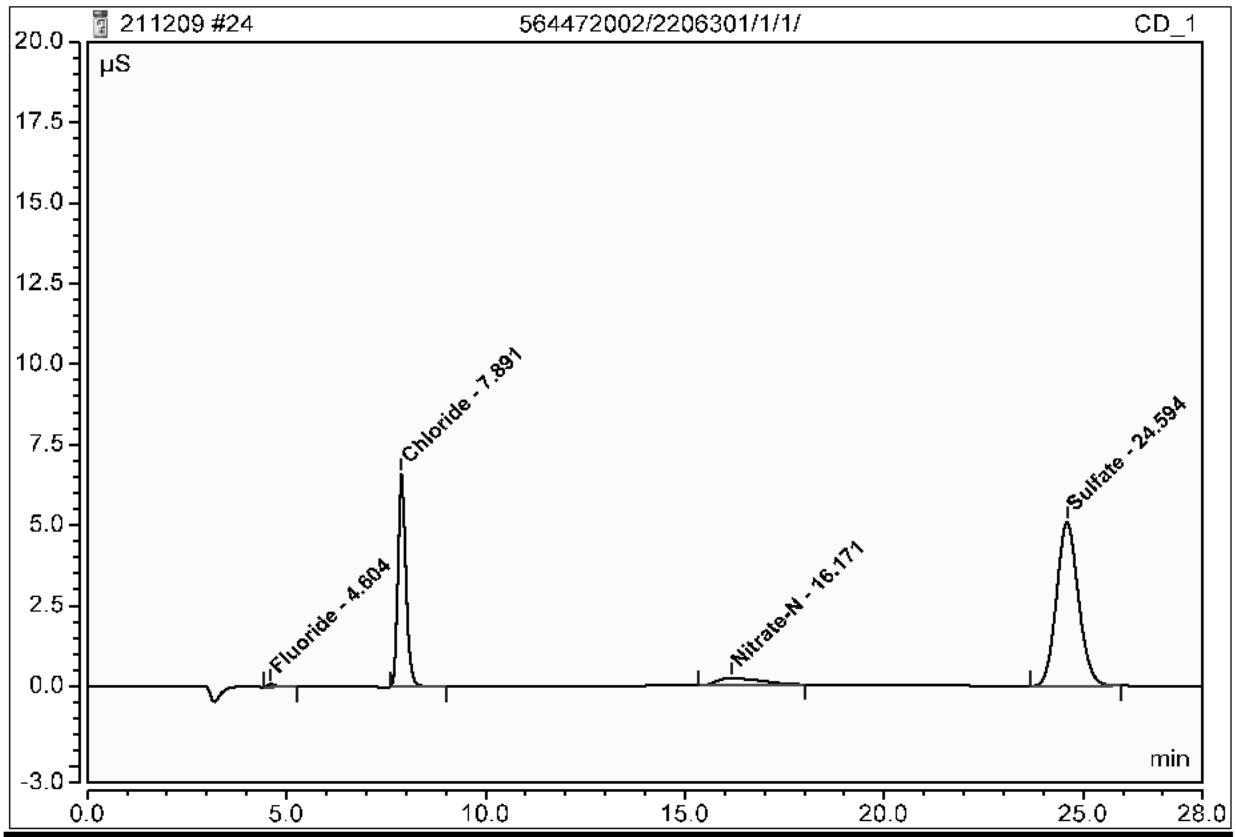
Sample Name:	**564472001/2206301/1/1/**	*Injection Volume:*	**50.0**
Vial Number:	**10**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 15:00**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.59	Fluoride	n.a.	0.3381		0.16699	0.16
2	8.04	Chloride	n.a.	96.2701		33.51996	32.68
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
3	12.91	Bromide	n.a.	0.1501		0.01700	0.02
4	16.78	Nitrate-N	n.a.	0.1512		0.09816	0.10
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
5	24.74	Sulfate	n.a.	289.1553		68.77714	67.05
Total:				386.0648	0.000	102.579	100.00

24 564472002/2206301/1/1/

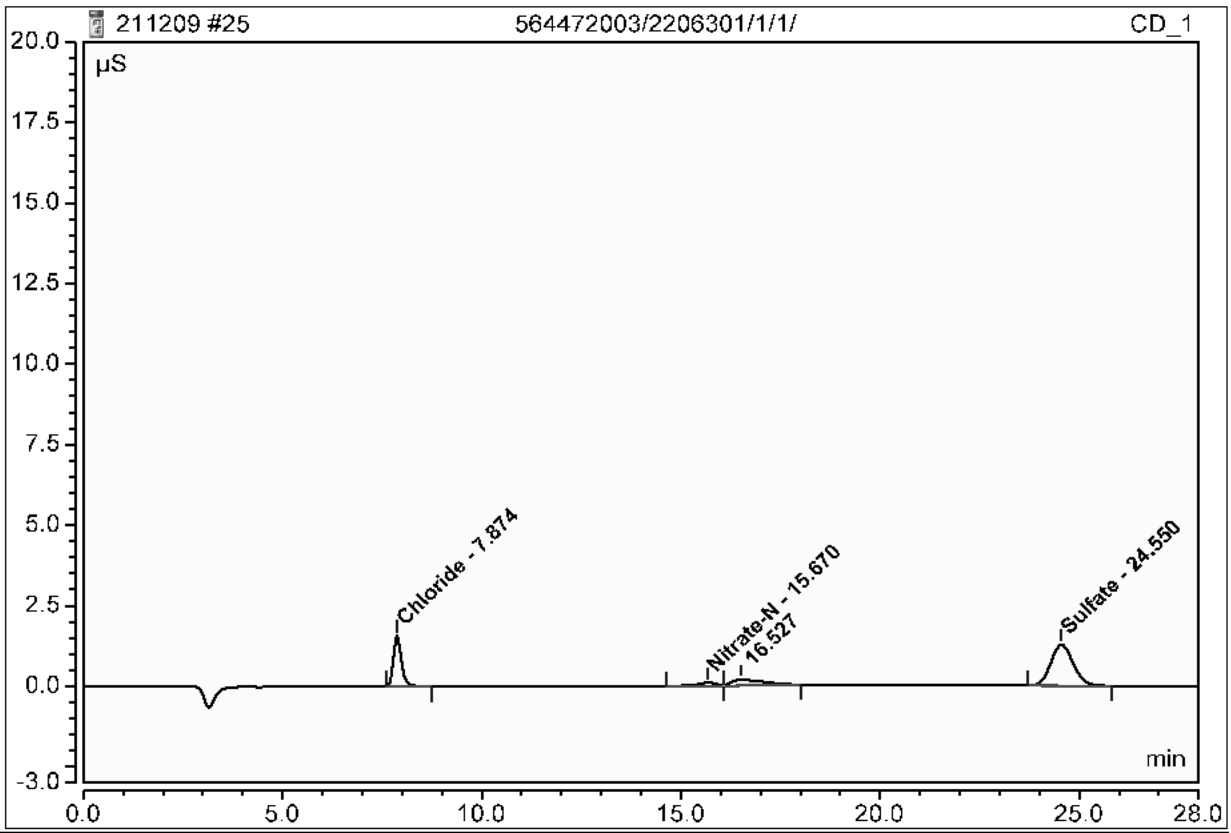
Sample Name:	**564472002/2206301/1/1/**	*Injection Volume:*	**50.0**
Vial Number:	**11**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 15:30**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.60	Fluoride	n.a.	0.0587		0.02423	0.48
2	7.89	Chloride	n.a.	4.4480		1.52084	29.86
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
3	16.17	Nitrate-N	n.a.	0.3820		0.28905	5.68
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
4	24.59	Sulfate	n.a.	13.7593		3.25917	63.99
Total:				18.6480	0.000	5.093	100.00

25 564472003/2206301/1/1/

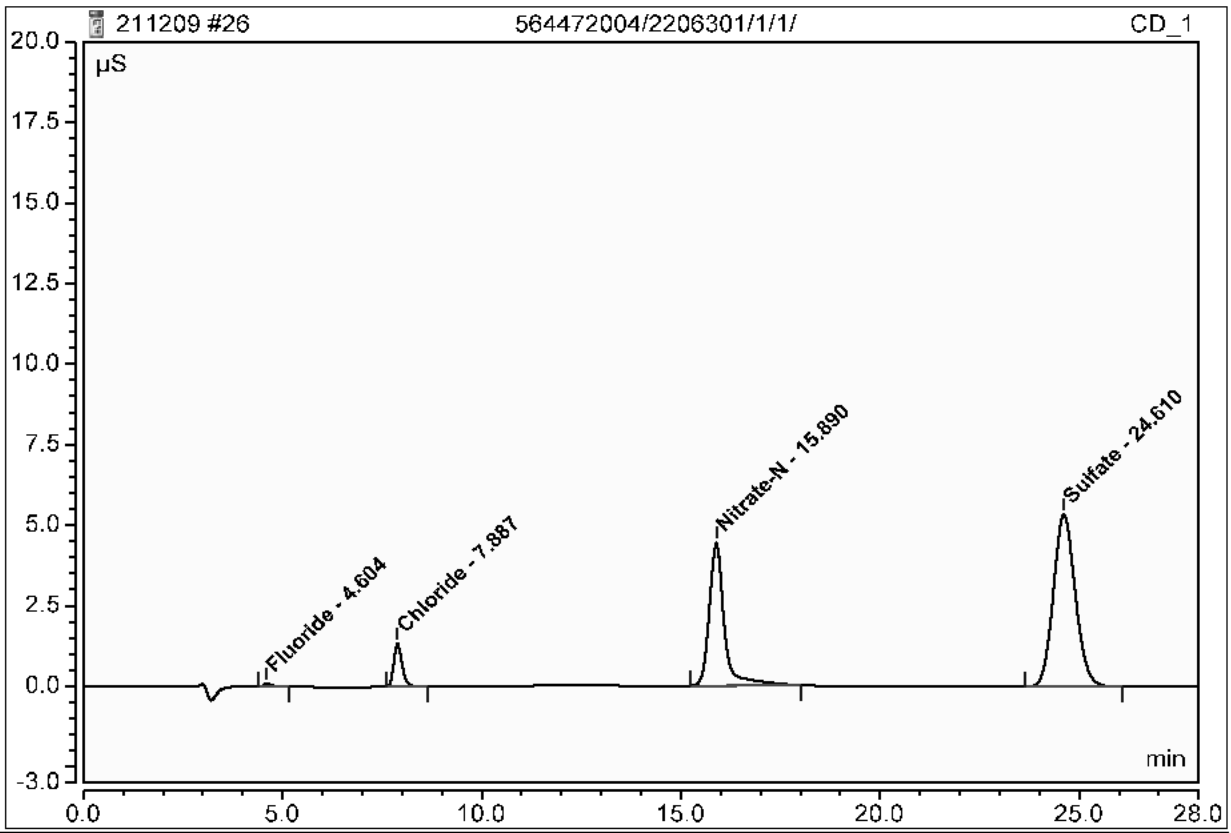
Sample Name:	**564472003/2206301/1/1/**	*Injection Volume:*	**50.0**
Vial Number:	**12**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 16:01**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	7.87	Chloride	n.a.	1.1116		0.35815	24.99
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
2	15.67	Nitrate-N	n.a.	0.1060		0.06079	4.24
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
4	24.55	Sulfate	n.a.	3.5824		0.83804	58.49
Total:				4.8000	0.000	1.257	87.72

26 564472004/2206301/1/1/

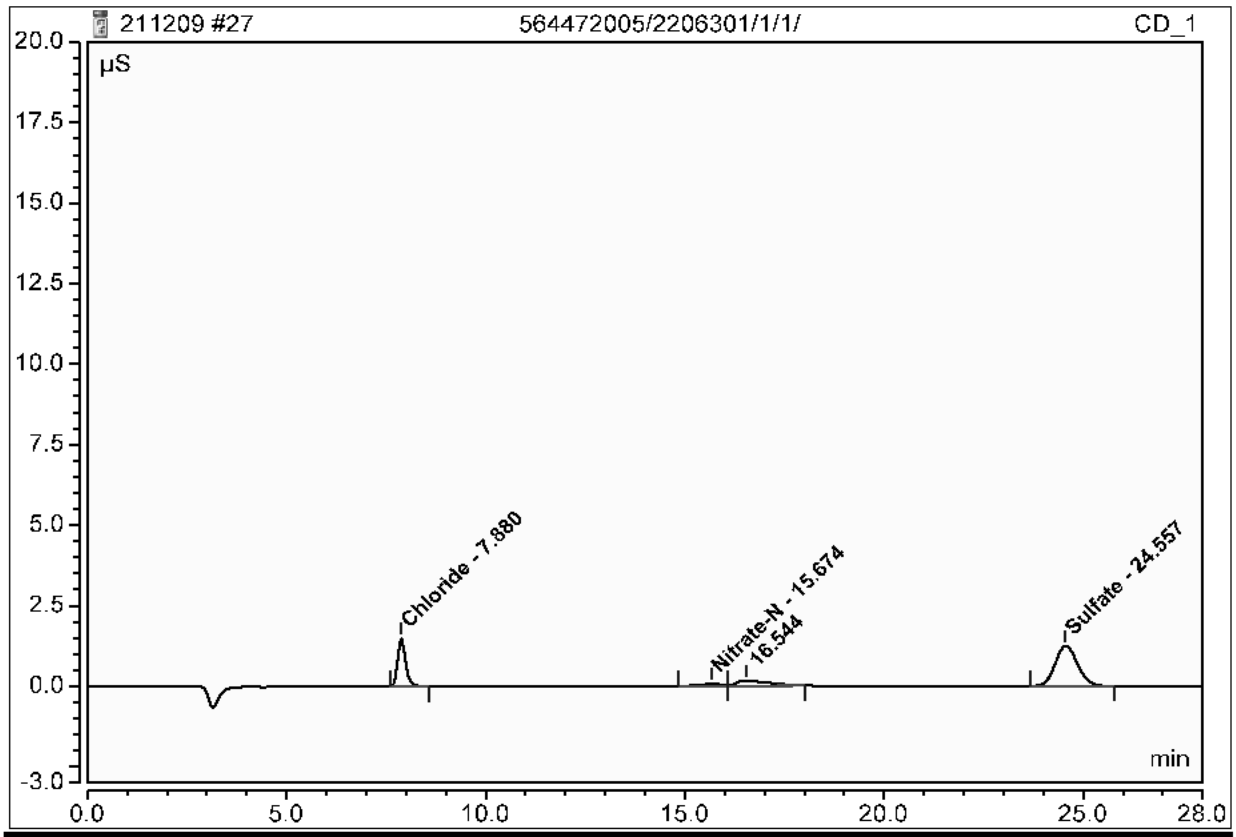
Sample Name:	**564472004/2206301/1/1/**	*Injection Volume:*	**50.0**
Vial Number:	**13**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 16:32**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.60	Fluoride	n.a.	0.0660		0.02792	0.49
2	7.89	Chloride	n.a.	1.0315		0.33024	5.75
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
3	15.89	Nitrate-N	n.a.	2.3913		1.95119	33.98
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
4	24.61	Sulfate	n.a.	14.4907		3.43317	59.78
Total:				17.9795	0.000	5.743	100.00

27 564472005/2206301/1/1/

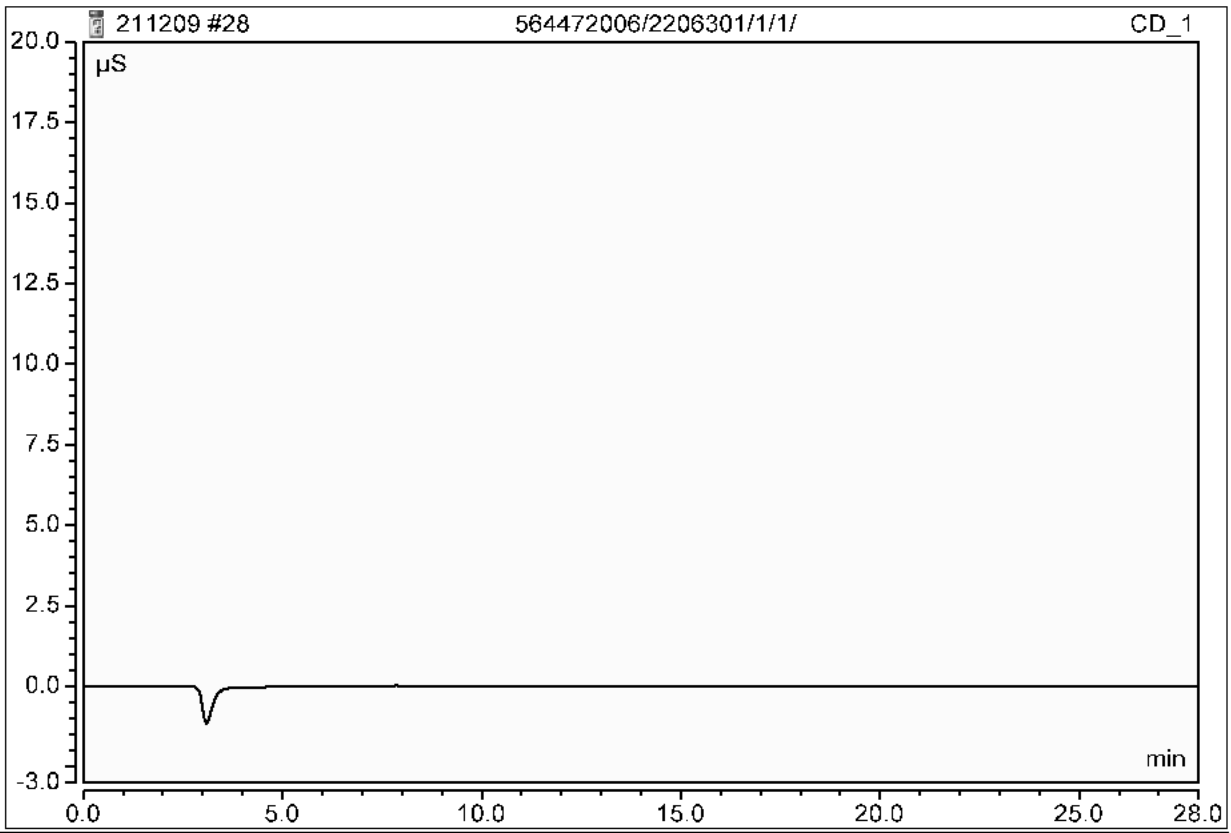
Sample Name:	**564472005/2206301/1/1/**	*Injection Volume:*	**50.0**
Vial Number:	**14**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 17:03**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	7.88	Chloride	n.a.	1.0677		0.34287	25.11
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
2	15.67	Nitrate-N	n.a.	0.0851		0.04345	3.18
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
4	24.56	Sulfate	n.a.	3.5182		0.82277	60.27
Total:				4.6710	0.000	1.209	88.56

28 564472006/2206301/1/1/

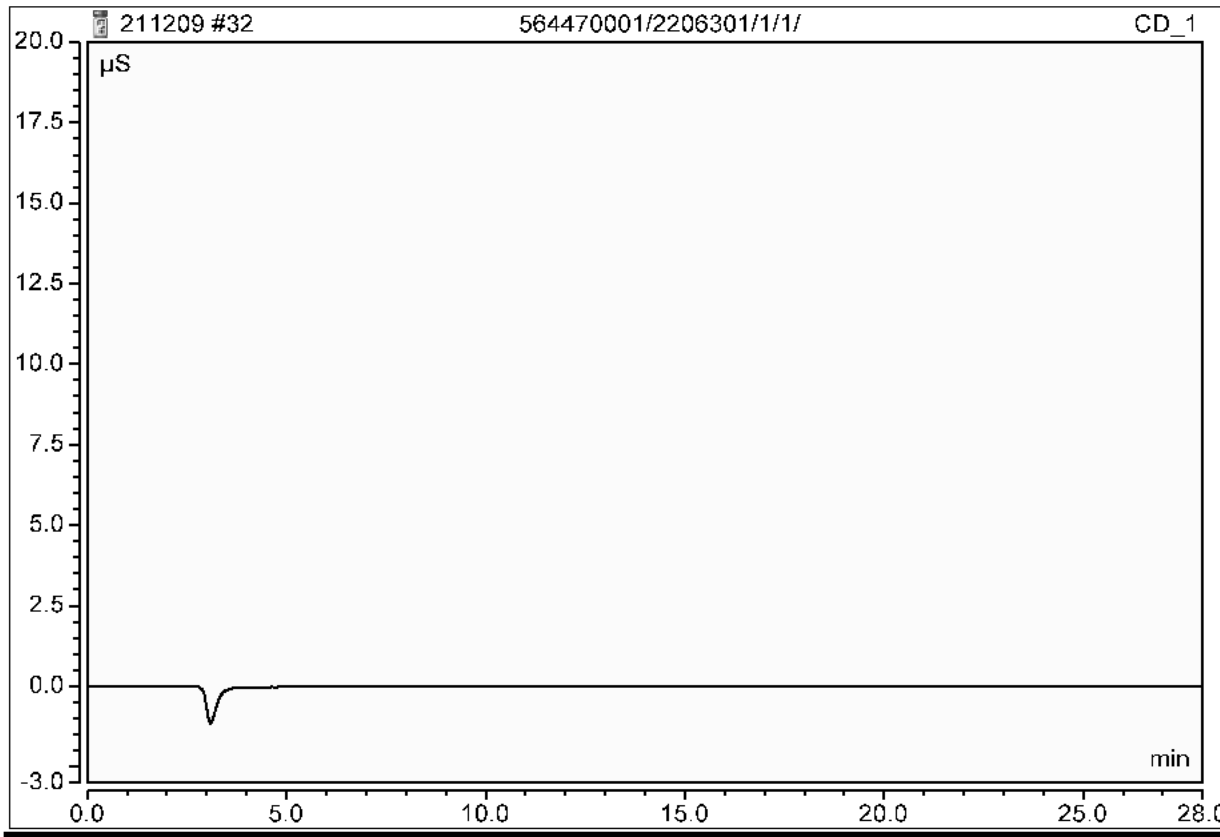
Sample Name:	**564472006/2206301/1/1/**	*Injection Volume:*	**50.0**
Vial Number:	**15**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 17:33**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

32 564470001/2206301/1/1/

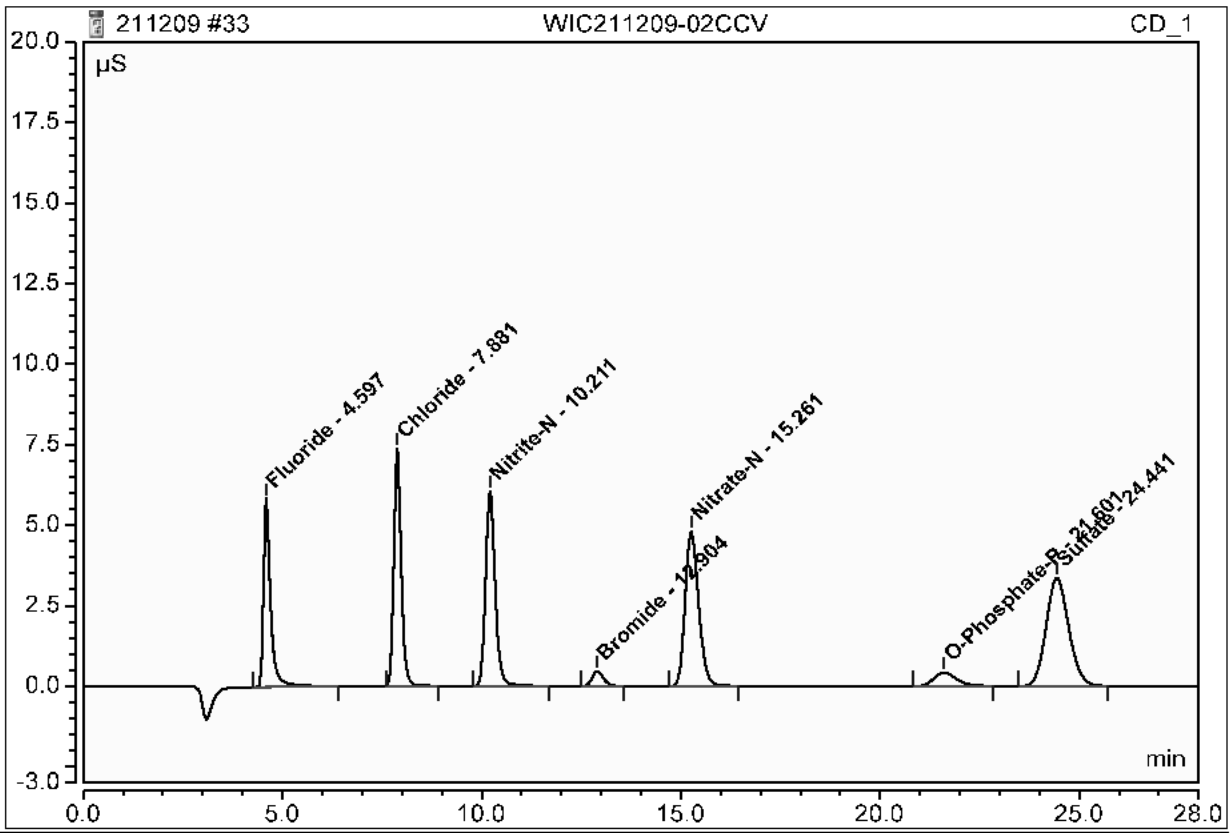
Sample Name:	**564470001/2206301/1/1/**	*Injection Volume:*	**50.0**
Vial Number:	**19**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 19:37**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

33 WIC211209-02CCV

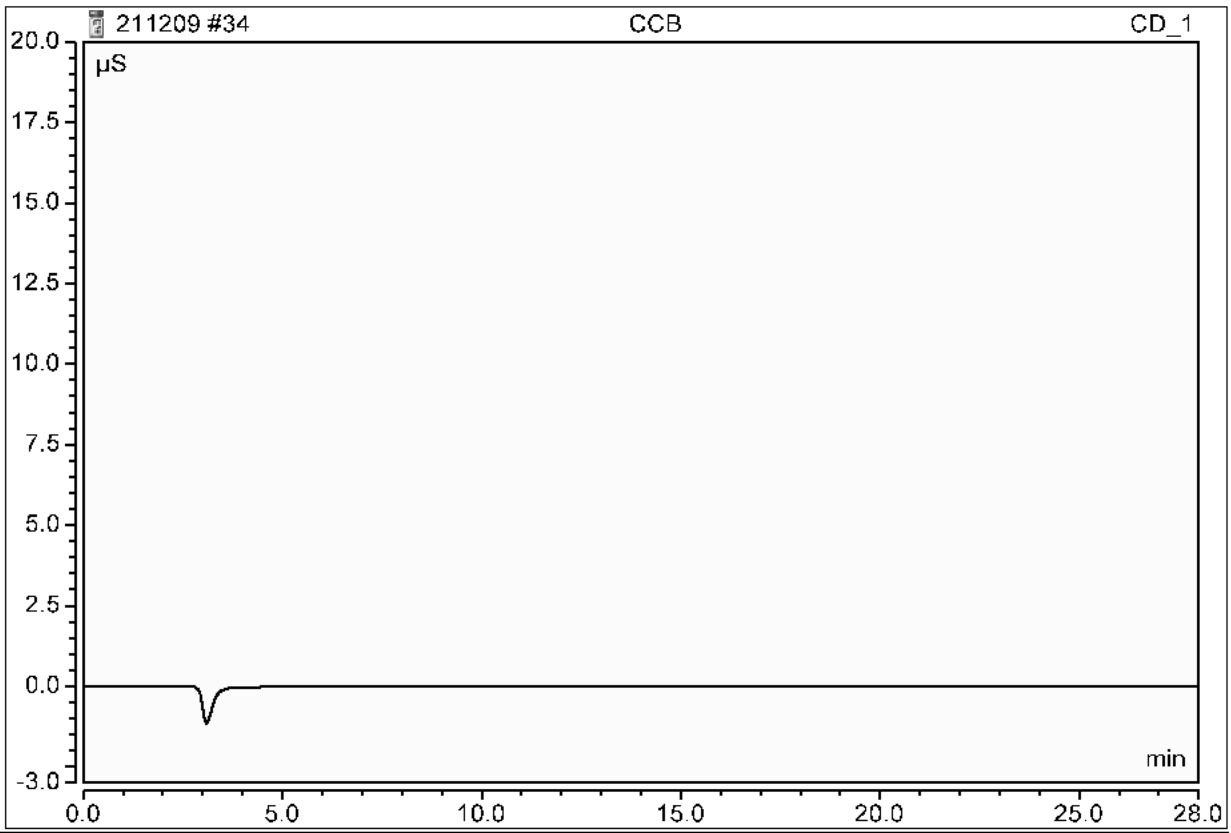
Sample Name:	**WIC211209-02CCV**	*Injection Volume:*	**50.0**
Vial Number:	**20**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 20:08**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.60	Fluoride	n.a.	2.3493		1.19472	13.28
2	7.88	Chloride	n.a.	4.5526		1.55730	17.31
3	10.21	Nitrite-N	n.a.	2.4481		1.69684	18.86
4	12.90	Bromide	n.a.	1.2113		0.15557	1.73
5	15.26	Nitrate-N	n.a.	2.3170		1.88968	21.00
6	21.60	O-Phosphate-P	n.a.	1.1819		0.28520	3.17
7	24.44	Sulfate	n.a.	9.3851		2.21852	24.66
Total:				23.4452	0.000	8.998	100.00

34 CCB

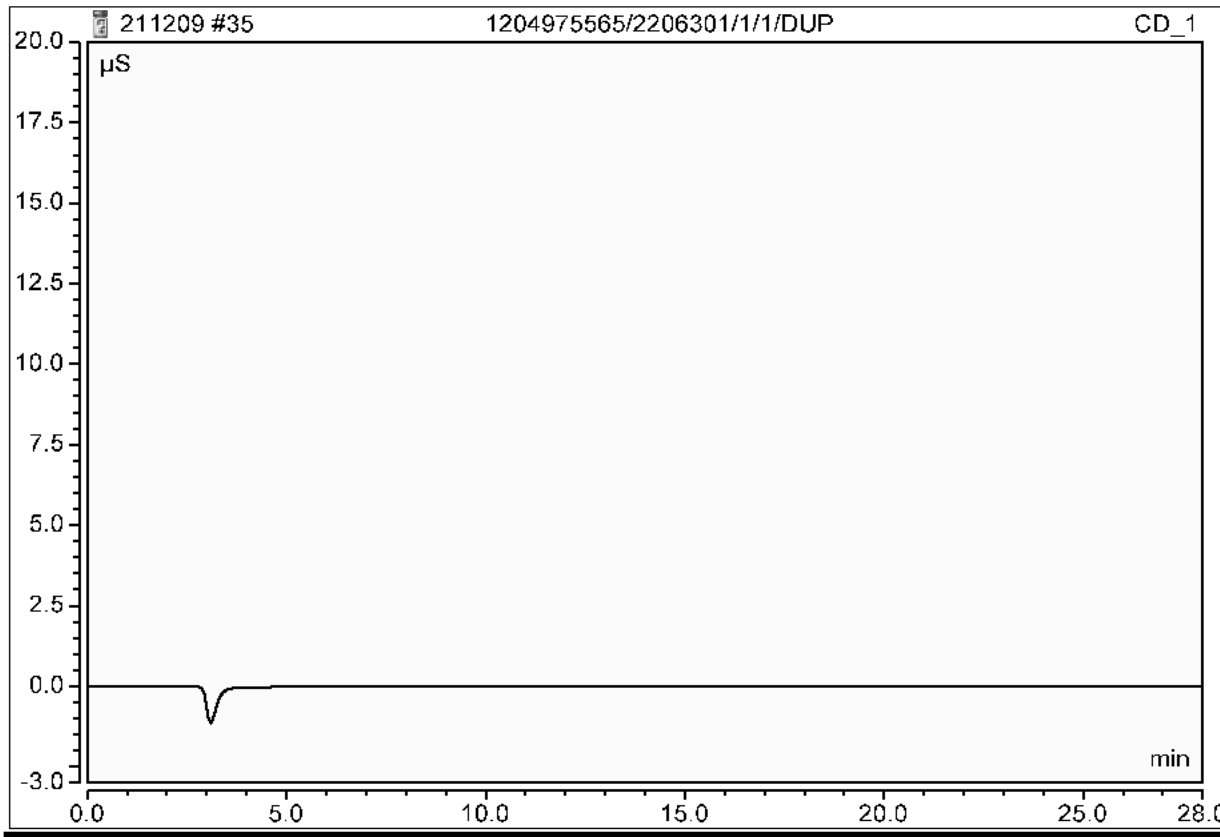
Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**21**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 20:39**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

35 1204975565/2206301/1/1/DUP

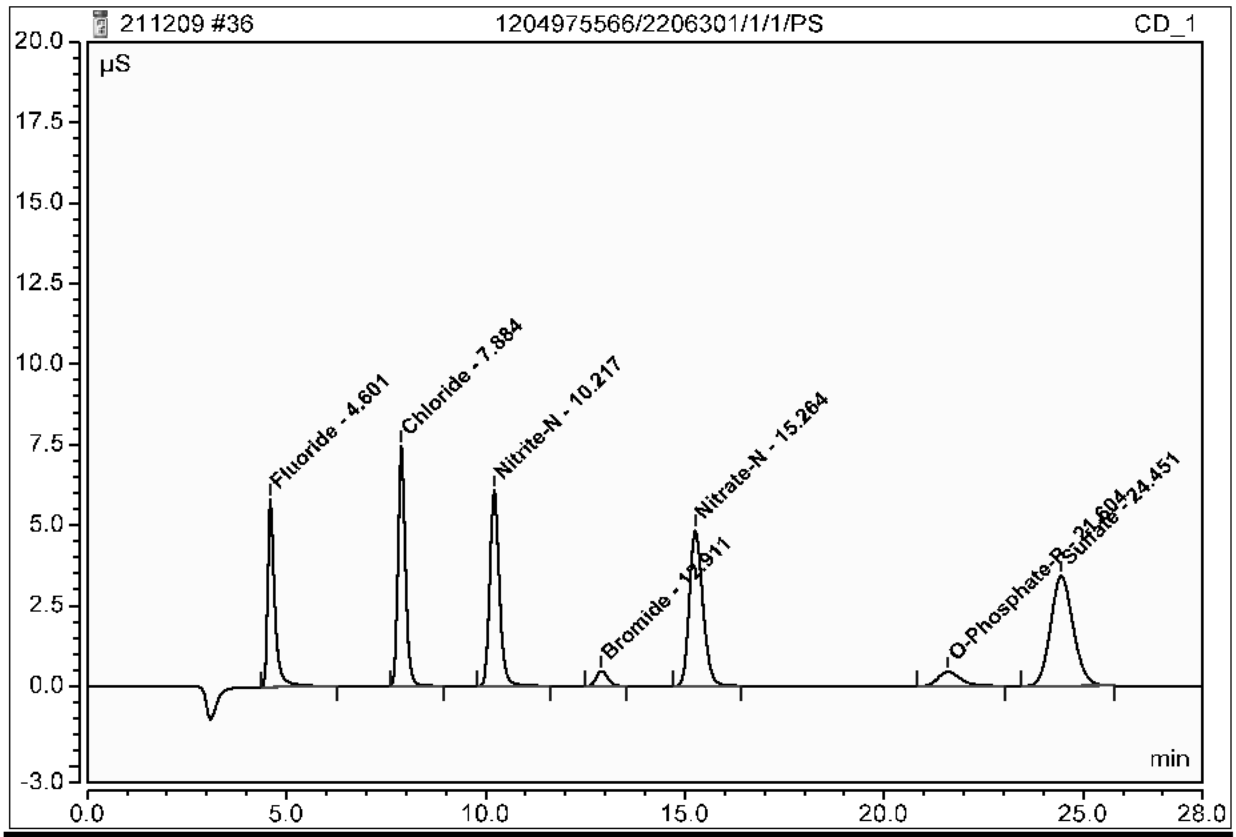
Sample Name:	**1204975565/2206301/1/1/DUP**	*Injection Volume:*	**50.0**
Vial Number:	**22**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 21:09**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

36 1204975566/2206301/1/1/PS

Sample Name:	**1204975566/2206301/1/1/PS**	*Injection Volume:*	**50.0**
Vial Number:	**23**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/9/2021 21:40**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



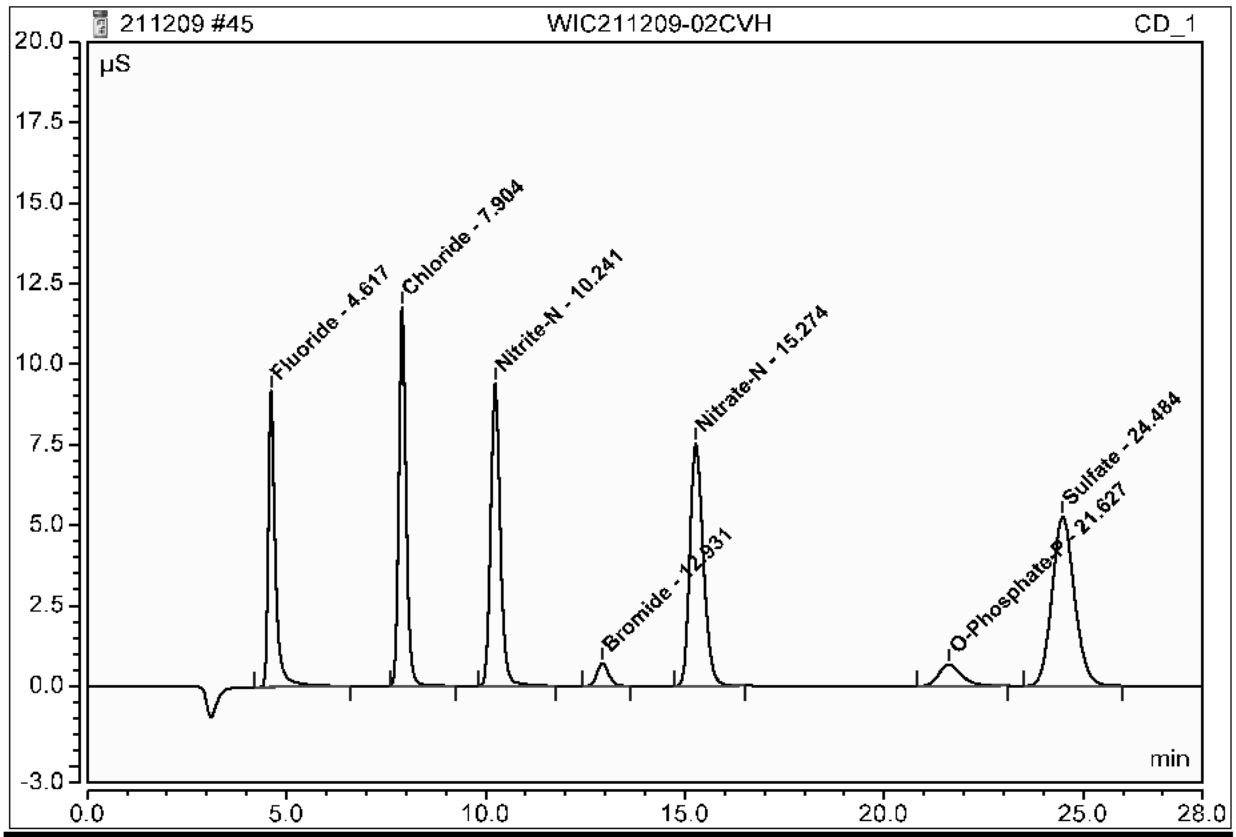
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.60	Fluoride	n.a.	2.3314		1.18558	13.06
2	7.88	Chloride	n.a.	4.6089		1.57693	17.37
3	10.22	Nitrite-N	n.a.	2.4579		1.70370	18.77
4	12.91	Bromide	n.a.	1.2216		0.15692	1.73
5	15.26	Nitrate-N	n.a.	2.3374		1.90655	21.00
6	21.60	O-Phosphate-P	n.a.	1.2345		0.29853	3.29
7	24.45	Sulfate	n.a.	9.5137		2.24912	24.78
Total:				23.7053	0.000	9.077	100.00

This is runlog for Sequence 211209.seq for IC7

Sample ID	Run Time	Batch	Dilution	Dataset	Analyst
564470006	12/10/21 00:14	2206301	1	211209	HXC1
564470007	12/10/21 00:45	2206301	1	211209	HXC1
564470008	12/10/21 01:16	2206301	1	211209	HXC1
564470009	12/10/21 01:47	2206301	1	211209	HXC1
CVH	12/10/21 02:18		1	211209	HXC1
CCB	12/10/21 02:49		1	211209	HXC1
564470010	12/10/21 03:19	2206301	1	211209	HXC1
564470011	12/10/21 03:50	2206301	1	211209	HXC1
1204975549	12/10/21 04:21	2206301	1	211209	HXC1
1204975550	12/10/21 04:52	2206301	1	211209	HXC1
564282001	12/10/21 05:23	2205823	5	211209	HXC1
1204974626	12/10/21 05:54	2205823	5	211209	HXC1
1204974628	12/10/21 06:25	2205823	5	211209	HXC1
duse	12/10/21 06:55		1	211209	HXC1
duse	12/10/21 07:26		1	211209	HXC1
duse	12/10/21 07:57		1	211209	HXC1
CCV	12/10/21 08:28		1	211209	HXC1
CCB	12/10/21 08:59		1	211209	HXC1
564472001	12/10/21 09:30	2206301	10	211209	HXC1
564457009	12/10/21 10:00	2206301	5	211209	HXC1
1204975551	12/10/21 10:32	2206301	5	211209	HXC1
1204975552	12/10/21 11:02	2206301	5	211209	HXC1
564472001	12/10/21 11:33	2206301	20	211209	HXC1
CVH	12/10/21 12:04		1	211209	HXC1
CCB	12/10/21 12:35		1	211209	HXC1

45 WIC211209-02CVH

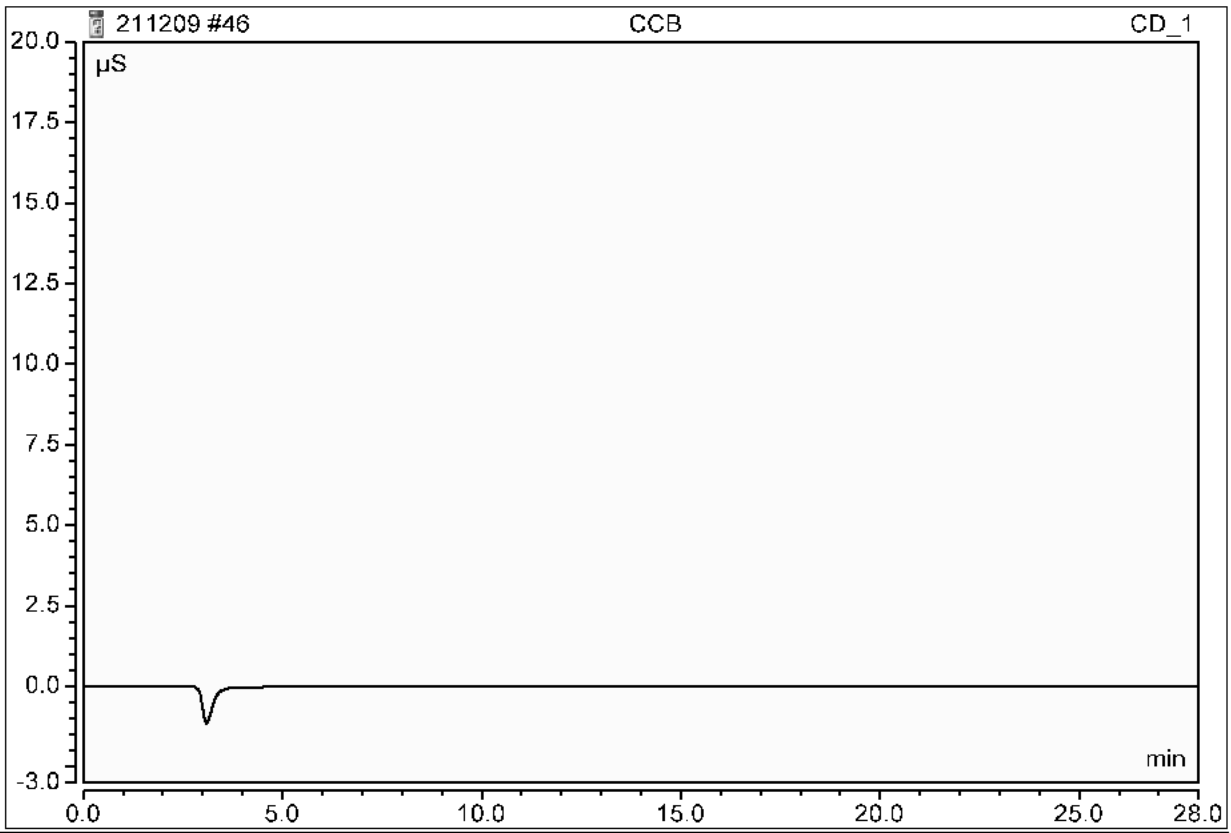
Sample Name:	**WIC211209-02CVH**	*Injection Volume:*	**50.0**
Vial Number:	**32**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 2:18**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.62	Fluoride	n.a.	3.6934		1.88156	13.38
2	7.90	Chloride	n.a.	7.1623		2.46675	17.55
3	10.24	Nitrite-N	n.a.	3.7803		2.63311	18.73
4	12.93	Bromide	n.a.	1.8675		0.24127	1.72
5	15.27	Nitrate-N	n.a.	3.6027		2.95325	21.01
6	21.63	O-Phosphate-P	n.a.	1.8028		0.44251	3.15
7	24.48	Sulfate	n.a.	14.5200		3.44015	24.47
Total:				36.4290	0.000	14.059	100.00

46 CCB

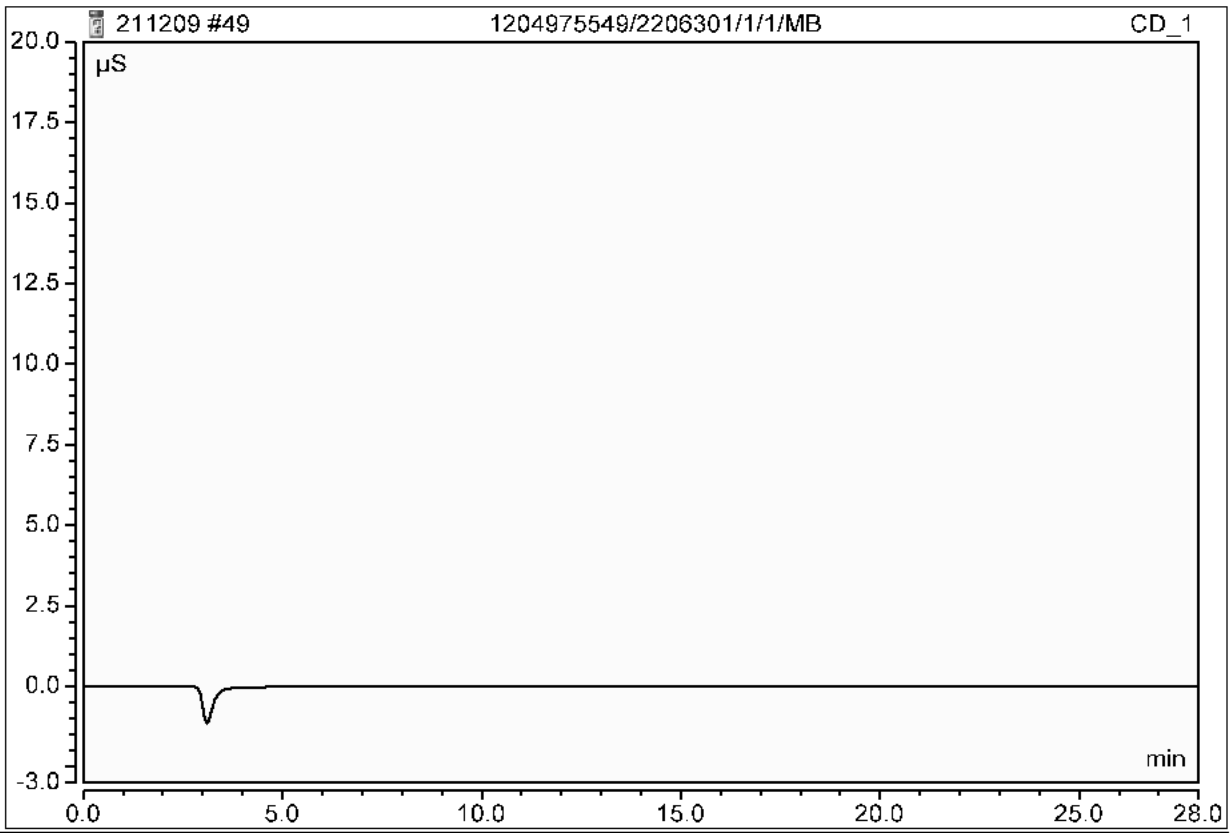
Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**33**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 2:49**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

49 1204975549/2206301/1/1/MB

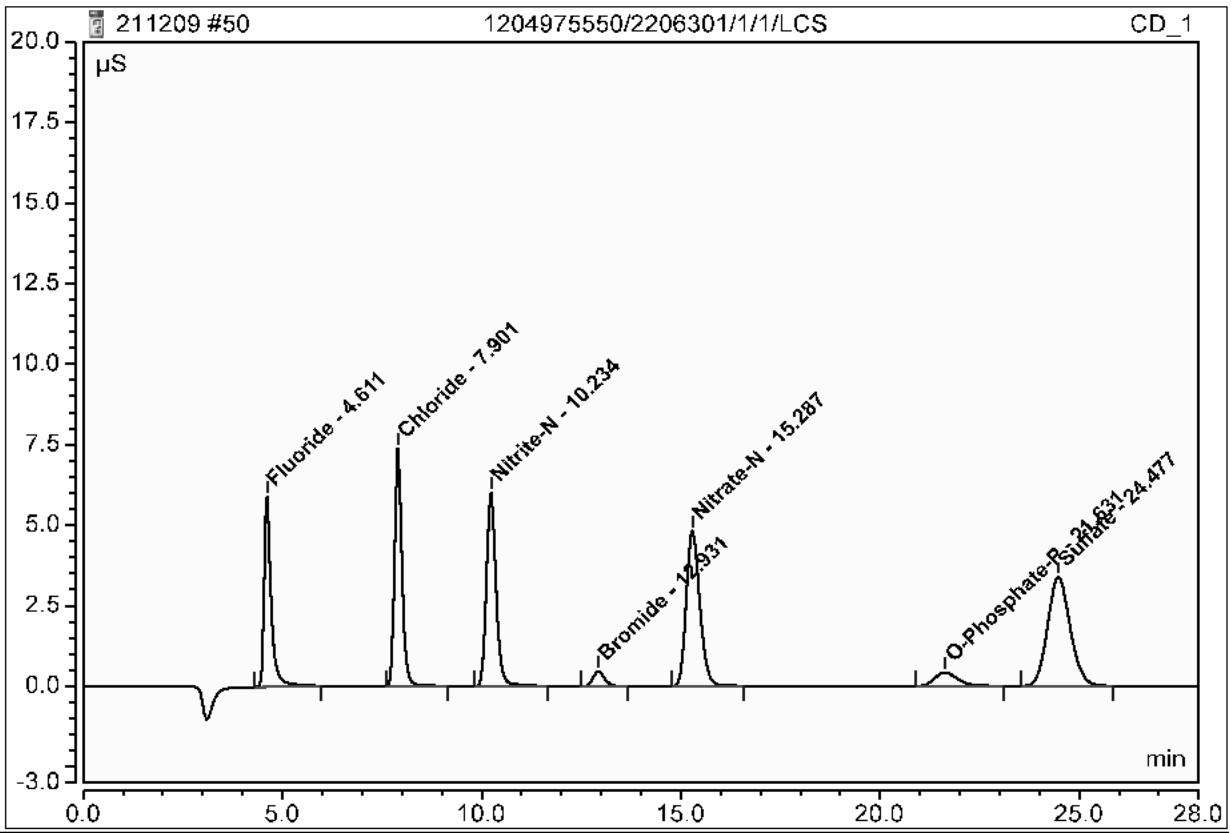
Sample Name:	**1204975549/2206301/1/1/MB**	*Injection Volume:*	**50.0**
Vial Number:	**36**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 4:21**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

50 1204975550/2206301/1/1/LCS

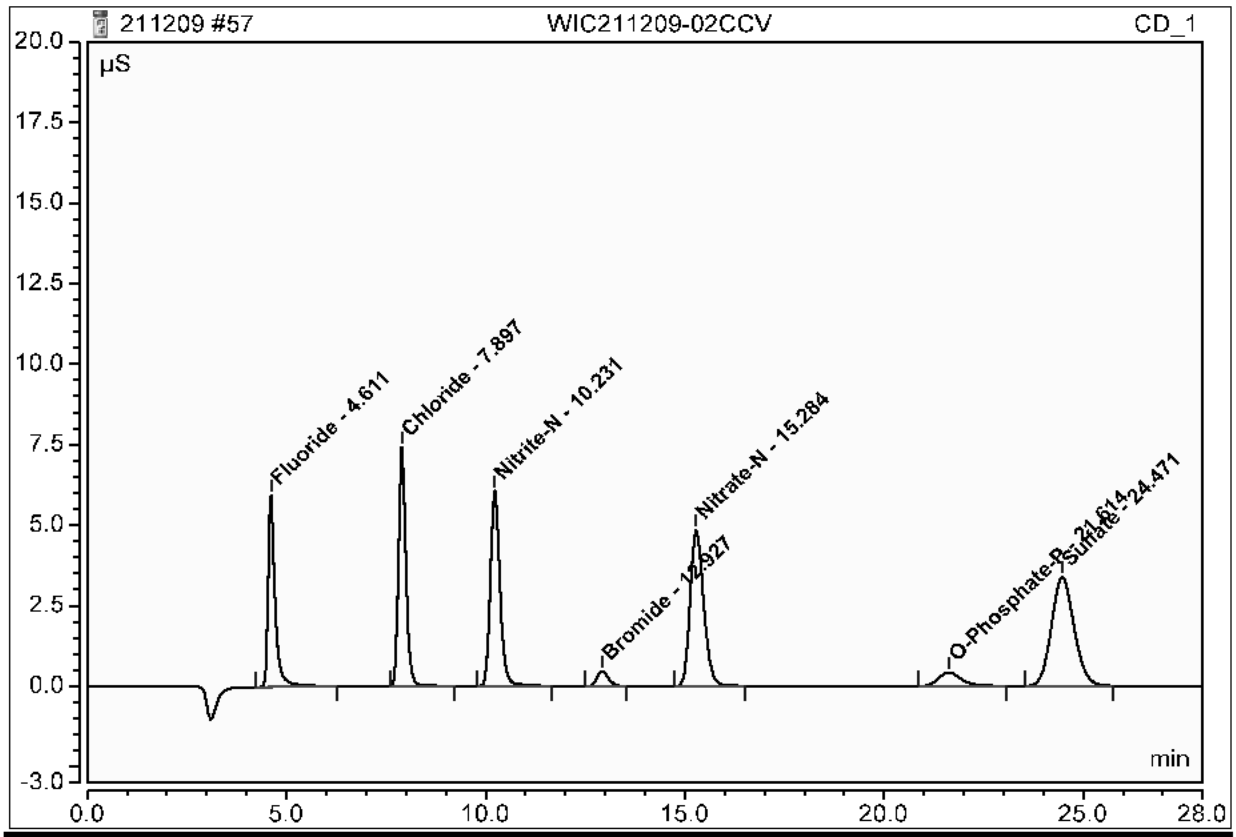
Sample Name:	**1204975550/2206301/1/1/LCS**	*Injection Volume:*	**50.0**
Vial Number:	**37**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 4:52**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.61	Fluoride	n.a.	2.3619		1.20115	13.30
2	7.90	Chloride	n.a.	4.5898		1.57028	17.38
3	10.23	Nitrite-N	n.a.	2.4427		1.69306	18.74
4	12.93	Bromide	n.a.	1.2229		0.15709	1.74
5	15.29	Nitrate-N	n.a.	2.3263		1.89737	21.00
6	21.63	O-Phosphate-P	n.a.	1.1766		0.28385	3.14
7	24.48	Sulfate	n.a.	9.4408		2.23177	24.70
Total:				23.5610	0.000	9.035	100.00

57 WIC211209-02CCV

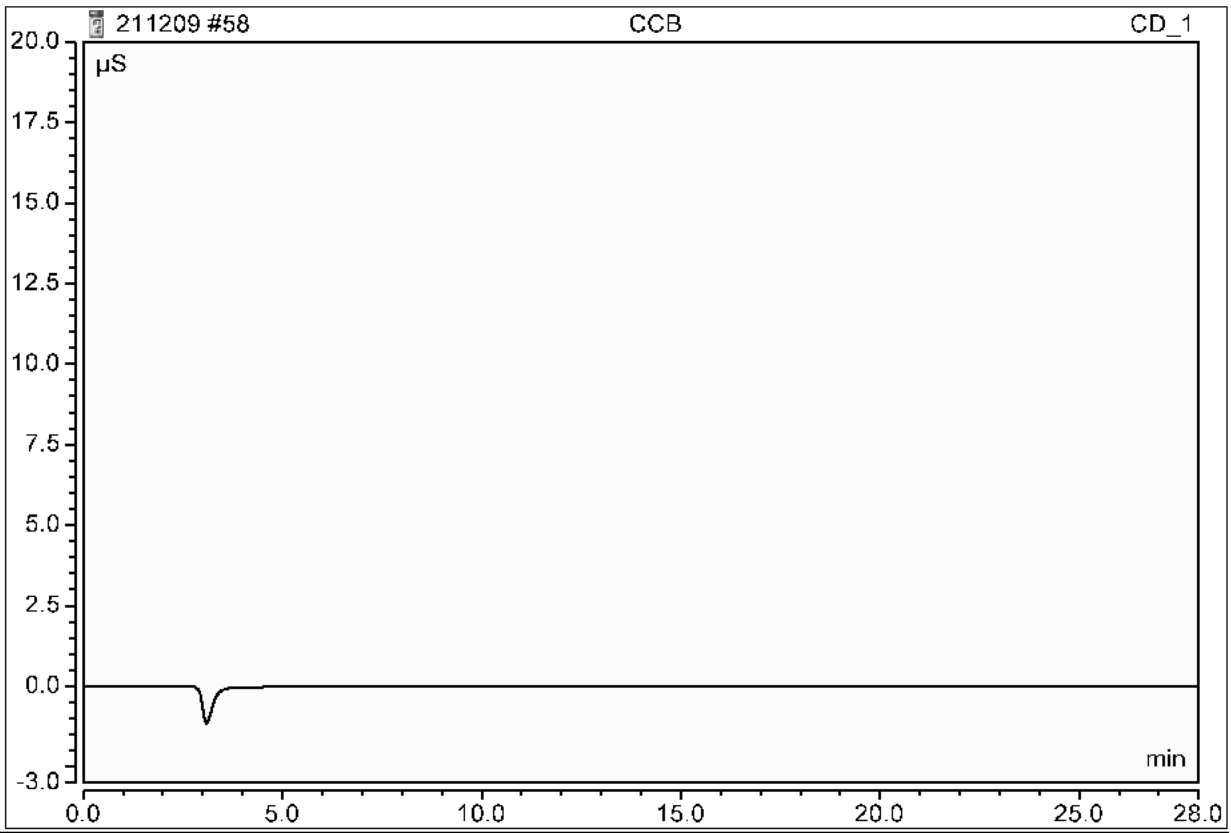
Sample Name:	**WIC211209-02CCV**	*Injection Volume:*	**50.0**
Vial Number:	**44**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 8:28**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.61	Fluoride	n.a.	2.3611		1.20077	13.26
2	7.90	Chloride	n.a.	4.6117		1.57792	17.42
3	10.23	Nitrite-N	n.a.	2.4531		1.70034	18.77
4	12.93	Bromide	n.a.	1.2195		0.15665	1.73
5	15.28	Nitrate-N	n.a.	2.3349		1.90450	21.03
6	21.61	O-Phosphate-P	n.a.	1.1934		0.28811	3.18
7	24.47	Sulfate	n.a.	9.4314		2.22955	24.61
Total:				23.6052	0.000	9.058	100.00

58 CCB

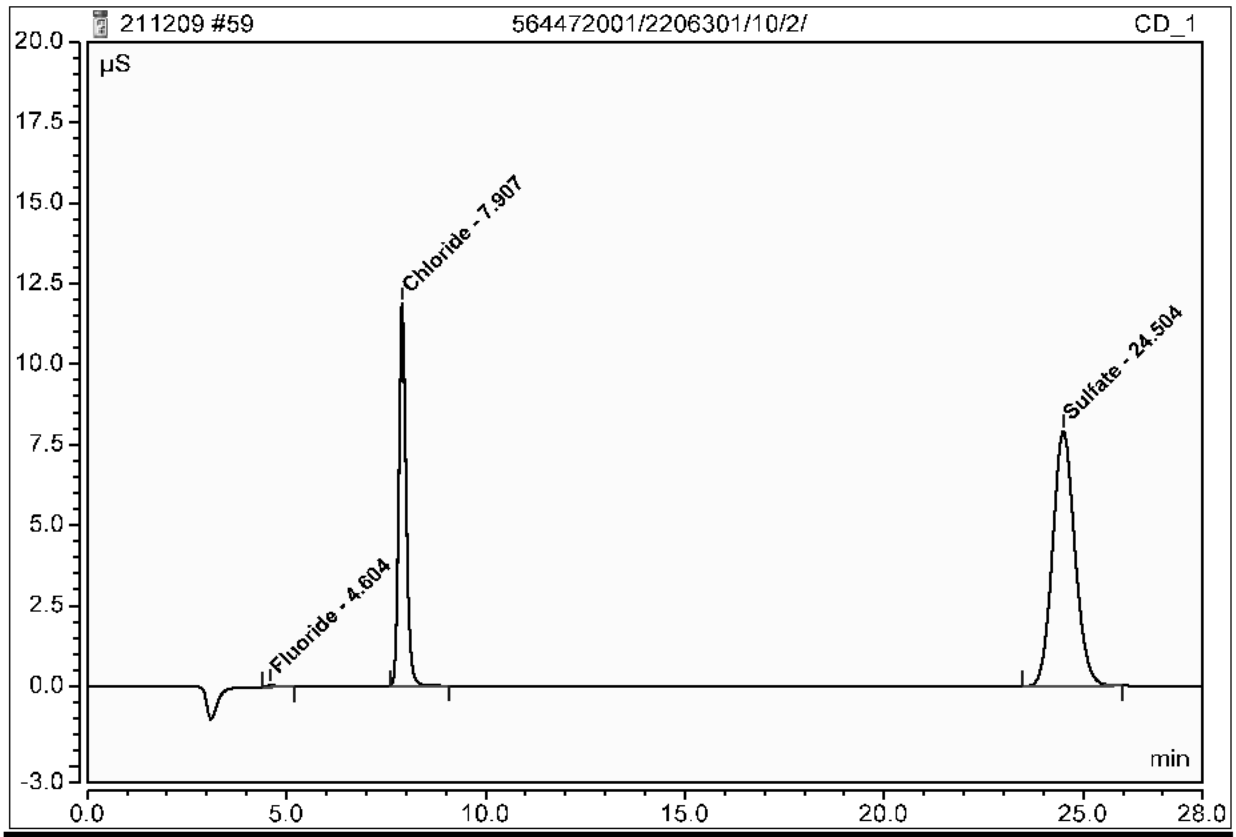
Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**45**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 8:59**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

59 564472001/2206301/10/2/

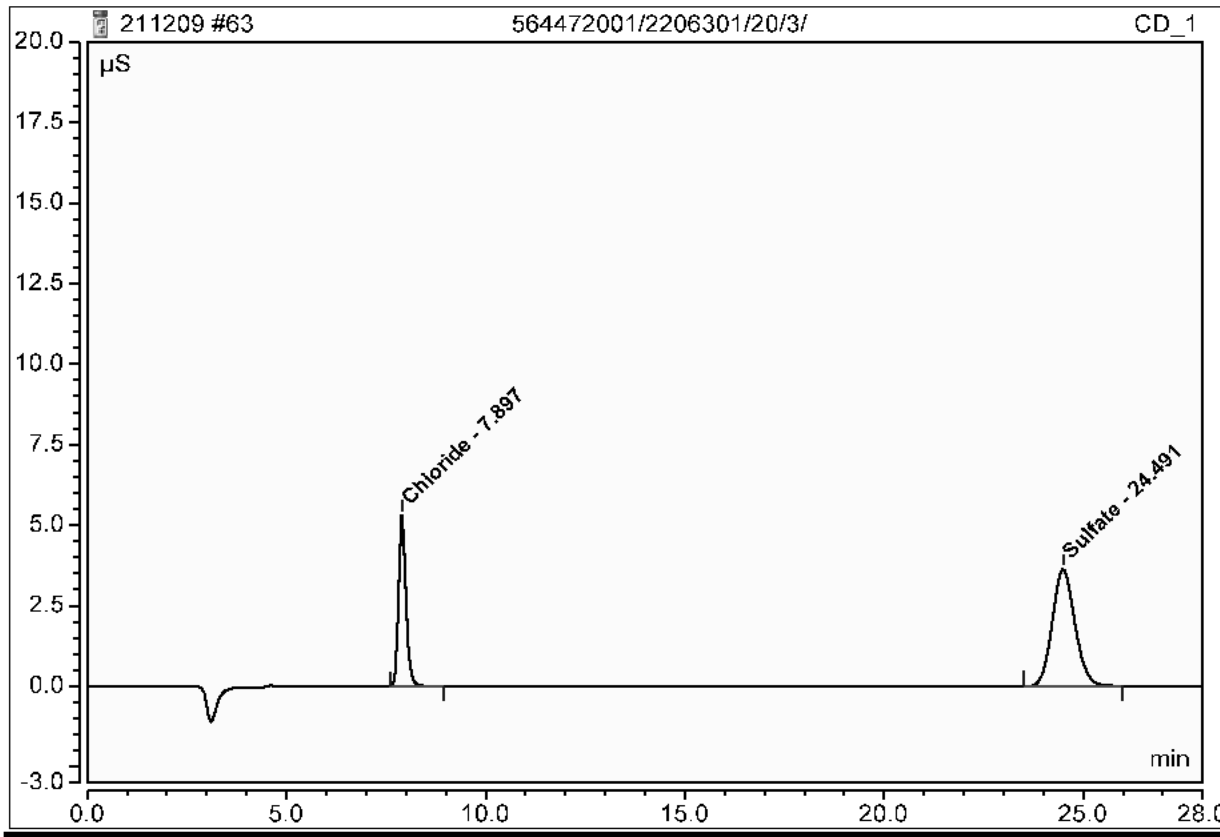
Sample Name:	**564472001/2206301/10/2/**	*Injection Volume:*	**50.0**
Vial Number:	**46**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 9:30**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.60	Fluoride	n.a.	0.0467		0.01806	0.24
2	7.91	Chloride	n.a.	7.2182		2.48625	32.55
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
3	24.50	Sulfate	n.a.	21.6388		5.13375	67.21
Total:				28.9037	0.000	7.638	100.00

63 564472001/2206301/20/3/

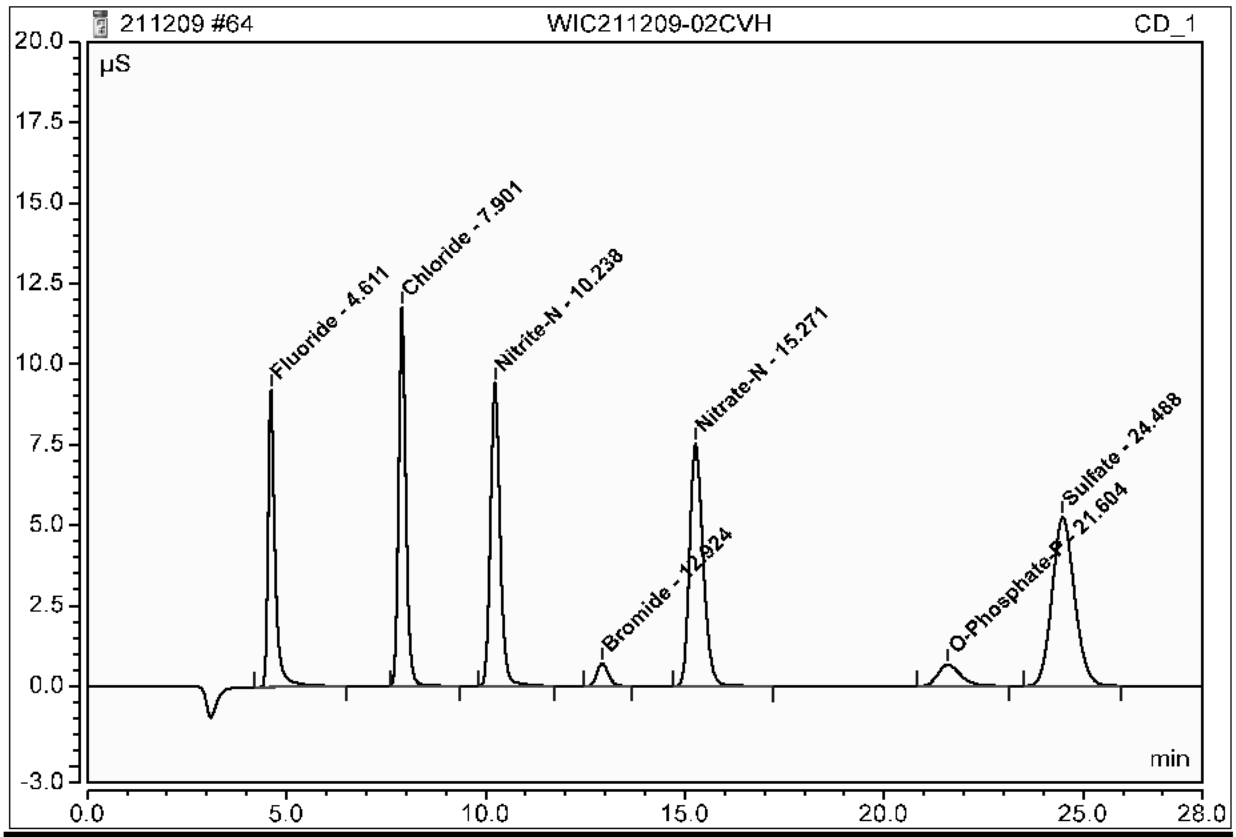
Sample Name:	**564472001/2206301/20/3/**	*Injection Volume:*	**50.0**
Vial Number:	**50**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 11:33**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	7.90	Chloride	n.a.	3.3590		1.14134	32.26
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
2	24.49	Sulfate	n.a.	10.1338		2.39665	67.74
Total:				13.4928	0.000	3.538	100.00

64 WIC211209-02CVH

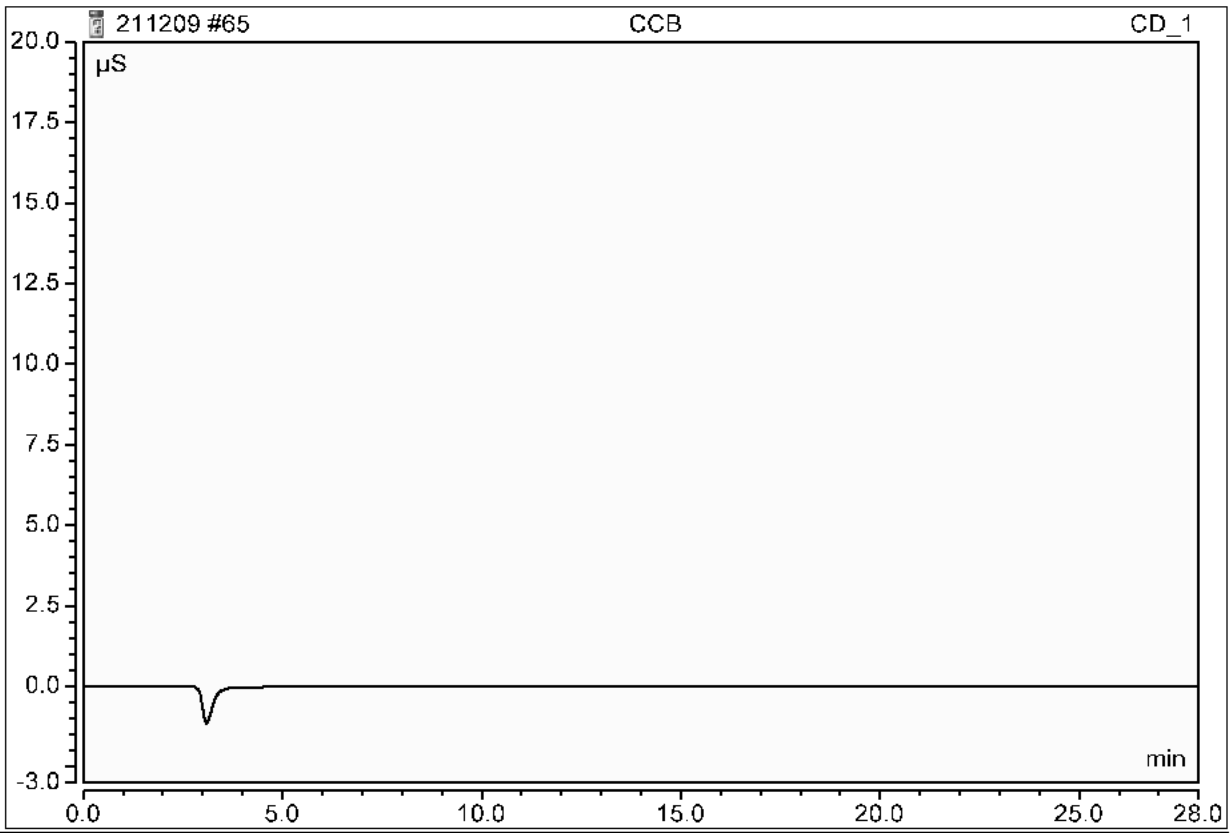
Sample Name:	**WIC211209-02CVH**	*Injection Volume:*	**50.0**
Vial Number:	**1**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 12:04**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.61	Fluoride	n.a.	3.6477		1.85821	13.21
2	7.90	Chloride	n.a.	7.1583		2.46535	17.53
3	10.24	Nitrite-N	n.a.	3.7848		2.63630	18.75
4	12.92	Bromide	n.a.	1.8660		0.24108	1.71
5	15.27	Nitrate-N	n.a.	3.6294		2.97530	21.16
6	21.60	O-Phosphate-P	n.a.	1.8399		0.45192	3.21
7	24.49	Sulfate	n.a.	14.4947		3.43413	24.42
Total:				36.4208	0.000	14.062	100.00

65 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**2**	*Channel:*	**CD_1**
Sample Type:	**Unknown**	*Dilution Factor:*	**1.0000**
Control Program:	**AS23**	*Sample Weight:*	**1.0000**
Quantif. Method:	**211104an**	*Sample Amount:*	**1.0000**
Recording Time:	**12/10/2021 12:35**	Analyst:	**HXC1**
Run Time (min):	**28.00**	Column:	**AS23-002407;GLGCE086;300;9056**



No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	O-Phosphate-P	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Sulfate	n.a.	n.a.	n.a.	n.a.	n.a.
Total:				0.0000	0.000	0.000	0.00

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

January 05, 2022

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 564468
SDG: S31034

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 09, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4523.

Sincerely,

Grace Bodiford

Grace Bodiford for
Samuel Hogan
Project Manager

Purchase Order: GELP20-0018
Enclosures

Table of Contents

Case Narrative

Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S31034
Work Order: 564468

January 05, 2022

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on December 09, 2021 for analysis. 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.

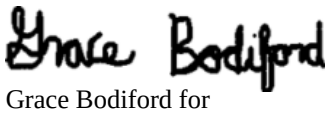
Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
564468001	S31034.01
564468002	S31034.02
564468003	S31034.03
564468004	S31034.04
564468005	S31034.05
564468006	S31034.06 (Field Blank)

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Grace Bodiford for
Samuel Hogan
Project Manager

Chain of Custody and Supporting Documentation

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

5644468

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Project Management Team
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: results@meritlabs.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague SAME: ☒
COMPANY: Merit Laboratories
ADDRESS: 2680 East Lansing Drive
CITY: East Lansing STATE: MI ZIP CODE: 48823
PHONE NO.: 517-332-0167 E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S31034 SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐1 DAY ☐2 DAYS ☐3 DAYS ☒STANDARD ☐OTHER

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☐LEVEL III ☒LEVEL IV ☐EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☐NPDES
Project Locations: ☐Detroit ☐New York ☐Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Radium 226*	Radium 228**	Special Instructions
	12/7/21	1425	S31034.01	GW	2			2					✓	✓	* E903.1 Mod.
	12/7/21	1304	S31034.02	GW	2			2					✓	✓	** E904.0/SW 9320 Mod.
	12/7/21	1122	S31034.03	GW	2			2					✓	✓	
	12/7/21	0951	S31034.04	GW	2			2					✓	✓	Please use calculation product &
	12/7/21	1122	S31034.05	GW	2			2					✓	✓	provide Radium 226/228 combined
	12/7/21	0850	S31034.06 (Field Blank)	Wa	2			2					✓	✓	results on the report
															(No Ice needed)
															** Subcontracted to
															GEL Laboratories, Inc.
															2040 Savage Road
															Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Johanna Manning (Sampler)	DATE 12/8/21	TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION	UPS	DATE 12/8/21	TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE 12/9/21	TIME 1010

RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

SEAL NO. — SEAL INTACT YES☐ NO☐ — INITIALS
SEAL NO. — SEAL INTACT YES☐ NO☐ — INITIALS

NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

SH

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	**SDG/AR/COC/Work Order:** SGA-4468 / 3604472
Received By: DC	**Date Received:** 12-9-21
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground (UPS) Field Services Courier Other 1Z4664770163258621

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?		X	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?		X	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
D) Did the client designate samples are hazardous?		X	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		X	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 None Other: *all temperatures are recorded in Celsius TEMP: 6°
4	Daily check performed and passed on IR temperature gun?	✓			**Temperature Device Serial #:** IR6-21 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):

PM (or PMA) review: Initials GB Date 12/13/21 Page 1 of 1

GL-CHL-SR-001 Rev 7

Laboratory Certifications

List of current GEL Certifications as of 05 January 2022

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	SC000122021−1
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	2019−165
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	T104704235−21−19
Utah NELAP	SC000122021−36
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S31034
Work Order #: 564468

Product: **Radium-226+Radium-228 Calculation**
Analytical Method: Calculation
Analytical Procedure: GL-RAD-D-003 REV# 44
Analytical Batch: 2207658

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

GEL Sample ID#	Client Sample Identification
564468001	S31034.01
564468002	S31034.02
564468003	S31034.03
564468004	S31034.04
564468005	S31034.05
564468006	S31034.06 (Field Blank)

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. 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.

Product: **GFPC Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2207640

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

GEL Sample ID#	Client Sample Identification
564468001	S31034.01
564468002	S31034.02
564468003	S31034.03
564468004	S31034.04
564468005	S31034.05
564468006	S31034.06 (Field Blank)
1204978136	Method Blank (MB)
1204978137	564713004(NonSDG) Sample Duplicate (DUP)
1204978138	Laboratory Control Sample (LCS)

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

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. 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.

Product: **Lucas Cell, Ra226, Liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2207637

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

GEL Sample ID#	Client Sample Identification
564468001	S31034.01
564468002	S31034.02
564468003	S31034.03
564468004	S31034.04
564468005	S31034.05
564468006	S31034.06 (Field Blank)
1204978128	Method Blank (MB)
1204978129	564713006(NonSDG) Sample Duplicate (DUP)
1204978130	564713006(NonSDG) Matrix Spike (MS)
1204978131	Laboratory Control Sample (LCS)
1204978132	Laboratory Control Sample Duplicate (LCSD)

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 1204978129 (Non SDG 564713006DUP) and 1204978130 (Non SDG 564713006MS) were non-homogenous matrix.

Miscellaneous Information

Additional Comments
The matrix spike, 1204978130 (Non SDG 564713006MS), 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

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

Qualifier Definition Report
for

MERI001 Merit Laboratories, Inc.

Client SDG: S31034 GEL Work Order: 564468

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: Kenshalla Oston **Name: Kenshalla Oston**

Date: 06 JAN 2022 **Title: Analyst I**

Sample Data Summary

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

Certificate of Analysis

Report Date: January 6, 2022

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S31034.01
Sample ID: 564468001
Matrix: Ground Water
Collect Date: 07-DEC-21 14:25
Receive Date: 09-DEC-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.179	+/-0.985	1.81	3.00	pCi/L			JXC9	01/05/22	1021	2207640	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.82	+/-1.12			pCi/L		1	NXL1	01/05/22	1203	2207658	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		2.64	+/-0.539	0.215	1.00	pCi/L			LXP1	01/04/22	0757	2207637	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			82.6	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: January 6, 2022

Company :	Merit Laboratories Inc.
Address :	2680 East Lansing Drive
	East Lansing, Michigan 48823
Contact:	John Laverty
Project:	Routine Analysis

Client Sample ID:	S31034.02	Project:	MERI00120
Sample ID:	564468002	Client ID:	MERI001
Matrix:	Ground Water		
Collect Date:	07-DEC-21 13:04		
Receive Date:	09-DEC-21		
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	0.583	+/-0.878	1.53	3.00	pCi/L			JXC9	01/05/22	1021	2207640	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.28	+/-0.980			pCi/L		1	NXL1	01/05/22	1203	2207658	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.70	+/-0.436	0.262	1.00	pCi/L			LXP1	01/04/22	0757	2207637	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			74.2	(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

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

Certificate of Analysis

Report Date: January 6, 2022

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S31034.03
Sample ID: 564468003
Matrix: Ground Water
Collect Date: 07-DEC-21 11:22
Receive Date: 09-DEC-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.666	+/-0.895	1.53	3.00	pCi/L			JXC9	01/05/22	1021	2207640	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.34	+/-0.994			pCi/L		1	NXL1	01/05/22	1203	2207658	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.67	+/-0.431	0.317	1.00	pCi/L			LXP1	01/04/22	0757	2207637	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			89.3	(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

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

Certificate of Analysis

Report Date: January 6, 2022

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S31034.04
Sample ID: 564468004
Matrix: Ground Water
Collect Date: 07-DEC-21 09:51
Receive Date: 09-DEC-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.929	+/-0.889	1.45	3.00	pCi/L			JXC9	01/05/22	1022	2207640	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.39	+/-0.970			pCi/L		1	NXL1	01/05/22	1203	2207658	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.46	+/-0.389	0.242	1.00	pCi/L			LXP1	01/04/22	0757	2207637	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			88.7	(15%-125%)

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

Column headers are defined as follows:

DF: Dilution Factor
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: January 6, 2022

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S31034.05
Sample ID: 564468005
Matrix: Ground Water
Collect Date: 07-DEC-21 11:22
Receive Date: 09-DEC-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.826	+/-1.21	2.07	3.00	pCi/L			JXC9	01/05/22	1022	2207640	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.51	+/-1.28			pCi/L		1	NXL1	01/05/22	1203	2207658	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.69	+/-0.430	0.211	1.00	pCi/L			LXP1	01/04/22	0757	2207637	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			88.8	(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

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

Certificate of Analysis

Report Date: January 6, 2022

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S31034.06 (Field Blank)
Sample ID: 564468006
Matrix: Ground Water
Collect Date: 07-DEC-21 08:50
Receive Date: 09-DEC-21
Collector: Client

Project: MERI00120
Client ID: MERI001

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	0.549	+/-1.01	1.77	3.00	pCi/L			JXC9	01/05/22	1022	2207640	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.26	+/-1.10			pCi/L		1	NXL1	01/05/22	1203	2207658	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.71	+/-0.433	0.211	1.00	pCi/L			LXP1	01/04/22	0757	2207637	3

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			87.8	(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 Summary

QC Summary

Report Date: January 6, 2022

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: **John Laverty**

Workorder: **564468**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 2207640										
QC1204978137 564713004 DUP										
Radium-228		2.88		2.86	pCi/L	0.762		(0% - 100%)	JXC9	01/05/22 10:21
	Uncertainty	+/-1.21		+/-1.05						
QC1204978138 LCS										
Radium-228	49.1			50.3	pCi/L		102	(75%-125%)		01/05/22 10:21
	Uncertainty			+/-3.82						
QC1204978136 MB										
Radium-228			U	0.661	pCi/L					01/05/22 10:21
	Uncertainty			+/-0.773						
Rad Ra-226										
Batch 2207637										
QC1204978129 564713006 DUP										
Radium-226		0.410	U	0.273	pCi/L	40.1		(0% - 100%)	LXP1	01/04/22 08:30
	Uncertainty	+/-0.216		+/-0.251						
QC1204978131 LCS										
Radium-226	26.5			21.9	pCi/L		82.8	(75%-125%)		01/04/22 09:12
	Uncertainty			+/-1.67						
QC1204978132 LCSD										
Radium-226	26.5			25.4	pCi/L	14.5	95.7	(0%-20%)		01/04/22 09:12
	Uncertainty			+/-1.64						
QC1204978128 MB										
Radium-226			U	0.0271	pCi/L					01/04/22 08:30
	Uncertainty			+/-0.206						
QC1204978130 564713006 MS										
Radium-226	133	0.410		108	pCi/L		80.9	(75%-125%)		01/04/22 08:30
	Uncertainty	+/-0.216		+/-8.17						

Notes:

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

The Qualifiers in this report are defined as follows:

** Analyte is a Tracer compound

< Result is less than value reported

> Result is greater than value reported

QC Summary

Workorder: **564468**

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

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

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 2207640 Check-list

This check-list was completed on 05-JAN-22 by Nat Long

This batch was reviewed by Kenshalla Oston on 05-JAN-22 and Nat Long on 05-JAN-22.

Batch ID:	**Product:**	**Description:** Gas Flow Radium 228
2207640	GFC28RAL	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 relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **2207640**
Analyst: Jasmine Conley (JXC9)
Prep: Lyndsey Pace (LXP1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 5
Instrument: LUCAS−C037036045

Due Dates for Lab: 04−JAN−2022 **Package: 06−JAN−2022** **SDG: 07−JAN−2022**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204978138	Radium−228 SPIKE	1965−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	564468001	21−DEC−2021	3	300.48	300.48	12/30/21 12:30	01/05/22 08:10
2	564468002	21−DEC−2021	3	301.61	301.61	12/30/21 12:30	01/05/22 08:10
3	564468003	21−DEC−2021	3	300.77	300.77	12/30/21 12:30	01/05/22 08:10
4	564468004	21−DEC−2021	3	300.44	300.44	12/30/21 12:30	01/05/22 08:10
5	564468005	21−DEC−2021	3	300.4	300.4	12/30/21 12:30	01/05/22 08:10
6	564468006	21−DEC−2021	3	301.11	301.11	12/30/21 12:30	01/05/22 08:10
7	564713001	21−DEC−2021	3	301.93	301.93	12/30/21 12:30	01/05/22 08:10
8	564713002	21−DEC−2021	3	300.6	300.6	12/30/21 12:30	01/05/22 08:10
9	564713003	21−DEC−2021	3	301.66	301.66	12/30/21 12:30	01/05/22 08:10
10	564713004	21−DEC−2021	3	301.1	301.1	12/30/21 12:30	01/05/22 08:10
11	564713005	21−DEC−2021	3	300.61	300.61	12/30/21 12:30	01/05/22 08:10
12	564713006	21−DEC−2021	3	302.82	302.82	12/30/21 12:30	01/05/22 08:10
13	1204978136 MB	21−DEC−2021	3		302.82	12/30/21 12:30	01/05/22 08:10
14	1204978137 DUP (564713004)	21−DEC−2021	3	302.07	302.07	12/30/21 12:30	01/05/22 08:10
15	1204978138 LCS	21−DEC−2021	3		302.82	12/30/21 12:30	01/05/22 08:10

Reagent/Solvent Lot ID	Description	Amount
WORK 1951−C	Barium−133	.1 mL
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL
REGNT 3301783	Barium Carrier Ra228 REG	1 mL
REGNT 3353921	RGF−1M Citric Acid	5 mL
REGNT 3354444	RGF−Neodymium Subtrate	5 mL
REGNT 3357922	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 3364305.2	Concentrated HNO3 (16M)	5 mL
REGNT 3365600	RGF−1.5M Ammonium Sulfate	10 mL
REGNT 3369003.7	29M HF (48−50%)	4 mL
REGNT 3369751	RGF−7M Nitric Acid	25 mL
REGNT 3373303	RGF−50% Potassium Carbonate	2 mL
REGNT 3374980	Lot #DGA0026	2 g
REGNT 3378803	2M HCl	20 mL

Comments:
Pipet Id: RAD−GFC−1795419
Data Entry Date2: 21−DEC−2021 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 1951-C
Tracer Exp Date : 9/16/2022
Tracer Volume Added: 0.10

Batch : 2207640
Analyst : LIN01615
Prep Date : 12/21/2021
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

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

Sample Characteristics					Tracer Calculations					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	564468001.1	0.3005	1.8467E-05	12/7/2021 14:25	816.9	2.09%	674.9	2.32%	0.1	0.000200
2	564468002.1	0.3016	1.8486E-05	12/7/2021 13:04	816.9	2.09%	605.8	2.46%	0.1	0.000200
3	564468003.1	0.3008	1.8472E-05	12/7/2021 11:22	816.9	2.09%	729.3	2.22%	0.1	0.000200
4	564468004.1	0.3004	1.8467E-05	12/7/2021 9:51	816.9	2.09%	724.5	2.23%	0.1	0.000200
5	564468005.1	0.3004	1.8466E-05	12/7/2021 11:22	816.9	2.09%	725.6	2.23%	0.1	0.000200
6	564468006.1	0.3011	1.8478E-05	12/7/2021 8:50	816.9	2.09%	717.5	2.24%	0.1	0.000200
7	564713001.1	0.3019	1.8492E-05	12/6/2021 9:54	816.9	2.09%	710.6	2.26%	0.1	0.000200
8	564713002.1	0.3006	1.8469E-05	12/6/2021 9:59	816.9	2.09%	721.9	2.24%	0.1	0.000200
9	564713003.1	0.3017	1.8487E-05	12/6/2021 11:13	816.9	2.09%	696.6	2.28%	0.1	0.000200
10	564713004.1	0.3011	1.8478E-05	12/6/2021 12:15	816.9	2.09%	744.5	2.20%	0.1	0.000200
11	564713005.1	0.3006	1.8469E-05	12/7/2021 10:36	816.9	2.09%	750.5	2.19%	0.1	0.000200
12	564713006.1	0.3028	1.8507E-05	12/7/2021 10:41	816.9	2.09%	760.3	2.18%	0.1	0.000200
13	1204978136.1	0.3028	1.8507E-05	12/21/2021 0:00	816.9	2.09%	738.0	2.21%	0.1	0.000200
14	1204978137.1	0.3021	1.8494E-05	12/6/2021 12:15	816.9	2.09%	747.7	2.20%	0.1	0.000200
15	1204978138.1	0.3028	1.8507E-05	12/21/2021 0:00	816.9	2.09%	643.9	2.38%	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

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	2C	60	8	54	0.900	1/5/2022 10:21	12/30/2021 12:30	1/5/2022 8:10	0.991	0.781	1.000	1.057	82.6%	1.59%
2	3B	60	3	36	0.600	1/5/2022 10:21	12/30/2021 12:30	1/5/2022 8:10	0.991	0.781	1.000	1.057	74.2%	1.64%
3	3C	60	1	55	0.917	1/5/2022 10:21	12/30/2021 12:30	1/5/2022 8:10	0.990	0.780	1.000	1.057	89.3%	1.55%
4	3D	60	8	50	0.833	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.780	1.000	1.057	88.7%	1.55%
5	4A	60	7	99	1.650	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.780	1.000	1.057	88.8%	1.55%
6	5B	60	9	68	1.133	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.780	1.000	1.057	87.8%	1.56%
7	5C	60	8	101	1.683	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.780	1.000	1.057	87.0%	1.56%
8	5D	60	2	109	1.817	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.780	1.000	1.057	88.4%	1.56%
9	6A	60	5	148	2.467	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.780	1.000	1.057	85.3%	1.57%
10	6C	60	4	104	1.733	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.779	1.000	1.057	91.1%	1.54%
11	7A	60	5	41	0.683	1/5/2022 10:22	12/30/2021 12:30	1/5/2022 8:10	0.990	0.779	1.000	1.057	91.9%	1.54%
12	7B	60	6	46	0.767	1/5/2022 10:23	12/30/2021 12:30	1/5/2022 8:10	0.990	0.779	1.000	1.057	93.1%	1.54%
13	7C	60	19	44	0.733	1/5/2022 10:21	12/30/2021 12:30	1/5/2022 8:10	0.995	0.781	1.000	1.057	90.3%	1.55%
14	7D	60	9	83	1.383	1/5/2022 10:21	12/30/2021 12:30	1/5/2022 8:10	0.990	0.781	1.000	1.057	91.5%	1.54%
15	8A	60	16	858	14.300	1/5/2022 10:21	12/30/2021 12:30	1/5/2022 8:10	0.995	0.781	1.000	1.057	78.8%	1.61%

Pos.	Calibration Data: 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	6/1/2021	5/31/2022	0.6380	0.01274	0.854	12/31/2021 11:11	500
2	PIC	6/1/2021	5/31/2022	0.6428	0.01614	0.464	12/31/2021 11:11	500
3	PIC	6/1/2021	5/31/2022	0.6497	0.00988	0.728	12/31/2021 11:11	500
4	PIC	6/1/2021	5/31/2022	0.6259	0.02297	0.582	12/31/2021 11:11	500
5	PIC	6/1/2021	5/31/2022	0.6543	0.01123	1.416	12/31/2021 11:11	500
6	PIC	6/1/2021	5/31/2022	0.6506	0.00426	0.980	12/31/2021 11:12	500
7	PIC	6/1/2021	5/31/2022	0.6672	0.00657	0.872	12/31/2021 11:12	500
8	PIC	6/1/2021	5/31/2022	0.6476	0.00925	0.980	12/31/2021 11:12	500
9	PIC	6/1/2021	5/31/2022	0.6392	0.02228	1.812	12/31/2021 11:04	500
10	PIC	6/1/2021	5/31/2022	0.6368	0.01970	0.918	12/31/2021 11:06	500
11	PIC	6/1/2021	5/31/2022	0.6479	0.00594	0.464	12/31/2021 11:04	500
12	PIC	6/1/2021	5/31/2022	0.6459	0.00627	0.698	12/31/2021 11:04	500
13	PIC	6/1/2021	5/31/2022	0.6553	0.00790	0.540	12/31/2021 11:04	500
14	PIC	6/1/2021	5/31/2022	0.6464	0.01113	0.554	12/31/2021 11:04	500
15	PIC	6/1/2021	5/31/2022	0.6470	0.01579	1.638	12/31/2021 11:04	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

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1965-B
LCS Exp Date : 8/22/2022
LCS Activity (dpm/ml): 329.91
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	1.1441	0.8077	3	1.8099	**0.1789**	281.01%	0.0460	0.1293	0.9853	0.9863		SAMPLE				
2	0.9291	0.6560	3	1.5262	**0.5827**	76.90%	0.1360	0.1045	0.8779	0.8902		SAMPLE				
3	0.9593	0.6773	3	1.5311	**0.6663**	68.59%	0.1887	0.1294	0.8955	0.9110		SAMPLE				
4	0.8976	0.6337	3	1.4523	**0.9290**	48.89%	0.2513	0.1227	0.8888	0.9197		SAMPLE				
5	1.3376	0.9444	3	2.0653	**0.8263**	74.45%	0.2340	0.1742	1.2054	1.2231		SAMPLE				
6	1.1293	0.7973	3	1.7738	**0.5495**	94.18%	0.1533	0.1444	1.0142	1.0235		SAMPLE				
7	1.0464	0.7387	3	1.6535	**2.8558**	21.34%	0.8113	0.1726	1.1910	1.3897		SAMPLE				
8	1.1302	0.7980	3	1.7752	**3.0007**	21.54%	0.8367	0.1795	1.2621	1.4699		SAMPLE				
9	1.6082	1.1354	3	2.4585	**2.4569**	32.42%	0.6547	0.2115	1.5558	1.6765		SAMPLE				
10	1.0773	0.7606	3	1.6978	**2.8798**	21.64%	0.8153	0.1753	1.2135	1.4159		SAMPLE				
11	0.7479	0.5281	3	1.2286	**0.7565**	50.63%	0.2193	0.1110	0.7503	0.7739		SAMPLE				
12	0.9020	0.6369	3	1.4433	**0.2329**	173.39%	0.0687	0.1191	0.7914	0.7936		SAMPLE				
13	0.7998	0.5646	3	1.3002	**0.6610**	59.68%	0.1933	0.1153	0.7728	0.7904		MB				
14	0.8165	0.5765	3	1.3253	**2.8580**	18.84%	0.8293	0.1554	1.0499	1.2721	564713004.1	DUP	0.8%			
15	1.6172	1.1418	3	2.4820	**50.2601**	4.49%	12.6620	0.4915	3.8241	13.2507		LCS			49.0744	102.4%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
564468001	2C	60	8	54	1/5/2022 10:21	1/5/2022 11:21	PIC	2207640
564468002	3B	60	3	36	1/5/2022 10:21	1/5/2022 11:21	PIC	2207640
564468003	3C	60	1	55	1/5/2022 10:21	1/5/2022 11:21	PIC	2207640
564468004	3D	60	8	50	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564468005	4A	60	7	99	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564468006	5B	60	9	68	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564713001	5C	60	8	101	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564713002	5D	60	2	109	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564713003	6A	60	5	148	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564713004	6C	60	4	104	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564713005	7A	60	5	41	1/5/2022 10:22	1/5/2022 11:22	PIC	2207640
564713006	7B	60	6	46	1/5/2022 10:23	1/5/2022 11:23	PIC	2207640
1204978136	7C	60	19	44	1/5/2022 10:21	1/5/2022 11:21	PIC	2207640
1204978137	7D	60	9	83	1/5/2022 10:21	1/5/2022 11:21	PIC	2207640
1204978138	8A	60	16	858	1/5/2022 10:21	1/5/2022 11:21	PIC	2207640

ASSAY	5-Jan-22	8:54:29	
Wizard 1480 s/n 4800440			
Protocol	id	9	228_REC2
Time	limit	180	
Count	limit	50000	
Isotope	Ba-133		
Protocol	date	26-Sep-13	15:01:58
Run	id.	49	

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	72	1	180	2590	816.9	2.09		08:54:36
564468001	2	72	2	180	2164	674.9	2.32	82.62	08:57:48
564468002	3	72	3	180	1957	605.8	2.46	74.16	09:00:59
564468003	4	72	4	180	2327	729.3	2.22	89.28	09:04:10
564468004	5	72	5	180	2313	724.5	2.23	88.69	09:07:22
564468005	6	99	6	180	2316	725.6	2.23	88.82	09:10:46
564468006	7	99	7	180	2292	717.5	2.24	87.83	09:13:58
564713001	8	99	8	180	2271	710.6	2.26	86.99	09:17:09
564713002	9	99	9	180	2305	721.9	2.24	88.37	09:20:21
564713003	10	99	10	180	2229	696.6	2.28	85.27	09:23:32
564713004	11	72	11	180	2372	744.5	2.2	91.14	09:27:02
564713005	12	72	12	180	2390	750.5	2.19	91.87	09:30:13
564713006	13	72	13	180	2420	760.3	2.18	93.07	09:33:25
1204978136	14	72	14	180	2353	738	2.21	90.34	09:36:36
1204978137	15	72	15	180	2382	747.7	2.2	91.53	09:39:47
1204978138	16	38	16	180	2071	643.9	2.38	78.82	09:43:06

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 05-Jan-2022

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

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	need 2nd	Alpha XTalk	05-Jan 08:59	5	0.520	0.288	0.558	+2.16
LB4100F3	need 2nd	Alpha bkg	05-Jan 06:04	60	0.217	-8.21E-2	0.542	-0.13
LB4100F3	need 2nd	Alpha eff	05-Jan 08:59	5	13380	12820	17130	-2.22
LB4100F3	need 2nd	Alpha XTalk	05-Jan 08:59	5	0.388	0.287	0.399	+2.38
LB4100G1	Above	Beta bkg	05-Jan 06:05	60	302	0.380	1.675	+1,392.60
LB4100G2	Below	Alpha eff	05-Jan 08:48	5	9248	9350	12920	-3.17
LB4100G2	need 2nd	Alpha XTalk	05-Jan 08:48	5	0.340	0.212	0.351	+2.55
LB4100G3	need 2nd	Alpha eff	05-Jan 08:48	5	6718	6620	7779	-2.49
LB4100G3	Above	Beta bkg	05-Jan 06:05	60	4.400	0.810	1.674	+21.93
PIC1A	Above	Alpha bkg	05-Jan 11:59	60	6.500	-1.13E-1	0.365	+79.99
PIC1A	Above	Beta bkg	05-Jan 11:59	60	3.850	-7.65E-1	2.862	+4.63
PIC1B	Above	Alpha bkg	05-Jan 11:59	60	0.633	-8.26E-2	0.204	+11.99
PIC1C	Above	Alpha bkg	05-Jan 11:59	60	0.383	-9.03E-2	0.275	+4.78
PIC1D	Above	Alpha bkg	05-Jan 11:59	60	0.333	-9.94E-2	0.351	+2.76
PIC2A	Above	Beta bkg	05-Jan 06:03	60	24.500	-3.53E-1	1.892	+63.41
PIC2D	Above	Beta bkg	05-Jan 11:59	60	2.050	0.004	2.015	+3.10
PIC4B	Above	Alpha bkg	05-Jan 06:05	60	3.150	-9.26E-2	0.241	+55.32
PIC4B	need 2nd	Beta bkg	05-Jan 06:05	60	0.050	-2.69E-1	2.230	-2.23
PIC4B	Below	Beta eff	05-Jan 09:25	5	2215	19280	21300	-53.69
PIC4B	Above	Beta XTalk	05-Jan 09:25	5	8.106	4.38E-5	7.15E-4	+72,422.55
PIC4C	Above	Alpha bkg	05-Jan 12:17	60	0.683	0.045	0.436	+6.79
PIC4C	Above	Alpha eff	05-Jan 10:14	5	22263	20250	21250	+9.08
PIC4C	Below	Alpha XTalk	05-Jan 10:14	5	0.170	0.251	0.285	-17.08
PIC4C	need 2nd	Beta bkg	05-Jan 12:17	60	0.417	0.128	1.044	-1.11
PIC4C	Below	Beta eff	05-Jan 10:06	5	23282	24190	26350	-5.52
PIC4C	Above	Beta XTalk	05-Jan 10:06	5	0.087	-1.86E-3	0.011	+37.09
PIC4D	need 2nd	Alpha bkg	05-Jan 11:59	60	0.300	0.002	0.387	+1.65
PIC4D	Below	Alpha XTalk	05-Jan 09:19	5	0.200	0.232	0.256	-10.90
PIC4D	Below	Beta eff	05-Jan 09:25	5	38415	38750	41560	-3.72
PIC4D	Above	Beta XTalk	05-Jan 09:25	5	0.058	0.001	0.030	+8.94
PIC5A	Above	Alpha bkg	05-Jan 11:59	60	0.367	0.017	0.369	+2.95

PIC6B	Above	Beta bkg	05-Jan 12:00	60	2.017	0.389	2.636	+1.35
PIC10B	Above	Beta bkg	05-Jan 06:18	60	2.217	0.037	2.494	+2.32
PIC12C	need 2nd	Alpha bkg	05-Jan 11:58	60	0.067	-4.32E-2	0.395	-1.50
PIC12C	Above	Beta bkg	05-Jan 11:58	60	4.100	0.024	2.905	+5.49
PIC14A	need 2nd	Alpha bkg	05-Jan 11:58	60	0.233	-5.86E-2	0.314	+1.70
PIC14B	Above	Beta bkg	05-Jan 11:58	60	4.000	-2.13E-1	2.672	+5.76

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

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

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

Reviewed by R. Beck-Hansen

Date 1-6-22

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 2207640**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204978136	MB	JXC9	PIC7C	JAN-05-22 10:21:30	DONE	25mm Filter	01-JUN-21 00:00
1204978137	DUP	JXC9	PIC7D	JAN-05-22 10:21:33	DONE	25mm Filter	01-JUN-21 00:00
1204978138	LCS	JXC9	PIC8A	JAN-05-22 10:21:36	DONE	25mm Filter	01-JUN-21 00:00
564468001	SAMPLE	JXC9	PIC2C	JAN-05-22 10:21:49	DONE	25mm Filter	01-JUN-21 00:00
564468002	SAMPLE	JXC9	PIC3B	JAN-05-22 10:21:52	DONE	25mm Filter	01-JUN-21 00:00
564468003	SAMPLE	JXC9	PIC3C	JAN-05-22 10:21:56	DONE	25mm Filter	01-JUN-21 00:00
564468004	SAMPLE	JXC9	PIC3D	JAN-05-22 10:22:09	DONE	25mm Filter	01-JUN-21 00:00
564468005	SAMPLE	JXC9	PIC4A	JAN-05-22 10:22:15	DONE	25mm Filter	01-JUN-21 00:00
564468006	SAMPLE	JXC9	PIC5B	JAN-05-22 10:22:18	DONE	25mm Filter	01-JUN-21 00:00
564713001	SAMPLE	JXC9	PIC5C	JAN-05-22 10:22:21	DONE	25mm Filter	01-JUN-21 00:00
564713002	SAMPLE	JXC9	PIC5D	JAN-05-22 10:22:31	DONE	25mm Filter	01-JUN-21 00:00
564713003	SAMPLE	JXC9	PIC6A	JAN-05-22 10:22:36	DONE	25mm Filter	01-JUN-21 00:00
564713004	SAMPLE	JXC9	PIC6C	JAN-05-22 10:22:43	DONE	25mm Filter	01-JUN-21 00:00
564713005	SAMPLE	JXC9	PIC7A	JAN-05-22 10:22:50	DONE	25mm Filter	01-JUN-21 00:00
564713006	SAMPLE	JXC9	PIC7B	JAN-05-22 10:23:03	DONE	25mm Filter	01-JUN-21 00:00

Lucas Cell Raw Data

Batch 2207637 Check-list

This check-list was completed on 04-JAN-22 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 04-JAN-22 and Lyndsey Pace on 04-JAN-22.

Batch ID: 2207637 **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 relative percent differences and/or error (RPD/RER) between the LCS and the LCSD recoveries within the acceptance limits?	Yes		
11	Were the matrix spike (MS/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: **2207637**
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL−RAD−A−008 REV# 15
Instrument: LUCAS−C037036045

Due Dates for Lab: 04−JAN−2022 **Package: 06−JAN−2022** **SDG: 07−JAN−2022**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204978131	Radium−226 SPIKE	1715−G	.1	mL
LCSD	1204978132	Radium−226 SPIKE	1715−G	.1	mL
MS	1204978130	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	564468001	21−DEC−2021	1	502.98	502.98	12/29/21 07:28	107	01/04/22 04:52	01/04/22 07:57	1	95
2	564468002	21−DEC−2021	1	503.7	503.7	12/29/21 07:28	202	01/04/22 04:52	01/04/22 07:57	2	64
3	564468003	21−DEC−2021	1	505.84	505.84	12/29/21 07:28	306	01/04/22 04:52	01/04/22 07:57	4	69
4	564468004	21−DEC−2021	1	500.73	500.73	12/29/21 07:28	403	01/04/22 04:52	01/04/22 07:57	2	60
5	564468005	21−DEC−2021	1	501.04	501.04	12/29/21 07:28	505	01/04/22 04:52	01/04/22 07:57	1	62
6	564468006	21−DEC−2021	1	500.69	500.69	12/29/21 07:28	604	01/04/22 04:52	01/04/22 07:57	1	63
7	564471001	21−DEC−2021	1	500.13	500.13	12/29/21 07:28	708	01/04/22 04:52	01/04/22 07:57	1	49
8	564713001	21−DEC−2021	1	502.83	502.83	12/29/21 07:28	806	01/04/22 04:52	01/04/22 07:57	4	84
9	564713002	21−DEC−2021	1	500.45	500.45	12/29/21 07:28	102	01/04/22 05:23	01/04/22 08:30	1	11
10	564713003	21−DEC−2021	1	501.94	501.94	12/29/21 07:28	208	01/04/22 05:23	01/04/22 08:30	8	25
11	564713004	21−DEC−2021	1	500.4	500.4	12/29/21 07:28	303	01/04/22 05:23	01/04/22 08:30	3	101
12	564713005	21−DEC−2021	1	500.6	500.6	12/29/21 07:28	402	01/04/22 05:23	01/04/22 08:30	1	18
13	564713006	21−DEC−2021	1	500.33	500.33	12/29/21 07:28	503	01/04/22 05:23	01/04/22 08:30	2	19
14	1204978128 MB	21−DEC−2021	1		505.84	12/29/21 07:28	607	01/04/22 05:23	01/04/22 08:30	7	8
15	1204978129 DUP (564713006)	21−DEC−2021	1	501.03	501.03	12/29/21 07:28	701	01/04/22 05:23	01/04/22 08:30	6	16
16	1204978130 MS (564713006)	21−DEC−2021	1	100.55	100.55	12/29/21 07:28	801	01/04/22 05:23	01/04/22 08:30	8	699
17	1204978131 LCS	21−DEC−2021	1		505.84	12/29/21 07:28	101	01/04/22 05:54	01/04/22 09:12	5	681
18	1204978132 LCSD	21−DEC−2021	1		505.84	12/29/21 07:28	204	01/04/22 05:54	01/04/22 09:12	3	932

Reagent/Solvent Lot ID	Description	Amount

Comments:
Data Entry Date2: 21−DEC−2021 00:00

Radium-226 Liquid

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

Batch : 2207637
Analyst : LIN01615
Prep Date : 12/21/2021
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	564468001.1	0.5030	2.0268E-05	12/7/2021 14:25	107	30	95	3.167	1	0.033	30	1.6610
2	564468002.1	0.5037	2.0271E-05	12/7/2021 13:04	202	30	64	2.133	2	0.067	30	1.7020
3	564468003.1	0.5058	2.0280E-05	12/7/2021 11:22	306	30	69	2.300	4	0.133	30	1.8014
4	564468004.1	0.5007	2.0259E-05	12/7/2021 9:51	403	30	60	2.000	2	0.067	30	1.8570
5	564468005.1	0.5010	2.0260E-05	12/7/2021 11:22	505	30	62	2.067	1	0.033	30	1.6950
6	564468006.1	0.5007	2.0259E-05	12/7/2021 8:50	604	30	63	2.100	1	0.033	30	1.6960
7	564471001.1	0.5001	2.0256E-05	12/7/2021 13:35	708	30	49	1.633	1	0.033	30	1.5950
8	564713001.1	0.5028	2.0267E-05	12/6/2021 9:54	806	30	84	2.800	4	0.133	30	1.7130
9	564713002.1	0.5005	2.0258E-05	12/6/2021 9:59	102	30	11	0.367	1	0.033	30	1.5460
10	564713003.1	0.5019	2.0264E-05	12/6/2021 11:13	208	30	25	0.833	8	0.267	30	1.6950
11	564713004.1	0.5004	2.0258E-05	12/6/2021 12:15	303	30	101	3.367	3	0.100	30	1.6761
12	564713005.1	0.5006	2.0258E-05	12/7/2021 10:36	402	30	18	0.600	1	0.033	30	1.8830
13	564713006.1	0.5003	2.0257E-05	12/7/2021 10:41	503	30	19	0.633	2	0.067	30	1.9420
14	1204978128.1	0.5058	2.0280E-05	12/21/2021 0:00	607	30	8	0.267	7	0.233	30	1.7080
15	1204978129.1	0.5010	2.0260E-05	12/7/2021 10:41	701	30	16	0.533	6	0.200	30	1.7130
16	1204978130.1	0.1006	1.1404E-05	12/7/2021 10:41	801	30	699	23.300	8	0.267	30	1.4860
17	1204978131.1	0.5058	2.0280E-05	12/21/2021 0:00	101	30	681	22.700	5	0.167	30	1.4260
18	1204978132.1	0.5058	2.0280E-05	12/21/2021 0:00	204	30	932	31.067	3	0.100	30	1.6950

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			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
8.500%	5/2/2021	4/30/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
4.100%	8/1/2021	7/31/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
4.380%	1/1/2022	12/31/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
8.000%	2/1/2021	1/31/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
9.600%	6/1/2021	5/31/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
6.400%	7/1/2021	6/30/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
2.200%	11/1/2021	10/31/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
1.500%	4/1/2021	3/31/2022	12/29/2021 7:28	1/4/2022 4:52	1/4/2022 7:57	0.656	0.977	1.002	1.000
2.800%	5/2/2021	4/30/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
2.600%	8/1/2021	7/31/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
3.164%	1/1/2022	12/31/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
9.400%	2/1/2021	1/31/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
4.800%	6/1/2021	5/31/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
4.600%	7/1/2021	6/30/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
5.900%	11/1/2021	10/31/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
1.000%	4/1/2021	3/31/2022	12/29/2021 7:28	1/4/2022 5:23	1/4/2022 8:30	0.658	0.977	1.002	1.000
2.400%	5/2/2021	4/30/2022	12/29/2021 7:28	1/4/2022 5:54	1/4/2022 9:12	0.659	0.975	1.002	1.000
7.800%	8/1/2021	7/31/2022	12/29/2021 7:28	1/4/2022 5:54	1/4/2022 9:12	0.659	0.975	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 : 9/15/2022
Spike Activity (dpm/ml): 297.59
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/15/2022
LCS Activity (dpm/ml): 297.59
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	0.0925	0.0653	1	0.2149	**2.6397**	13.45%	3.1333	0.3266	0.5393	0.7934		SAMPLE				
2	0.1275	0.0900	1	0.2622	**1.6967**	13.73%	2.0667	0.2708	0.4358	0.5181		SAMPLE				
3	0.1697	0.1198	1	0.3168	**1.6735**	13.86%	2.1667	0.2848	0.4312	0.5147		SAMPLE				
4	0.1176	0.0830	1	0.2417	**1.4634**	15.76%	1.9333	0.2625	0.3894	0.4989		SAMPLE				
5	0.0910	0.0643	1	0.2114	**1.6851**	16.17%	2.0333	0.2646	0.4298	0.5869		SAMPLE				
6	0.0910	0.0643	1	0.2114	**1.7130**	14.40%	2.0667	0.2667	0.4332	0.5431		SAMPLE				
7	0.0969	0.0684	1	0.2251	**1.4117**	14.89%	1.6000	0.2357	0.4076	0.4598		SAMPLE				
8	0.1795	0.1267	1	0.3352	**2.1790**	11.82%	2.6667	0.3127	0.5008	0.5948		SAMPLE				
9	0.0997	0.0704	1	0.2316	**0.3027**	34.75%	0.3333	0.1155	0.2055	0.2108		SAMPLE				
10	0.2565	0.1811	1	0.4448	**0.4680**	33.89%	0.5667	0.1915	0.3099	0.3181		SAMPLE				
11	0.1594	0.1125	1	0.3088	**2.7365**	10.88%	3.2667	0.3399	0.5581	0.7045		SAMPLE				
12	0.0819	0.0578	1	0.1901	**0.4224**	27.31%	0.5667	0.1453	0.2123	0.2341		SAMPLE				
13	0.1123	0.0793	1	0.2309	**0.4097**	27.38%	0.5667	0.1528	0.2165	0.2277		SAMPLE				
14	0.2363	0.1668	1	0.4150	**0.0271**	387.33%	0.0333	0.1291	0.2058	0.2058		MB				
15	0.2202	0.1555	1	0.3928	**0.2729**	47.27%	0.3333	0.1563	0.2509	0.2559	564713006.1	DUP	40.1%			
16	1.4608	1.0313	1	2.5329	**108.3054**	3.98%	23.0333	0.8863	8.1684	17.7665	564713006.1	MS			133.3169	80.9%
17	0.2391	0.1688	1	0.4349	**21.9332**	4.56%	22.5333	0.8731	1.6656	3.7233		LCS			26.5001	82.8%
18	0.1558	0.1100	1	0.3019	**25.3583**	8.47%	30.9667	1.0193	1.6359	5.5772		LCSD	14.5%		26.5001	95.7%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 04-JAN-2022

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:50	1	1.21E+05	120547	-1.17		
LUCAS2	EFF	06:49	1	1.31E+05	130725	0.17		
LUCAS3	EFF	06:48	1	1.31E+05	130914	-1.09		
LUCAS4	EFF	06:47	1	1.28E+05	128149	0.8		
LUCAS5	EFF	06:45	1	1.28E+05	128376	-1.22		
LUCAS6	EFF	06:44	1	1.31E+05	130550	-0.77		
LUCAS7	EFF	06:42	1	1.31E+05	131329	-0.99		
LUCAS8	EFF	06:41	1	1.21E+05	120965	-0.98		

Reviewed by: Lyndsey Pace **Date:** 04-JAN-22

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 2207637**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
564468001	SAMPLE	LXP1	LUCAS1	JAN-04-22 07:57:00	DONE	Lucas Cell	02-MAY-21 00:00
564468002	SAMPLE	LXP1	LUCAS2	JAN-04-22 07:57:00	DONE	Lucas Cell	01-AUG-21 00:00
564468003	SAMPLE	LXP1	LUCAS3	JAN-04-22 07:57:00	DONE	Lucas Cell	01-JAN-22 00:00
564468004	SAMPLE	LXP1	LUCAS4	JAN-04-22 07:57:00	DONE	Lucas Cell	01-FEB-21 00:00
564468005	SAMPLE	LXP1	LUCAS5	JAN-04-22 07:57:00	DONE	Lucas Cell	01-JUN-21 00:01
564468006	SAMPLE	LXP1	LUCAS6	JAN-04-22 07:57:00	DONE	Lucas Cell	01-JUL-21 00:00
564471001	SAMPLE	LXP1	LUCAS7	JAN-04-22 07:57:00	DONE	Lucas Cell	01-NOV-21 00:00
564713001	SAMPLE	LXP1	LUCAS8	JAN-04-22 07:57:00	DONE	Lucas Cell	01-APR-21 00:00
564713002	SAMPLE	LXP1	LUCAS1	JAN-04-22 08:30:00	DONE	Lucas Cell	02-MAY-21 00:00
564713003	SAMPLE	LXP1	LUCAS2	JAN-04-22 08:30:00	DONE	Lucas Cell	01-AUG-21 00:00
564713004	SAMPLE	LXP1	LUCAS3	JAN-04-22 08:30:00	DONE	Lucas Cell	01-JAN-22 00:00
564713005	SAMPLE	LXP1	LUCAS4	JAN-04-22 08:30:00	DONE	Lucas Cell	01-FEB-21 00:00
564713006	SAMPLE	LXP1	LUCAS5	JAN-04-22 08:30:00	DONE	Lucas Cell	01-JUN-21 00:01
1204978128	MB	LXP1	LUCAS6	JAN-04-22 08:30:00	DONE	Lucas Cell	01-JUL-21 00:00
1204978129	DUP	LXP1	LUCAS7	JAN-04-22 08:30:00	DONE	Lucas Cell	01-NOV-21 00:00
1204978130	MS	LXP1	LUCAS8	JAN-04-22 08:30:00	DONE	Lucas Cell	01-APR-21 00:00
1204978131	LCS	LXP1	LUCAS1	JAN-04-22 09:12:00	DONE	Lucas Cell	02-MAY-21 00:00
1204978132	LCSD	LXP1	LUCAS2	JAN-04-22 09:12:00	DONE	Lucas Cell	01-AUG-21 00:00