



# Groundwater Monitoring 2021 Annual Report

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for Compliance with the Michigan Part 115 CCR  
Solid Waste Regulations

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
COI	constituent of interest
COC	constituents of concern
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

# 1.0 Introduction

The U.S. Environmental Protection Agency's (EPA) final Coal Combustion Residuals (CCR) Rule 40 CFR §257 and Michigan's Part 115 Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451 (Part 115), 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, 2021e). 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. In addition, detection monitoring samples were collected in October 2020 and compared against the BTVs as specified under the federal EPA CCR Rule Part §257.94 and assessment monitoring was initiated in November 2020 as specified under Part §257.95.

The State of Michigan adopted legislation requiring that CCR impoundments be permitted under Part 115 Solid Waste Management as of the end of December 2020. The BWL submitted an application for an Operating License under Part 115 within the regulatory deadline. The application was denied due to the impoundments construction not meeting the groundwater isolation distance or liner requirements. Therefore, currently the BWL CCR surface impoundments, Forebay, Retention Basin, and CWP, are not regulated under Part 115; however, because EGLE has stated that they are drafting an Administrative Consent Order, BWL will be continuing to work with EGLE and develop compliance documentation for EGLE as if the impoundments were operating under an operating permit.

BWL implements both the federal and state groundwater monitoring programs concurrently to comply with both the federal CCR Rule and Part 115 solid waste rules. The Part 115 permitting application requirements included approval of a Hydrogeologic Monitoring Plan (HMP) (HDR, 2021a). The HMP was approved by EGLE and describes the monitoring network, sampling and analysis plan, and data validation and statical procedures for the monitoring program to comply with Part 115 solid waste rules.

As documented in the November 23, 2020 *Groundwater Protection Standards and Determination of SSLs per §257.95(g)* developed for the federal CCR Rule compliance program, lithium was observed at statistically significant levels above the site-specific

groundwater protection standard (GPS) developed for the CCR Rule compliance program in two downgradient monitoring wells. The BWL provided EGLE a Response Action Plan prepared in accordance with Part 115 on March 26, 2021 after calculating a potential SSL for lithium at BWL impoundments. That report documented sources of contamination, interim response activities taken to control possible sources of contamination, and a schedule for terminating receipt of waste and initiating closure. BWL also completed the Assessment of Corrective Measures (ACM) report for the Site on November 5, 2021.

The BWL has initiated planning for dewatering and removing CCR material from the impoundments in 2023 as part of impoundment remediation and closure efforts. In 2021 BWL continued implementation of the federal CCR Rule groundwater monitoring program, as required by §257.90-95, as well as the EGLE Part 115 solid waste regulations.

## 1.1 Monitoring Well Network

The CCR Rule requires, at a minimum, one upgradient and three downgradient monitoring wells per CCR unit to be completed in the uppermost aquifer. Section §257.90 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 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."

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. The flow of groundwater under the CCR impoundments is east-northeast.

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 flow of groundwater under the CCR impoundments is east-northeast and remains similar flow direction throughout the year (**Appendix A**), such that waste boundary wells would have to be installed on the embankments to the east of the impoundments to be located at the waste boundary. 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**). Under the State groundwater program, monitoring wells MW-1 and MW-6 serve as upgradient/downgradient wells for the

CWP, MW-4 and MW-2 are the upgradient/downgradient wells for the Retention Basin, and for the Forebay wells MW-3 and MW-5 serve as upgradient/downgradient wells (**Figure 3**).

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 to comply with §257.95(g)(1)(iii) and with the BWL Response Action Plan (RAP) (**Figure 3**). The wells were not installed directly on the eastern property boundary due to wetlands that are seasonally inundated and very thick brush. These four 2021 wells are 2-inch wells constructed with screened intervals in the same shallow, uppermost glacial aquifer as the other network wells.

The well construction details are provided in the *Groundwater Monitoring System Certification* (HDR, 2021e) and the HMP (HDR, 2021a).





Figure 1. Vicinity Map for Erickson Station



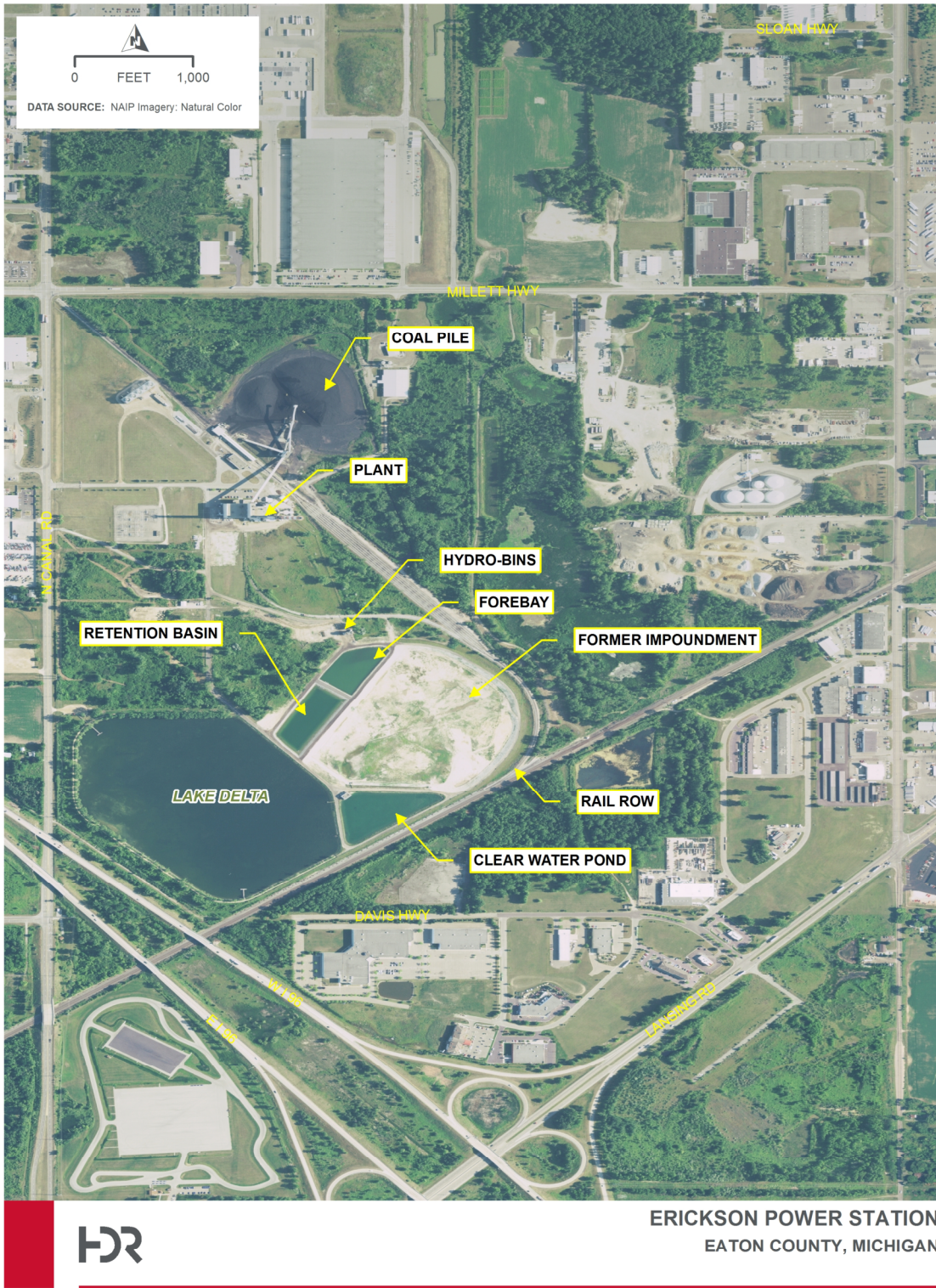


Figure 2. Erickson Station Facility Layout





Figure 3. Erickson Station CCR Units and Monitoring Wells



## 2.0 Monitoring

### 2.1 Frequency

Eight rounds of groundwater sampling for background monitoring was conducted on wells MW-1, MW-2, MW-4, MW-5, and MW-6 between April and October 2020. In accordance with Statute 324.11511a(3), BWL performed the first detection monitoring event October 19, 2020, and analyzed for the COIs in Michigan Statute 324.11511a(3)(c). The downgradient monitoring well data were compared against the BTVs and statistically significant increases (SSIs) were identified at each of the three downgradient wells; therefore, SSIs were identified for each of the three coal ash impoundments. According to Michigan Statute 324.11519b(2), if the detection monitoring confirms an SSI over background at one of the impoundments for one or more of the constituents listed in Section 11511a(3), the owner shall develop an Assessment Monitoring Plan (AMP) and a Response Action Plan (RAP) and conduct assessment monitoring at that impoundment. The AMP (HDR, 2021) was completed on March 19, 2021 and the RAP (HDR, 2021b) on March 26, 2021.

Under the Federal CCR Rule compliance program, the first assessment monitoring event was November 2020, and the second assessment monitoring event was January 2021. Because the Michigan Part 115 solid waste regulations require the first assessment monitoring sample events to fall within 60 days of the AMP submittal, the first assessment monitoring event for the State groundwater compliance program was May 4, 2021. The Part 115 regulations require that the second assessment monitoring event is to occur within 90 days of the obtaining the results from the first assessment monitoring event; therefore, the second assessment monitoring event for the state program was August 2021 (**Table 1**). The Federal compliance sampling events were shifted to start to coincide with the State sample events beginning in May 2021.

**Table 1** provides the well identification number, well location, and the dates the samples were collected. Well MW-3 was not 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 2021.

In June 2021, four new wells were installed (MW-7, MW-8, MW-9, and MW-10). These were installed to delineate the extents of the GPS exceedances. Since installation, samples have been collected on a five-week frequency in order to achieve statistical strength in the sampling data interpretation as quickly as possible. Six sampling events were completed in 2021 on these wells (**Table 1**).



**Table 1. Dates of Groundwater Samples Collected for each Well in 2021 and the Required Monitoring Programs for the Erickson Impoundments**

Monitoring Well I.D.	Well Location	Dates Monitored	CCR Rule Monitoring Purpose
MW-1	Background/Upgradient	January 27, 2021	Second Assessment Monitoring (Federal program)
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-2	Downgradient	January 27, 2021	Second Assessment Monitoring (Federal program)
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-3	Background/Upgradient	May 4, 2021 August 3, 2021	Assessment Monitoring
MW-4	Background/Upgradient	January 27, 2021	Second Assessment Monitoring (Federal program)
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-5	Downgradient	January 27, 2021	Second Assessment Monitoring (Federal program)
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-6	Downgradient	January 27, 2021	Second Assessment Monitoring (Federal program)
		May 4, 2021 August 3, 2021	Assessment Monitoring
MW-7	Downgradient / Perimeter	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 / Perimeter	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 / Perimeter	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 / Perimeter	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 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**. 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

Samples were taken for assessment monitoring and analyzed for the parameters listed in **Table 2**.

**Table 2. Constituents of Interest**

Constituents for Assessment Monitoring	
Boron	Fluoride
Calcium	Iron
Chloride	Lead
Fluoride	Lithium
pH	Mercury
Sulfate	Molybdenum
Total Dissolved Solids (TDS)	Nickel
Antimony	Selenium
Arsenic	Silver
Barium	Thallium
Beryllium	Radium 226 and 228 combined
Cadmium	Vanadium
Chromium	Zinc
Cobalt	<b>Additional Parameters</b>
Copper	Total Suspended Solids (TSS)

## 2.4 Data Validation and Data Management

Data validation and data management tasks were performed per the Hydrogeologic Monitoring Plan (HDR, 2021a). Data validation was conducted to eliminate data that did not meet validation criteria and designate a data qualifier for any data quality limitation discovered.

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. The 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.

**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	
<b>TOC Elevation (ft amsl)</b>	891.53	885.8	884.81	893.07	885.19	885.2	870.74	873.74	872.6	875.65	
<b>Groundwater Elevation (ft amsl)</b>	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 B** and laboratory reports are provided in **Appendix C**. 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, 2021c) 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 SSLs were observed as documented in the November 19, 2020 BWL memorandum, *Determination of Statistically Significant Increases over Background per §257.93(h)(2)* (HDR, 2020).

In accordance with Michigan Statute 324.11519b(2), downgradient well concentrations from each assessment monitoring event were compared against background values, and some concentrations were found to be above background values. In accordance with Michigan Rule R 299.4441, detected COI concentrations in downgradient wells were compared against GPS and were found to exceed GPS. The following wells had concentrations of one or more COIs that exceeded GPS during the 2021 assessment monitoring sampling events: MW-1, MW-2, MW-5, and MW-6. Therefore, in accordance with Michigan Rule R 299.4441, downgradient well concentrations were statistically evaluated to determine if one or more constituents are detected at SSLs above the GPS. To determine if an exceedance of a GPS was statistically significant, the 95% lower confidence limit (95 LCL) was calculated for each of the downgradient wells for each of the COIs. The data set used to calculate the LCL included all sampling results collected at the wells since the establishment of the groundwater monitoring system. The monitoring wells had at least 11 sample events that were used to calculate the LCL. The GPS values for the State compliance groundwater program are presented in the HMP (HDR, 2021a), approved by EGLE.

In January 2021, annual assessment monitoring samples were collected, and samples were analyzed for the COIs in **Table 2**. Sampling data from the January 2021 assessment monitoring event shows GPS exceedances at the following wells for one or more COIs: MW-1, MW-2, MW-5, and MW-6. The LCL values that exceeded GPS are provided in **Table 4**. Downgradient wells MW-2 and MW-5 had SSLs of boron, calcium, lithium, sulfate, and TDS over the GPS. Well MW-6 had SSLs of boron and lithium over the GPS.

In May 2021, annual assessment monitoring samples were collected from the certified monitoring well network and samples were analyzed for the COIs in **Table 2**. Sampling data from the May 2021 assessment monitoring event shows GPS exceedances at the following wells for one or more COIs: MW-2, MW-3, MW-5, and MW-6. LCL results that exceeded GPS are provided in **Table 4**. Downgradient wells MW-2 and MW-5 had SSLs of boron, calcium, lithium, sulfate, and TDS over the GPS. Well MW-6 had SSLs of boron and lithium over the GPS.



In August 2021, annual assessment monitoring samples were collected from the certified monitoring well network and samples were analyzed for the COIs in **Table 2**. Sampling data from the August 2021 assessment monitoring event shows GPS exceedances at the following wells for one or more COIs: MW-2, MW-3, MW-5, and MW-6. LCL results that exceeded GPS are provided in **Table 4**. Downgradient wells MW-2 and MW-5 had SSLs of boron, calcium, lithium, sulfate, and TDS over the GPS. Well MW-6 had SSLs of boron and lithium over the GPS.

**Table 4. LCLs for detected Appendix IV Constituents for Erickson Surface Impoundment Wells Exceeding GPS**

State GPS	Boron			Calcium			Lithium			Sulfate			Total Dissolved Solids		
	0.50 mg/l			170 mg/l			0.040 mg/l			250 mg/l			794 mg/l		
Well ID	Jan	May	Aug	Jan	May	Aug	Jan	May	Aug	Jan	May	Aug	Jan	May	Aug
MW-2 <sup>1</sup>	4.36	4.43	4.61	260	259	253	0.0558	0.0564	0.0565	465	472	473	1280	1280	1270
MW-5 <sup>1</sup>	4.67	4.49	4.52	260	254	251	0.0596	0.0608	0.062	733	713	713	1470	1430	1430
MW-6 <sup>1</sup>	0.698	0.692	0.699	--	--	--	0.0424	0.0430	0.0433	--	--	--	--	--	--

<sup>1</sup>95% Adjusted Gamma LCL

"--" Denotes the LCL did not exceed GPS

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 had SSLs, calculated after the four sample events (through September 2021), of boron, lithium, and molybdenum over the GPS.

Water quality data collected at MW-1 shows a potential impact from the CWP. The potential impact is observed when comparing historical sampling data from MW-1 to background well MW-4. Sample results show MW-1 is consistently higher than MW-4 in concentrations of calcium, 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.

## 4.0 Remedy Selection Progress Update

This section provides 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) of the Federal compliance program. Based on well locations with SSLs of constituents of concern (COCs), it was determined that modeling groundwater flow then COIs would be appropriate to aid in the selection of corrective measures.

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, 2021d). 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 available site-specific data is included.

Water quality sampling and initial 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 initial 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 wells serve as downgradient wells monitoring as close to the BWL property boundary and delineate the extent of the GPS exceedances. These new wells were sampled at a five-week frequency from June through December, for a total of six sample events.
- 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 and MW-5 for boron, calcium, lithium, sulfate, and TDS. Well MW-6 had SSLs of boron and lithium over the GPS.
- SSLs of boron, lithium, and molybdenum over GPS were observed at MW-7 after four sampling events in 2021 (through September 2021).
- Model calibration is complete, and recalibration will be carried out, if necessary, after new are installed and sampled in February 2022.
- The initial 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. The wells will include a well to potentially replace MW-1 as the background monitoring well for the CWP and a well to act as an upgradient well for the Forebay, while MW-3 may potentially transition to a downgradient well. In addition, a well will be installed northeast of MW-5 near the BWL property boundary to assess the northern-most plume extents, and 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

HDR, 2019. Hydrogeologic Characterization Report. October 4, 2019.

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

HDR, 2020. Determination of Statistically Significant Increases over Background. November 23, 2020.

HDR, 2021. Assessment Monitoring Plan (AMP). March 26, 2021.

HDR, 2021a. Hydrogeologic Monitoring Plan (HMP). March 26, 2021.

HDR, 2021b. Response Action Plan (RAP). March 26, 2021.

HDR, 2021c. Background Water Quality Statistical Certification. November 5, 2021.

HDR, 2021d. Conceptual Site Model and Assessment of Corrective Measures. November 5, 2021





HDR, 2021e. Groundwater Monitoring System Certification, Erickson Station. November 5, 2021.

## **Appendix A**

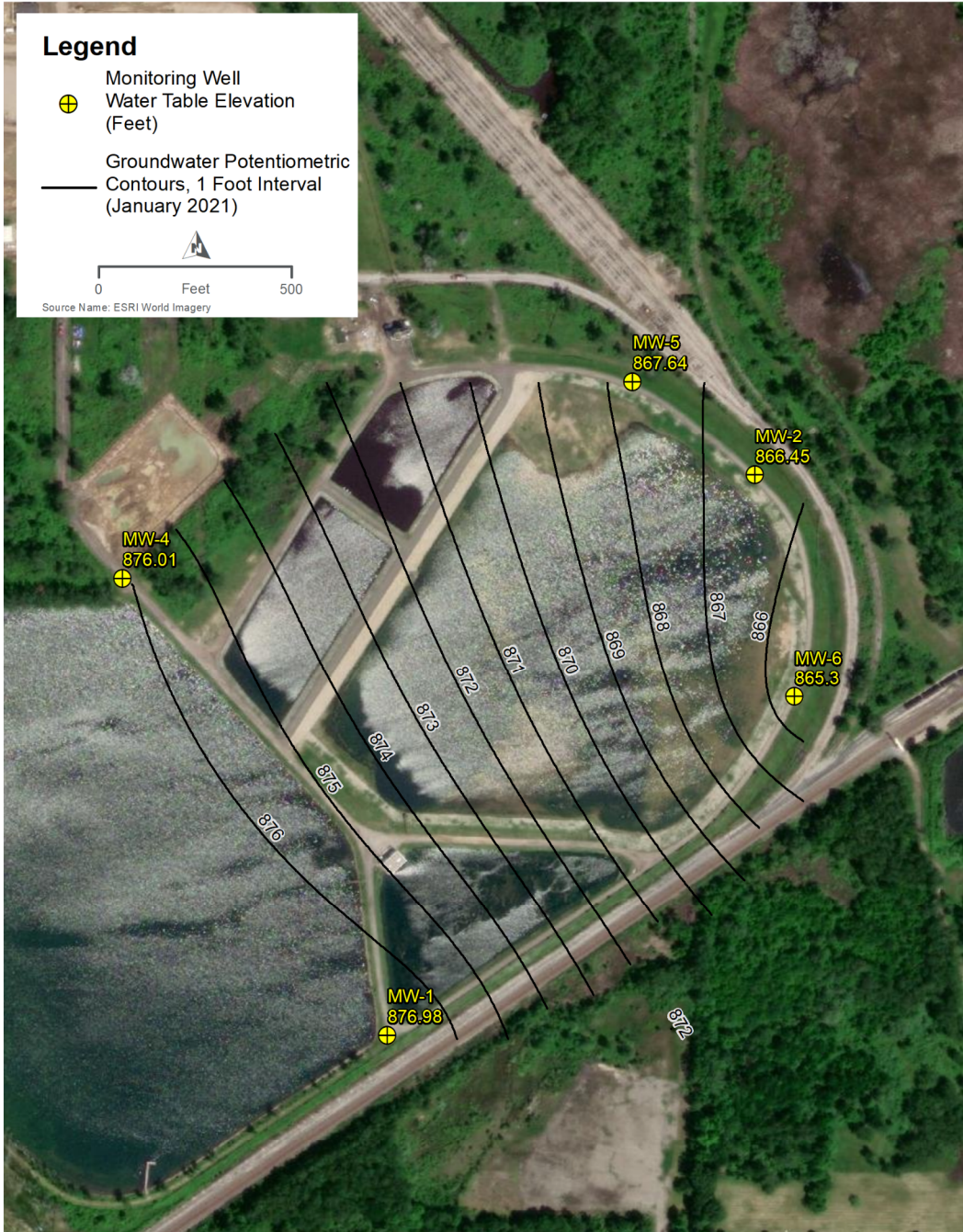
### **Potentiometric Surface Maps**

### Legend

- Monitoring Well
- Water Table Elevation (Feet)
- Groundwater Potentiometric Contours, 1 Foot Interval (January 2021)

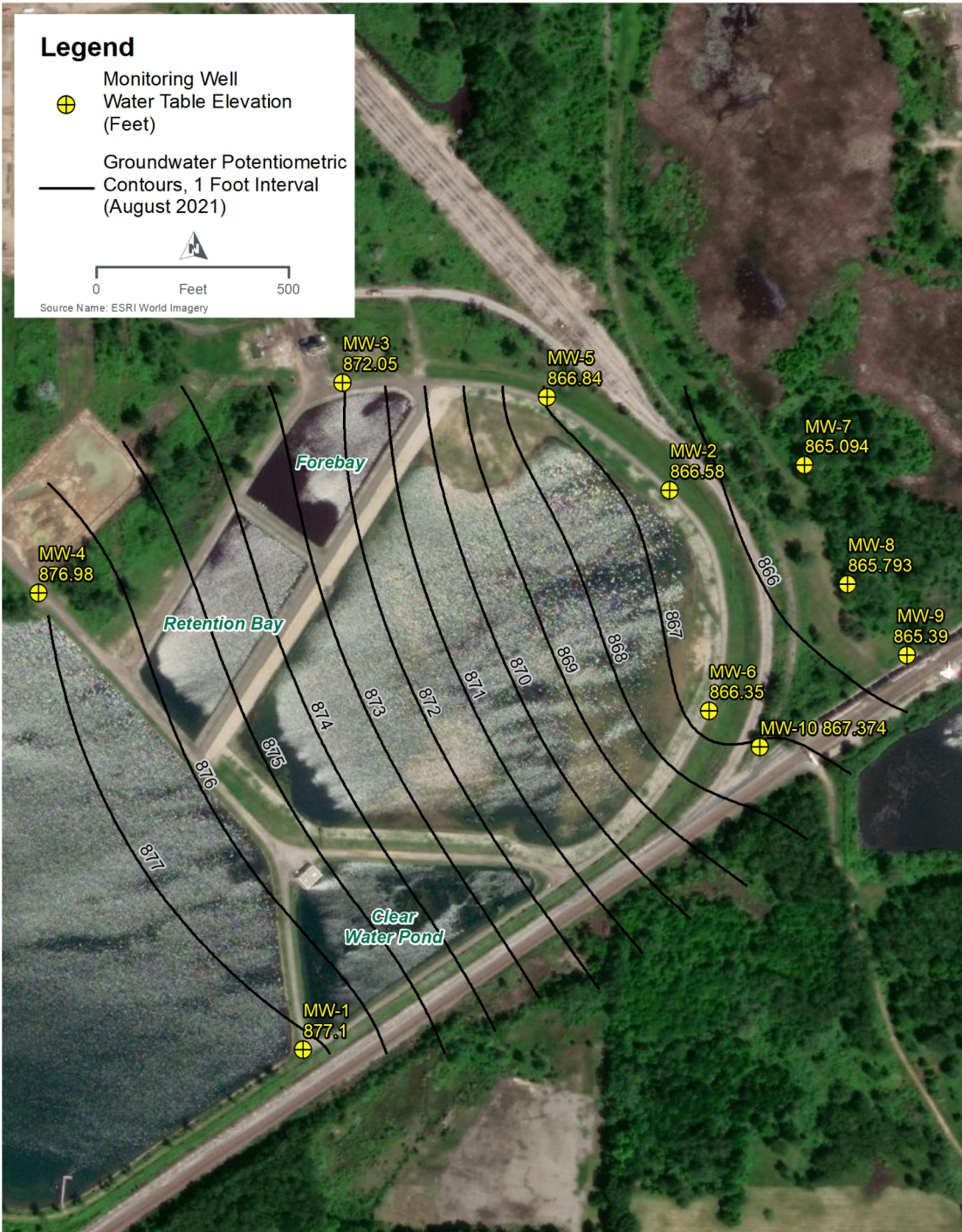


Source Name: ESRI World Imagery



ERICKSON POWER STATION  
EATON COUNTY, MICHIGAN





**ERICKSON POWER STATION**  
 EATON COUNTY, MICHIGAN

## **Appendix B**

### **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	State Program GPS	Background Monitoring										Initial A.M.	Assessment Monitoring			
														Field Dup			
<b>Field Parameters</b>																	
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	1.185	
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	
<b>Part 115</b>																	
Copper	mg/L	1.00	<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	
Iron	mg/L	8.04	5.05	5.26	<b>8.44</b>	6.09	6.32	<b>8.04</b>	5.98	6.02	6.14	6.15	7.12	5.45	4.84	6.61	
Nickel	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	
Silver	mg/L	0.098	<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	
Vanadium	mg/L	0.062	<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	
Zinc	mg/L	5	<0.005	0.036	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
<b>Appendix III</b>																	
Boron	mg/L	0.50	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	170	162	<b>180</b>	165	156	161	<b>170</b>	153	167	156	150	-	<b>173</b>	156	153	
Chloride	mg/L	250	74	52	70	64	65	59	61	59	52	53	-	44	48	46	
Fluoride	mg/L	2.0	<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	250	38	69	59	75	75	77	80	81	84	85	-	78	65	57	
Total Dissolved Solids	mg/L	794	728	<b>794</b>	774	782	776	768	<b>796</b>	774	<b>806</b>	784	-	776	760	748	
<b>Appendix IV</b>																	
Antimony	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	<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	0.15	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	0.004	<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	0.005	<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	0.100	<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	0.006	<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	
Fluoride	mg/L	2.00	<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	0.004	<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	0.040	0.036	0.023	0.032	0.033	0.034	0.039	<b>0.041</b>	0.037	0.036	0.036	0.034	0.019	0.015	0.016	
Mercury	mg/L	0.002	<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	0.100	<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	5.00	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	0.050	<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	
Total Suspended Solids	mg/L	-	31	45	43	37	48	55	19	20	31	32	19	14	14	11	

**BOLD** values denote GPS exceedances

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	State Program GPS	Background Monitoring									Initial A.M.	Assessment Monitoring		
			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
<b>Field Parameters</b>															
pH	su		6.77	6.54	6.69	6.75	6.80	6.83	6.70	6.72	7.08	6.83	6.76	6.70	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	1.700	1.655
Turbidity	NTU		72.31	8.27	8.95	9.42	5.95	4.15	7.11	9.56	6.28	11.27	10.15	10.00	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	12.0	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
<b>Part 115</b>															
Copper	mg/L	1.00	<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
Iron	mg/L	8.04	0.91	0.67	0.48	0.44	0.62	0.51	0.51	0.67	0.63	0.54	0.49	0.55	0.66
Nickel	mg/L	0.1	0.018	0.019	0.022	0.024	0.026	0.027	0.027	0.028	0.027	0.027	0.026	0.025	0.025
Silver	mg/L	0.098	<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
Vanadium	mg/L	0.062	<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
Zinc	mg/L	5	<0.005	0.041	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Appendix III</b>															
Boron	mg/L	0.50	<b>3.56</b>	<b>3.38</b>	<b>4.05</b>	<b>4.61</b>	<b>5.19</b>	<b>5.97</b>	<b>5.94</b>	<b>5.97</b>	<b>5.97</b>	-	<b>5.8</b>	<b>5.04</b>	<b>6.17</b>
Calcium	mg/L	170	<b>251</b>	<b>256</b>	<b>268</b>	<b>271</b>	<b>272</b>	<b>270</b>	<b>265</b>	<b>270</b>	<b>270</b>	-	<b>260</b>	<b>254</b>	<b>226</b>
Chloride	mg/L	250	67	68	75	81	85	88	84	88	88	-	94	77	79
Fluoride	mg/L	2.0	<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	250	<b>386</b>	<b>386</b>	<b>484</b>	<b>549</b>	<b>580</b>	<b>560</b>	<b>586</b>	<b>560</b>	<b>560</b>	-	<b>506</b>	<b>505</b>	<b>504</b>
Total Dissolved Solids	mg/L	794	<b>1170</b>	<b>1180</b>	<b>1300</b>	<b>1390</b>	<b>1430</b>	<b>1390</b>	<b>1420</b>	<b>1390</b>	<b>1390</b>	-	<b>1320</b>	<b>1250</b>	<b>1300</b>
<b>Appendix IV</b>															
Antimony	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	<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	0.004	<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	0.005	<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	0.100	<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	0.006	<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
Fluoride	mg/L	2.00	<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	0.004	<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	0.040	<b>0.055</b>	<b>0.047</b>	<b>0.055</b>	<b>0.053</b>	<b>0.057</b>	<b>0.066</b>	<b>0.066</b>	<b>0.065</b>	<b>0.07</b>	<b>0.063</b>	<b>0.067</b>	<b>0.061</b>	<b>0.058</b>
Mercury	mg/L	0.002	<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	0.100	0.01	0.008	0.01	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	5.00	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	0.050	<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	-	<3	1	<3	<3	14	<3	2	6	3	10	10	12	10

**BOLD** values denote GPS exceedances

		Sample Location:	MW-3	
		Sample Type:	Upgradient	
		Sample Date:	5/4/2021	8/3/2021
Constituent	Unit	State Program GPS	Background Monitoring	
<b>Field Parameters</b>				
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
<b>Part 115</b>				
Copper	mg/L	1.00	<0.005	<0.005
Iron	mg/L	8.04	2.01	2.05
Nickel	mg/L	0.1	<0.005	<0.005
Silver	mg/L	0.098	<0.0005	<0.0005
Vanadium	mg/L	0.062	<0.005	<0.005
Zinc	mg/L	5	<0.005	<0.005
<b>Appendix III</b>				
Boron	mg/L	0.50	<b>5.41</b>	<b>6.16</b>
Calcium	mg/L	170	<b>243</b>	<b>223</b>
Chloride	mg/L	250	89	92
Fluoride	mg/L	2.0	<1.0	<1.0
Sulfate	mg/L	250	<b>698</b>	<b>727</b>
Total Dissolved Solids	mg/L	794	<b>1490</b>	<b>1500</b>
<b>Appendix IV</b>				
Antimony	mg/L	0.006	<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	0.004	<0.001	<0.001
Cadmium	mg/L	0.005	<0.0005	<0.0005
Chromium	mg/L	0.100	<0.005	<0.005
Cobalt	mg/L	0.006	<0.005	<0.005
Fluoride	mg/L	2.00	<1.0	<1.0
Lead	mg/L	0.004	<0.003	<0.003
Lithium	mg/L	0.040	<b>0.077</b>	<b>0.086</b>
Mercury	mg/L	0.002	<0.0002	<0.0002
Molybdenum	mg/L	0.100	<b>0.162</b>	<b>0.153</b>
Radium-226	pCi/L	-	0.437	0.152
Radium-228	pCi/L	-	0.76	0.963
Radium-226/228	pCi/L	5.00	1.2	1.11
Selenium	mg/L	0.050	<0.005	<0.005
Thallium	mg/L	0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	3	1

**BOLD** values denote GPS exceedances





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	State Program GPS	Background Monitoring									Initial A.M.	Assessment Monitoring		
<b>Field Parameters</b>															
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
<b>Part 115</b>															
Copper	mg/L	1.00	0.009	<0.005	<0.005	0.026	0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	8.04	8.00	1.93	0.39	0.27	2.45	0.21	0.18	1.74	0.18	<0.02	0.63	0.9	1.12
Nickel	mg/L	0.1	0.019	0.016	0.013	0.011	0.013	0.011	0.016	0.018	0.014	0.007	0.01	0.01	0.01
Silver	mg/L	0.098	<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
Vanadium	mg/L	0.062	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	5	0.023	0.033	0.026	0.007	0.011	<0.005	0.006	0.014	<0.005	<0.005	0.098	<0.005	0.005
<b>Appendix III</b>															
Boron	mg/L	0.50	<b>4.99</b>	<b>5.19</b>	<b>4.59</b>	<b>4.57</b>	<b>4.48</b>	<b>5</b>	<b>5.09</b>	<b>5</b>	<b>5.75</b>	-	<b>4.61</b>	<b>3.66</b>	<b>4.82</b>
Calcium	mg/L	170	<b>245</b>	<b>320</b>	<b>289</b>	<b>251</b>	<b>266</b>	<b>266</b>	<b>283</b>	<b>372</b>	<b>319</b>	-	<b>245</b>	<b>221</b>	<b>229</b>
Chloride	mg/L	250	68	82	75	80	76	77	78	81	83	-	66	73	66
Fluoride	mg/L	2.0	<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	250	<b>591</b>	<b>930</b>	<b>931</b>	<b>877</b>	<b>714</b>	<b>791</b>	<b>873</b>	<b>1,080</b>	<b>1,170</b>	-	<b>578</b>	<b>581</b>	<b>700</b>
Total Dissolved Solids	mg/L	794	<b>1280</b>	<b>1770</b>	<b>1720</b>	<b>1640</b>	<b>1520</b>	<b>1540</b>	<b>1660</b>	<b>1960</b>	<b>2020</b>	-	<b>1220</b>	<b>1230</b>	<b>1390</b>
<b>Appendix IV</b>															
Antimony	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	<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	0.004	<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	0.005	<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	0.100	0.01	<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	0.006	<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	2.00	<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	0.004	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	0.040	<b>0.091</b>	<b>0.051</b>	<b>0.061</b>	<b>0.074</b>	<b>0.085</b>	<b>0.091</b>	<b>0.07</b>	<b>0.054</b>	<b>0.046</b>	<b>0.057</b>	<b>0.08</b>	<b>0.073</b>	<b>0.078</b>
Mercury	mg/L	0.002	<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	0.100	0.096	0.051	0.05	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	5.00	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	0.050	<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	-	161	21	23	37	20	61	6	14	7	4	7	8	4

**BOLD** values denote GPS exceedances

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	State Program GPS	Background Monitoring									Initial A.M.	Assessment Monitoring		
<b>Field Parameters</b>															
pH	su		6.64	6.35	6.68	6.76	6.80	6.85	6.69	6.71	7.11	6.76	6.72	7.00	6.51
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
<b>Part 115</b>															
Copper	mg/L	1.00	<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
Iron	mg/L	8.04	0.08	0.20	0.07	0.05	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02
Nickel	mg/L	0.1	0.005	<0.005	0.007	0.007	0.008	0.007	0.008	0.007	0.007	0.007	0.006	0.006	0.007
Silver	mg/L	0.098	<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
Vanadium	mg/L	0.062	<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
Zinc	mg/L	5	<0.005	0.034	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Appendix III</b>															
Boron	mg/L	0.50	<b>0.56</b>	<b>0.49</b>	<b>0.65</b>	<b>0.75</b>	<b>0.86</b>	<b>1.05</b>	<b>0.97</b>	<b>0.99</b>	<b>1.09</b>	-	<b>0.91</b>	<b>0.64</b>	<b>0.76</b>
Calcium	mg/L	170	142	143	154	161	<b>170</b>	<b>192</b>	<b>175</b>	<b>189</b>	<b>173</b>	-	<b>191</b>	149	146
Chloride	mg/L	250	26	24	29	33	37	43	39	41	42	-	38	27	27
Fluoride	mg/L	2.0	<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	250	135	123	154	183	222	264	214	242	263	-	198	133	139
Total Dissolved Solids	mg/L	794	642	598	706	738	<b>820</b>	<b>880</b>	<b>822</b>	<b>868</b>	<b>898</b>	-	<b>798</b>	658	692
<b>Appendix IV</b>															
Antimony	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	<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	0.05	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	0.004	<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	0.005	<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	0.100	<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	0.006	<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
Fluoride	mg/L	2.00	<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	0.004	<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	0.040	0.037	0.038	0.037	<b>0.041</b>	<b>0.044</b>	<b>0.055</b>	<b>0.053</b>	<b>0.052</b>	<b>0.059</b>	<b>0.058</b>	<b>0.048</b>	<b>0.048</b>	<b>0.047</b>
Mercury	mg/L	0.002	<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	0.100	0.021	0.021	0.026	0.025	0.03	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	5.00	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	0.050	<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	-	<3	6	<3	<3	<3	<3	<3	<3	1	<3	<3	<3	2

**BOLD** values denote GPS exceedances

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	State Program GPS	Background Monitoring					
<b>Field Parameters</b>								
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
<b>Part 115</b>								
Copper	mg/L	1.00	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	8.04	1.34	1.25	1.31	1.37	1.49	1.50
Nickel	mg/L	0.1	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.098	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	5	< 0.005	0.007	0.014	<0.005	<0.005	<0.005
<b>Appendix III</b>								
Boron	mg/L	0.50	<b>1.88</b>	<b>1.78</b>	<b>1.89</b>	<b>1.81</b>	<b>2.12</b>	<b>2.19</b>
Calcium	mg/L	170	110	111	112	108	122	126
Chloride	mg/L	250	73	74	74	75	73	72.2
Fluoride	mg/L	2.0	< 1.0	<1.0	<1.0	<1.0	<1.0	0.338
Sulfate	mg/L	250	189	181	184	191	212	203
Total Dissolved Solids	mg/L	794	586	574	592	588	622	634
<b>Appendix IV</b>								
Antimony	mg/L	0.006	< 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	0.004	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.100	<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
Fluoride	mg/L	2.00	< 1.0	<1.0	<1.0	<1.0	<1.0	0.338
Lead	mg/L	0.004	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.040	<b>0.089</b>	<b>0.096</b>	<b>0.093</b>	<b>0.097</b>	<b>0.100</b>	<b>0.100</b>
Mercury	mg/L	0.002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.100	<b>0.259</b>	<b>0.26</b>	<b>0.292</b>	<b>0.276</b>	<b>0.276</b>	<b>0.293</b>
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	5.00	2.11	4.82	1.3	3.32	0.781	2.82
Selenium	mg/L	0.050	< 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
Total Suspended Solids	mg/L	-	< 3	<3	<3	<3	<3	<3

**BOLD** values denote GPS exceedances

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	State Program GPS	Background Monitoring					
<b>Field Parameters</b>								
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
<b>Part 115</b>								
Copper	mg/L	1.00	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	8.04	< 0.02	<0.02	<0.02	<0.02	<0.02	0.02
Nickel	mg/L	0.1	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.098	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.062	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	5	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Appendix III</b>								
Boron	mg/L	0.50	0.11	0.10	0.08	0.21	0.08	0.05
Calcium	mg/L	170	91.2	94.6	89.8	86.5	93.0	98.5
Chloride	mg/L	250	11	17	10	59	8	4.45
Fluoride	mg/L	2.0	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0587
Sulfate	mg/L	250	25	35	17	48	16	13.8
Total Dissolved Solids	mg/L	794	392	384	362	414	368	370
<b>Appendix IV</b>								
Antimony	mg/L	0.006	< 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	0.004	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.100	<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
Fluoride	mg/L	2.00	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0587
Lead	mg/L	0.004	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.040	< 0.010	<0.005	<0.005	0.013	0.009	0.006
Mercury	mg/L	0.002	< 0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.100	< 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	5.00	0.683	0.389	0.551	0.697	1.93	2.28
Selenium	mg/L	0.050	< 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
Total Suspended Solids	mg/L	-	< 3	<3	<3	<3	<3	2

**BOLD** values denote GPS exceedances

		Sample Location:	MW-9											
		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	State Program 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
<b>Part 115</b>														
Copper	mg/L	1.00	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	8.04	< 0.02	< 0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	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
Silver	mg/L	0.098	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.062	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	5	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005
<b>Appendix III</b>														
Boron	mg/L	0.50	< 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	170	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	250	< 5	< 5	<5	<5	<5	<5	<5	<5	<5	<5	1.11	1.07
Fluoride	mg/L	2.0	< 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	250	< 5	< 5	<5	<5	<5	<5	<5	<5	<5	<5	3.58	3.52
Total Dissolved Solids	mg/L	794	232	240	242	232	242	256	246	244	252	268	244	246
<b>Appendix IV</b>														
Antimony	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
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	0.004	< 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	0.005	< 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	0.100	< 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	2.00	< 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	0.004	< 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	0.040	<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	0.002	< 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	0.100	< 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	5.00	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	0.050	< 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	< 3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

**BOLD** values denote GPS exceedances

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	State Program GPS	Background Monitoring					
<b>Field Parameters</b>								
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	240.0	330.1	164.1	230.9	147.9
<b>Part 115</b>								
Copper	mg/L	1.00	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	8.04	< 0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/L	0.1	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.098	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.062	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	5	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Appendix III</b>								
Boron	mg/L	0.50	0.05	0.05	0.06	0.05	0.07	0.05
Calcium	mg/L	170	132	128	129	113	137	128
Chloride	mg/L	250	< 5	<5	<5	<5	<5	1.03
Fluoride	mg/L	2.0	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0660
Sulfate	mg/L	250	12	15	14	9	17	14.5
Total Dissolved Solids	mg/L	794	446	410	432	376	436	428
<b>Appendix IV</b>								
Antimony	mg/L	0.006	< 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	0.004	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.100	< 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
Fluoride	mg/L	2.00	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0660
Lead	mg/L	0.004	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.040	< 0.010	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury	mg/L	0.002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.100	< 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	5.00	0.671	0.262	0.371	0.701	0.605	2.39
Selenium	mg/L	0.050	< 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
Total Suspended Solids	mg/L	-	< 3	<3	<3	<3	<3	<3

**BOLD** values denote GPS exceedances

# **Appendix C**

## **Lab Reports**





**MERIT LABORATORIES, INC.**

2680 EAST LANSING DRIVE  
PHONE: 517-332-0167  
FULL SERVICE ANALYTICAL TESTING

EAST LANSING • MICHIGAN • 48823  
FAX: 517-332-6333  
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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FAX: 517-332-6333  
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

*Inorganics Inventory Sheet - SDG: S21073*

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

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

*Inorganics Inventory Sheet - SDG: S21073*

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



## MERIT LABORATORIES, INC.

2680 EAST LANSING DRIVE  
PHONE: 517-332-0167  
FULL SERVICE ANALYTICAL TESTING

EAST LANSING • MICHIGAN • 48823  
FAX: 517-332-6333  
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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*



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- 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."*

\_\_\_\_\_  
Barb Ball  
QA Officer

03/01/2021  
Date



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 Lavery (johnlavery@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**  
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Glossary of Abbreviations (Page 3)  
Method Summary (Page 4)  
Sample Summary (Page 5)

Maya Murshak  
Technical Director



## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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



# Analytical Laboratory Report

Final Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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





# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	





# Analytical Laboratory Report

Final Report

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

Report Produced by  
Merit Laboratories  
2680 East Lansing Drive  
East Lansing, MI 48823

Phone: 517-702-6372 FAX:

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

Cover Page (Page 1)  
Analysis Summary (Pages 2-8)  
Prep Batch Summary (Pages 9-12)

## 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

## QC Report - Analysis Summary

**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
<b><i>Inorganics</i></b>						
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
<b><i>Metals</i></b>						
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-HG3-21-0129AHGD	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

## QC Report - Analysis Summary

**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
<b><i>Inorganics</i></b>						
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
<b><i>Metals</i></b>						
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-HG3-21-0129AHGD	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

## QC Report - Analysis Summary

**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
<b><i>Inorganics</i></b>						
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
<b><i>Metals</i></b>						
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-HG3-21-0129AHGD	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

## QC Report - Analysis Summary

**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
<b><i>Inorganics</i></b>						
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
<b><i>Metals</i></b>						
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-HG3-21-0129AHGD	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

## QC Report - Analysis Summary

**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
<b><i>Inorganics</i></b>						
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
<b><i>Metals</i></b>						
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-HG3-21-0129AHGD	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



## QC Report - Analysis Summary

**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
<b><i>Inorganics</i></b>						
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
<b><i>Metals</i></b>						
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-HG3-21-0129AHGD	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

## QC Report - Analysis Summary

**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
<b><i>Inorganics</i></b>						
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
<b><i>Metals</i></b>						
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-HG3-21-0129AHGD	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

## QC Report - Prep Batch Summary

### 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

## QC Report - Prep Batch Summary

### 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

## QC Report - Prep Batch Summary

**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

# QC Report - Prep Batch Summary

## 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

Instrument ID: PE NEXION

Analysis Date: 01/29/21

Analyst: CCM

<i>Filename</i>	<i>Run Time</i>	<i>Sample ID</i>	<i>Matrix</i>	<i>QC Type</i>
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

<i>Filename</i>	<i>Run Time</i>	<i>Sample ID</i>	<i>Matrix</i>	<i>QC Type</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

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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

<i>Sample Name</i>	<i>QC Type</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Actual Conc</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Sample Name</i>	<i>QC Type</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Actual Conc</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Sample Name</i>	<i>QC Type</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Raw Conc</i>	<i>Units</i>	<i>Matrix</i>
<b>012 ICB</b>	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		
<b>013 CCB</b>	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		
<b>022 012921_3 LRB</b>	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		
<b>040 CCB2</b>	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

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

<i>Sample Name</i>	<i>QC Type</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Actual Conc</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
<b>018 Solu-AB</b>	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		
<b>019 Solu-AA</b>	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

<i>Spike Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Spike Conc</i>	<i>Sample Conc</i>	<i>Spike Amount</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
<b>014 BS-0.0001</b>		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		
<b>015 BS-0.0005</b>		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		
<b>016 BS-0.001</b>		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		
			<b>017 BS-0.002</b>		1	Li	0.00239	ND		
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		
<b>036 21073.06</b>	<b>035 21073.06s</b>	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

<i>Spike Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Spike Conc</i>	<i>Sample Conc</i>	<i>Spike Amount</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Duplicate Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Dup Conc</i>	<i>Samp Conc</i>	<i>%RPD</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Duplicate Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Dup Conc</i>	<i>Samp Conc</i>	<i>%RPD</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Actual Conc</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Actual Conc</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Duplicate Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Dup Conc</i>	<i>Samp Conc</i>	<i>%D</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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		

# Form 8: Serial Dilutions

Data Set ID: MT4-21-0129B

Instrument ID: PE NEXION

Analysis Date: 01/29/21

Analyst: CCM

<i>Duplicate Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Dup Conc</i>	<i>Samp Conc</i>	<i>%D</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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		

# Form 13: Analysis Run Log

Data Set ID: MT4-21-0129A

Instrument ID: PE NEXION

Analysis Date: 01/29/21

Analyst: CCM

<i>Filename</i>	<i>Run Time</i>	<i>Matrix</i>	<i>Analytes</i>
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

<i>Filename</i>	<i>Run Time</i>	<i>Matrix</i>	<i>Analytes</i>
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

### Optimization Summary

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

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

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

### Orch Alignment - [Passed]

Vertical	Horizontal	Intensity
0.45 mm	0.09 mm	59501.66

nebulizer 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

Mass 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

### QID 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

Element	Count	non-ICB/CCB/ICV/CCV		ICB/CCB/ICV/CCV		Flags
		LCL-UCL	Accept.Range	LCL-UCL	Accept.Range	
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	CP	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

Element	Count	non-ICB/CCB/ICV/CCV		ICB/CCB/ICV/CCV		Flags
		LCL-UCL	Accept.Range	LCL-UCL	Accept.Range	
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	CP	Page 72 of 207

## 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**

		<b>Prep Batch</b>	<b>Run Batch</b>
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.**

# Metals Quantitation Summary Report

Sequence #: 001

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 10:54:20 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Blank

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 002

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 10:55:43 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Std-0.0

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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



# Metals Quantitation Summary Report

Sequence #: 003

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 10:57:06 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Std-0.0001

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 004

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 10:58:29 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Std-0.0005

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 005

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 10:59:52 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Std-0.005

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 006

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:01:14 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Std-0.02

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 007

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:02:37 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Std-0.05

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 008

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:03:58 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Std-0.2

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 009

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:05:19 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: ICV-0.1

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments: Spex-std made 01/20/

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 010

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:06:42 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name:CCV-0.1

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments: IV-std made 01/20/21

Int Correct:

Dilution: 1

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



# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

Sequence #: 013

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:10:52 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: CCB

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 014

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:13:31 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: BS-0.0001

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 015

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:15:05 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: BS-0.0005

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 016

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:16:28 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: BS-0.001

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 017

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:18:28 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: BS-0.002

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 018

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:19:59 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Solu-AB

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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



# Metals Quantitation Summary Report

Sequence #: 019

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:21:22 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: Solu-AA

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 020

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:24:31 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 012921\_3 LCS-0.05

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 022

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:27:18 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 012921\_3 LRB

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 023

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:29:20 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.07s

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 2

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

# Metals Quantitation Summary Report

Sequence #: 024

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:31:20 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.01 dil

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 25

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

# Metals Quantitation Summary Report

Sequence #: 025

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:32:41 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.01s

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 5

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

# Metals Quantitation Summary Report

Sequence #: 027

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:35:38 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.02s

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 5

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

# Metals Quantitation Summary Report

Sequence #: 029

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:39:49 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.03s

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 5

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



# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

Sequence #: 033

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:46:50 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.05s

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 5

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

Sequence #: 036

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:51:54 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.06 MS-0.05

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 5

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

# Metals Quantitation Summary Report

Sequence #: 037

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:53:15 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: 21073.06 MSD-0.05

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 5

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

# Metals Quantitation Summary Report

Sequence #: 038

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:54:47 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: CCV2-0.1

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments: IV-std made 01/20/21

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

Sequence #: 040

Operator:

Method: 13-Sb-As-Ba-Be-B-Cd-Cr-Co-Li-P

Acq Mode: Data Acquisition

Acq Time: 11:57:38 Fri 29-Jan-21

Cal Title: 21-0129A.cal

Sample Name: CCB2

Cal Type: External Calibration

Sample Type: Sample

Last Calib: mtd-012921-3

Matrix: Liquid

Bkg File:

Comments:

Int Correct:

Dilution: 1

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

# Metals Quantitation Summary Report

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



# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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



# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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



# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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



# Metals Quantitation Summary Report

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

# Metals Quantitation Summary Report

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 $\pm$ 2% of nominal value Precision: RSD $\leq$ 1% of nominal value	3	1			Bias: Mean $\pm$ 2% of nominal value Precision: RSD $\leq$ 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 # 2026305

3) HNO<sub>3</sub> Lot # 258255

4) Centrifuge Tube Lot # 200413-010

5) Balance ID: MI

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

<i>Filename</i>	<i>Run Time</i>	<i>Sample ID</i>	<i>Matrix</i>	<i>QC Type</i>
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

<i>Filename</i>	<i>Run Time</i>	<i>Sample ID</i>	<i>Matrix</i>	<i>QC Type</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

<i>CAS #</i>	<i>Analyte</i>	<i>Result</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Dilute</i>	<i>Run Date</i>	<i>Notes</i>
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

Instrument ID: HG QuickTrace

Analysis Date: 01/29/21

Analyst: JRH

## Note/Qualifier Key

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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

<i>Sample Name</i>	<i>QC Type</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Actual Conc</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Sample Name</i>	<i>QC Type</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Raw Conc</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Spike Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Spike Conc</i>	<i>Sample Conc</i>	<i>Spike Amount</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Duplicate Name</i>	<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Dup Conc</i>	<i>Samp Conc</i>	<i>%RPD</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Sample Name</i>	<i>Dilute</i>	<i>Element</i>	<i>Sample Conc</i>	<i>Actual Conc</i>	<i>%Rec</i>	<i>LCL/UCL</i>	<i>Units</i>	<i>Matrix</i>
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

<i>Filename</i>	<i>Run Time</i>	<i>Matrix</i>	<i>Analytes</i>
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

<i>Filename</i>	<i>Run Time</i>	<i>Matrix</i>	<i>Analytes</i>
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

# Mercury Summary Report

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                      End  
 block #1 95 °C    block #1 95 °C ID # H3ISS05  
 block #2       °C    block #2       °C ID #  
 block #3       °C    block #3       °C ID #

DATE 1/29/21  
 ANALYST [Signature]  
 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	-----		-----	-----		25g	
21073.01							
02							
03							
04							
05							
06							
06 MS							
06 MSD							
07							
20934.04		0.533			47		top
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		
<del>21044.01</del>		<del>25</del>					
21091.01	12	25			1		
02	7	25			1		
21097.02		12.5			2		

OMIT

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<sub>3</sub> Lot # 258255  
 H<sub>2</sub>SO<sub>4</sub> 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	

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 13187M	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
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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 -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal4	12/3/2020 10:16:46 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal5	12/3/2020 10:26:48 AM -0		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	
	BSpoke 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 13187M	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 -0		1.0000	50.0000	1.0000		Jeff Phifer	
	21073.04	1/29/2021 10:17:24 AM -0		1.0000	50.0000	1.0000		Jeff Phifer	
	BSpoke 11785BS1	1/29/2021 10:27:28 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	Blank	1/29/2021 10:37:31 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	

ECD_1	Name	Inject Time	Lock Status	Weight	Dilution	IntStd	Replicate ID	Comment	ECD_1
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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 13187M	0	
21073.02	0	
21073.04	0	
BSpike 11785BS1	0	
Blank	0	



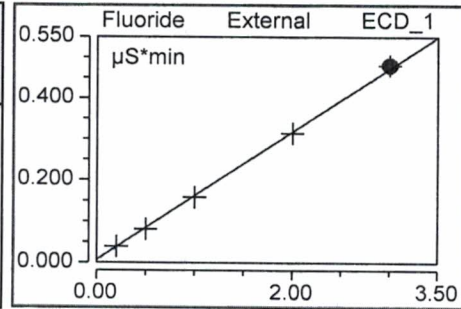
Name	Re-injections	Spike Group
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**Calibration Batch Report**  
**CAL ID# ICSA120320CAL**

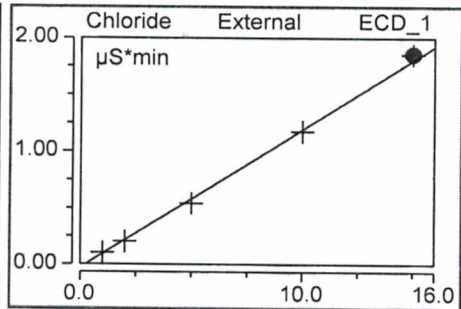
Sequence:	012921	Injection Volume:	5,000.00
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	03-Dec-2020 / 10:26	Column:	AS4A-SC 038777

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
<b>AVERAGE:</b>				-0.0045	0.1482	0.0000	99.8975

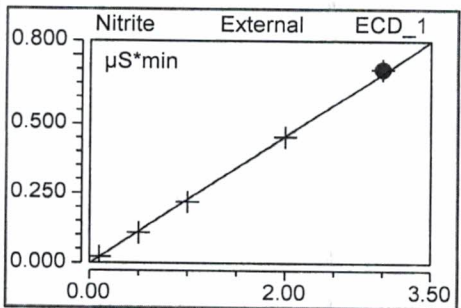
Injection Name	Ret.Time min	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
1132Cal1	1.110	0.0393	0.542	0.211
1132Cal2	1.110	0.0813	1.238	0.481
1132Cal3	1.110	0.1585	2.515	0.978
1132Cal4	1.110	0.3139	5.172	1.978
1132Cal5	1.107	0.4807	7.992	3.052
<b>Average</b>	1.110			
<b>Rel. Std. Dev.</b>	0.136 %			



Injection Name	Ret.Time min	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
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
<b>Average</b>	1.628			
<b>Rel. Std. Dev.</b>	0.392 %			

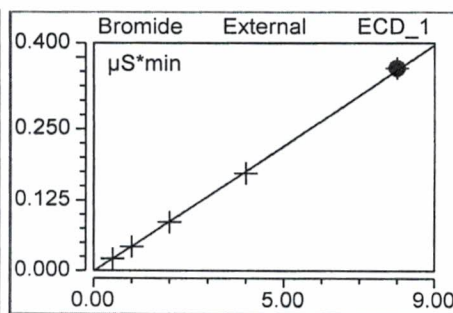


Injection Name	Ret.Time min	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
1132Cal1	1.904	0.0218	0.300	0.106
1132Cal2	1.904	0.1075	1.532	0.480
1132Cal3	1.904	0.2176	3.154	0.961
1132Cal4	1.907	0.4531	6.640	1.988
1132Cal5	1.910	0.6997	10.351	3.064
<b>Average</b>	1.906			
<b>Rel. Std. Dev.</b>	0.155 %			

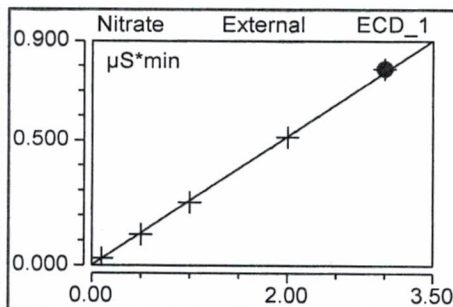




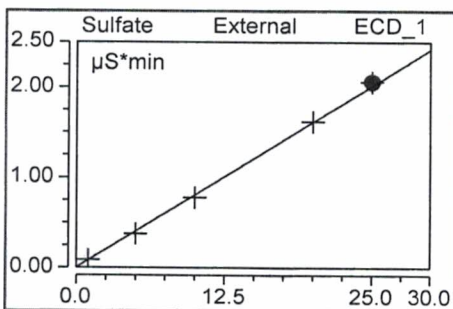
Injection Name	Ret. Time min ECD 1	Area $\mu\text{S} \cdot \text{min}$ ECD 1	Height $\mu\text{S}$ ECD 1	Amount ECD 1
1132Cal1	2.784	0.0213	0.253	0.511
1132Cal2	2.774	0.0428	0.502	0.997
1132Cal3	2.777	0.0860	0.996	1.976
1132Cal4	2.780	0.1724	2.034	3.932
1132Cal5	2.777	0.3559	4.227	8.085
<b>Average</b>	2.778			
<b>Rel. Std. Dev.</b>	0.139 %			



Injection Name	Ret. Time min ECD 1	Area $\mu\text{S} \cdot \text{min}$ ECD 1	Height $\mu\text{S}$ ECD 1	Amount ECD 1
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
<b>Average</b>	3.123			
<b>Rel. Std. Dev.</b>	0.382 %			

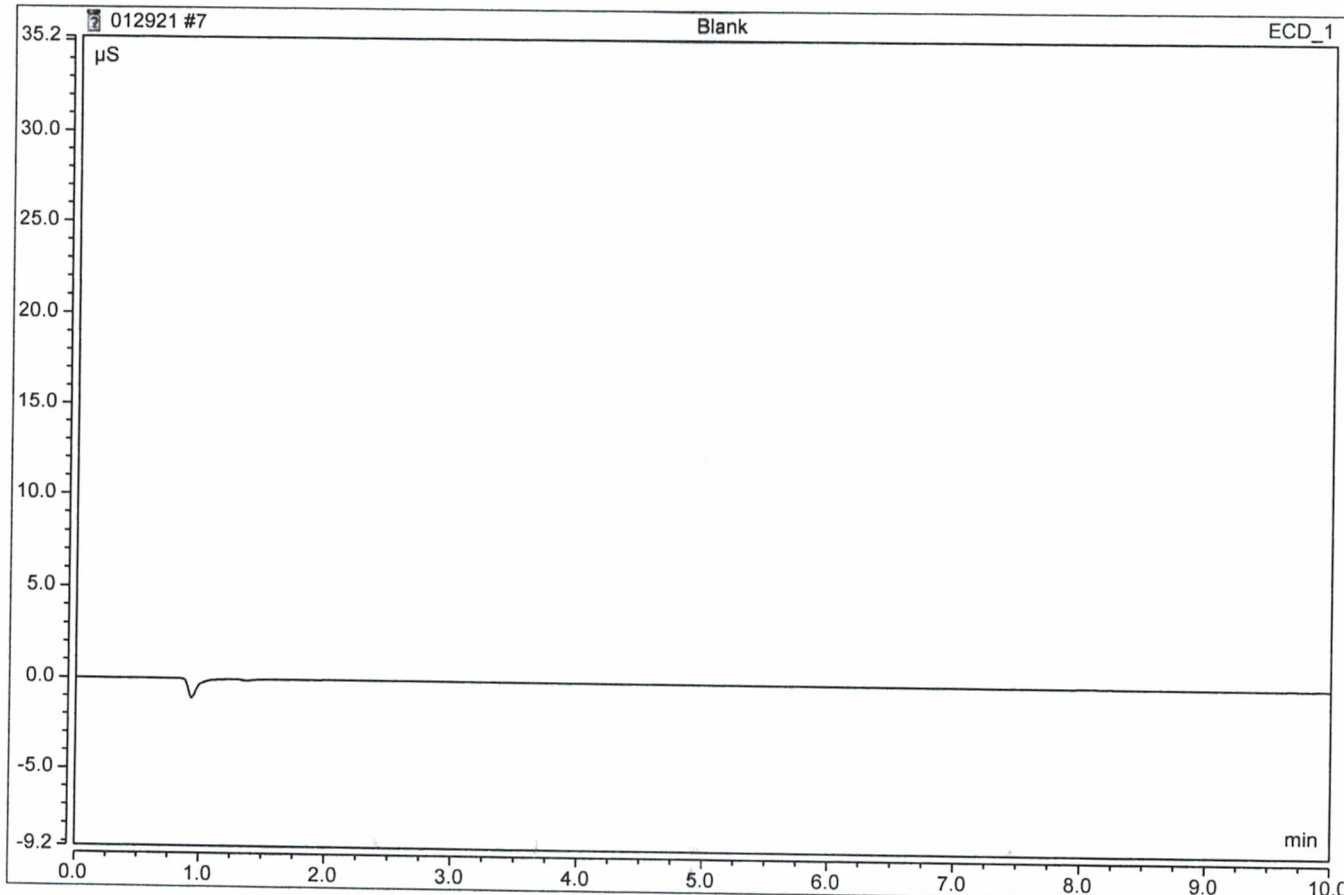


Injection Name	Ret. Time min ECD 1	Area $\mu\text{S} \cdot \text{min}$ ECD 1	Height $\mu\text{S}$ ECD 1	Amount ECD 1
1132Cal1	6.510	0.0866	0.394	1.074
1132Cal2	6.504	0.3774	1.750	4.680
1132Cal3	6.490	0.7785	3.633	9.654
1132Cal4	6.460	1.6169	7.566	20.051
1132Cal5	6.447	2.0595	9.609	25.540
<b>Average</b>	6.482			
<b>Rel. Std. Dev.</b>	0.426 %			



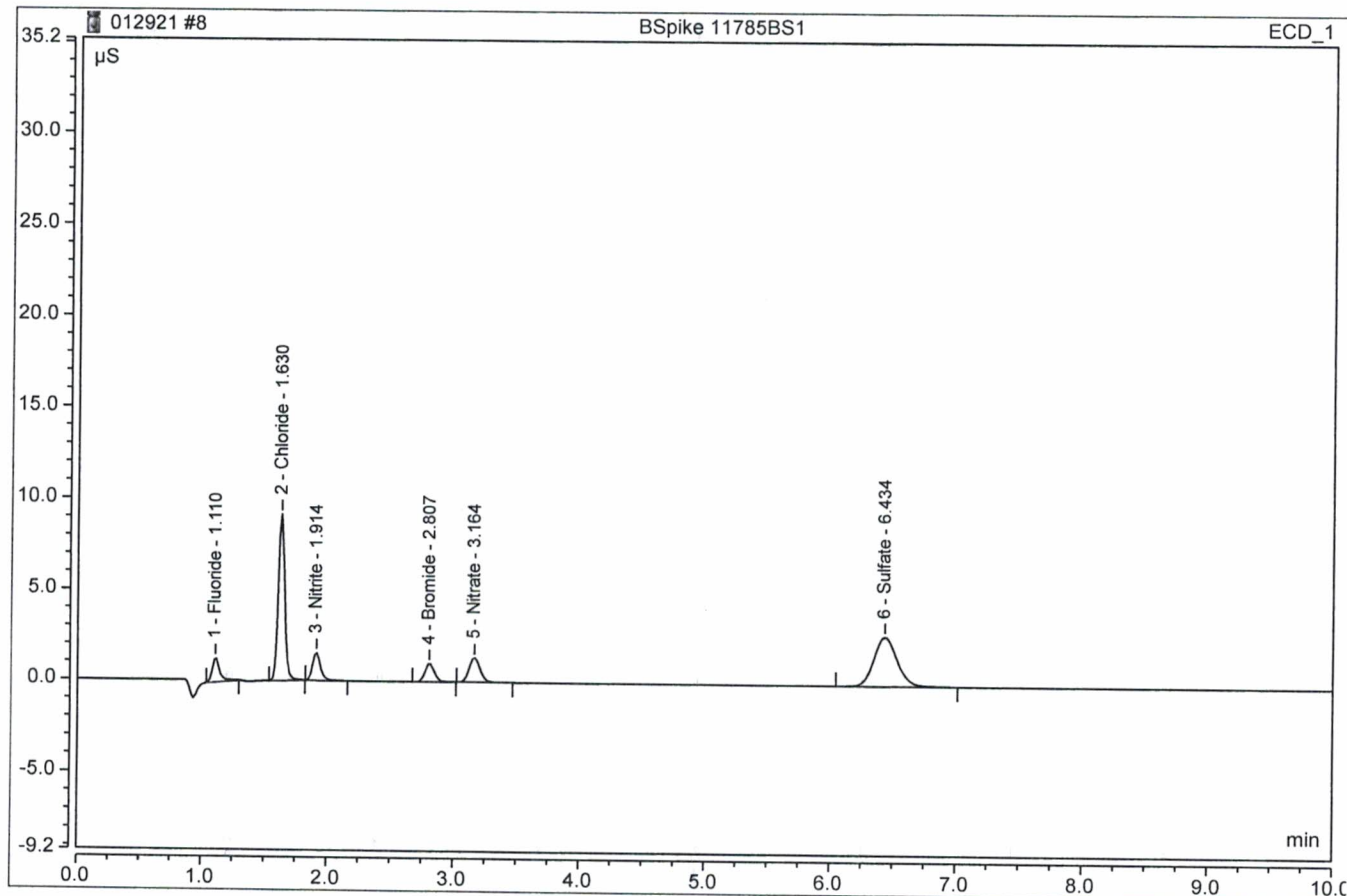
Sample Name:	Blank	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 07:54	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount n.a.
TOTAL:				0.00	0.00	0.00



Sample Name:	BSpoke 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

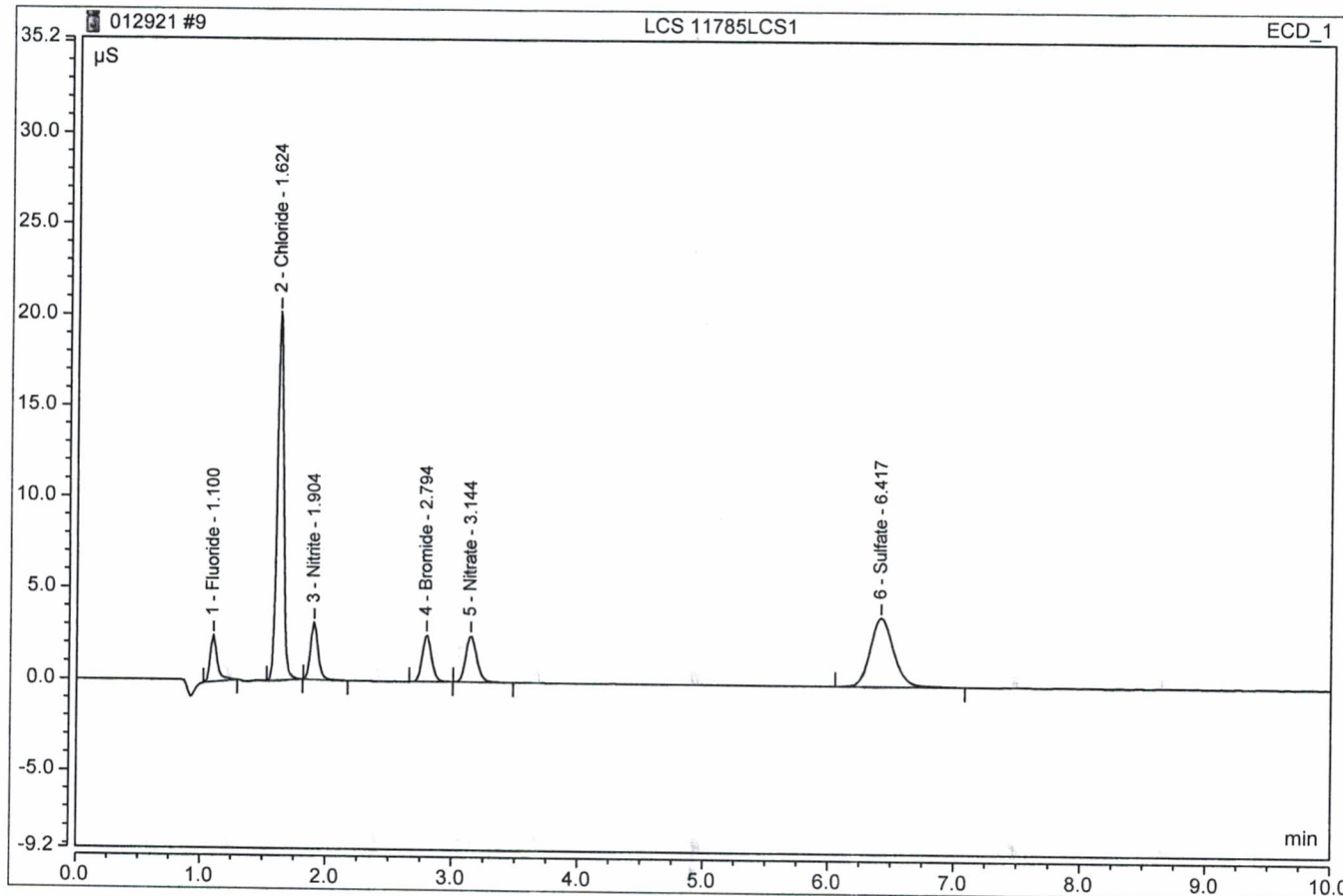
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.087	1.317	0.5147
2	1.63	Chloride	M	0.547	9.173	4.7355
3	1.91	Nitrite	M	0.107	1.516	0.4779
4	2.81	Bromide	M	0.087	0.997	1.9997
5	3.16	Nitrate	M	0.132	1.336	0.5090
6	6.43	Sulfate	M	0.583	2.726	7.2348
TOTAL:				1.54	17.06	15.47





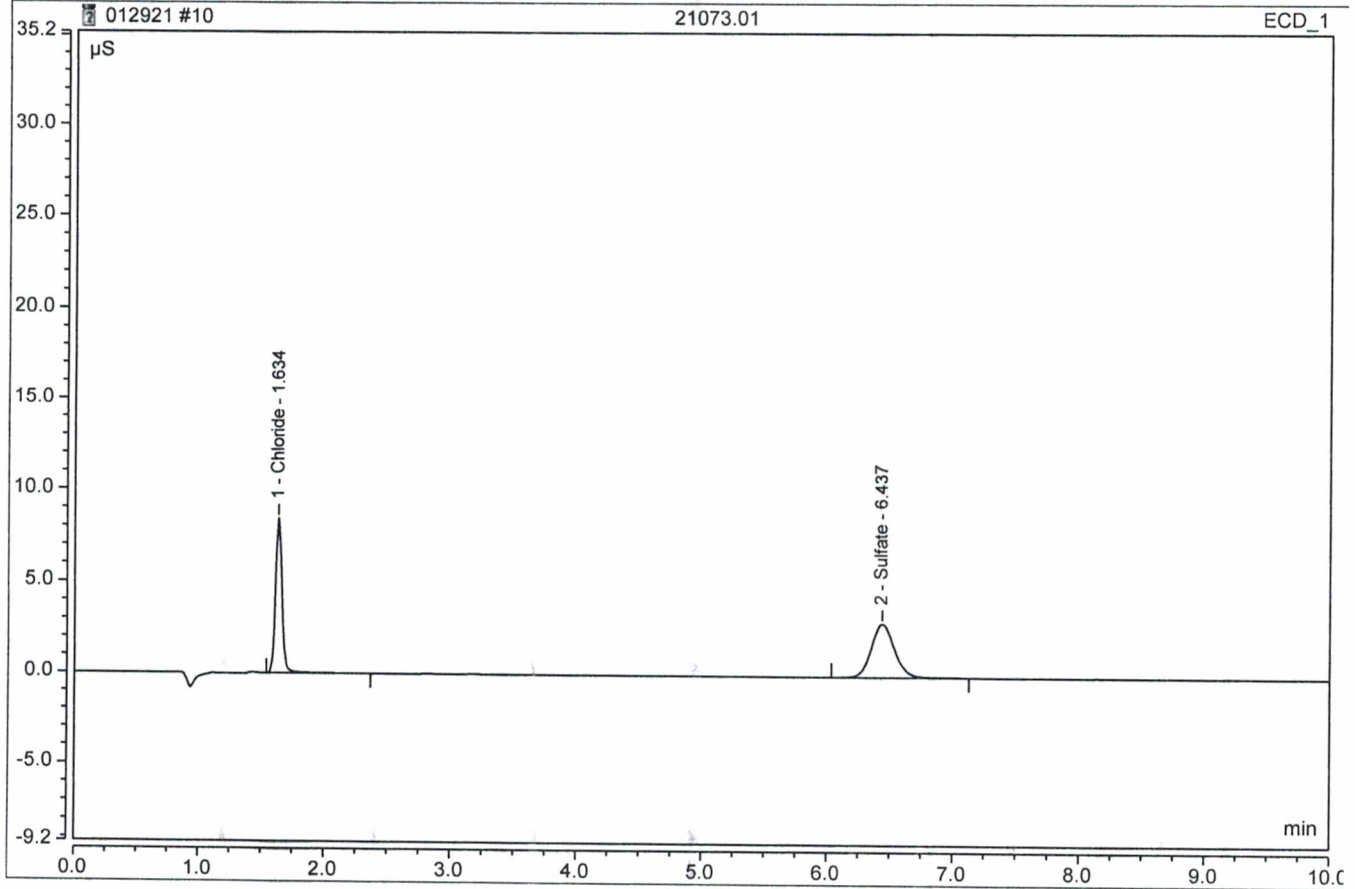
Sample Name:	LCS 11785LCS1	Inj. Vol.:	5000.00
Injection Type:	Check Standard	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 08:16	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



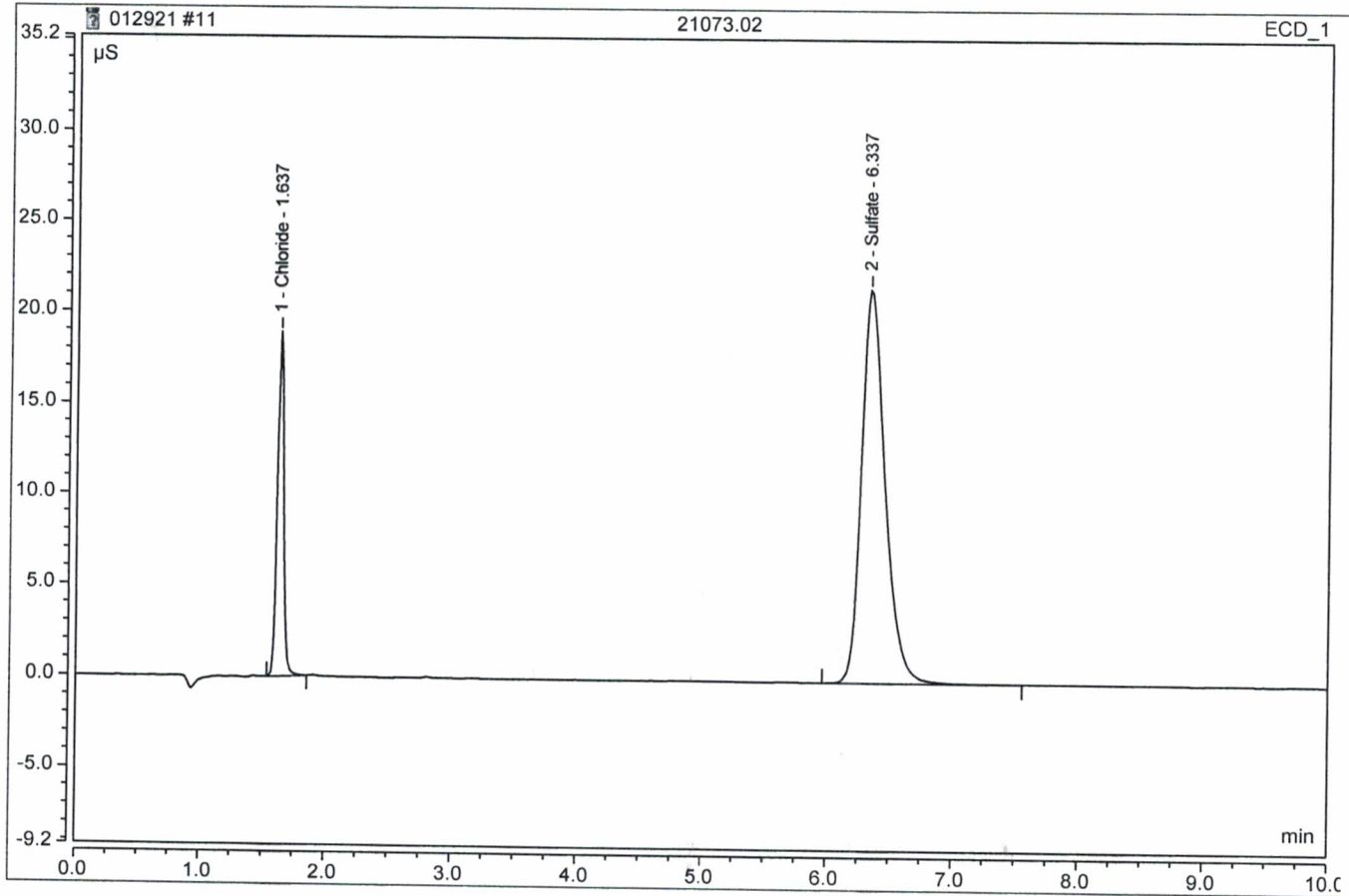
Sample Name:	21073.01	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	10.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 08:26	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



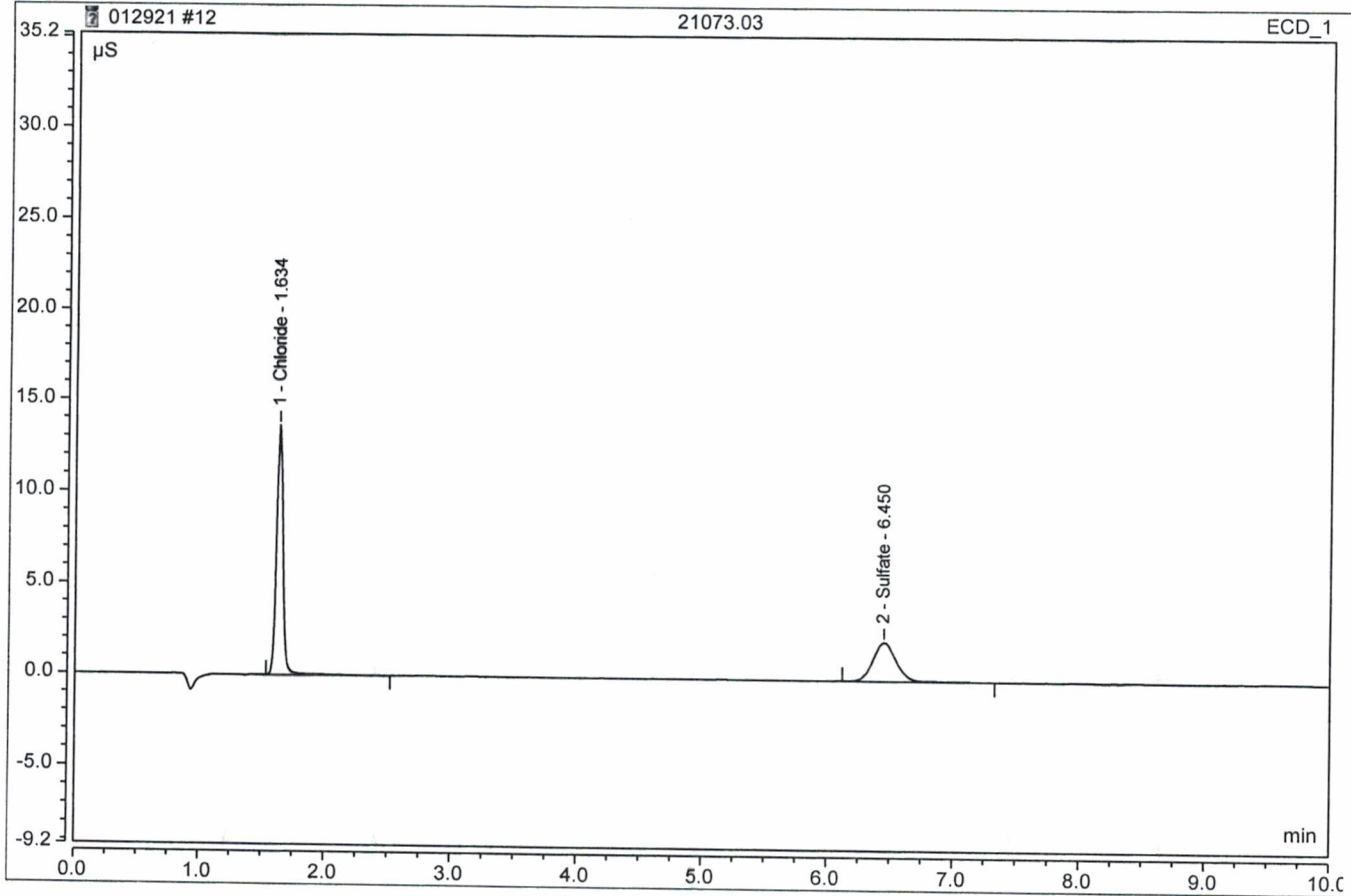
Sample Name:	21073.02	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	10.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 08:36	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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

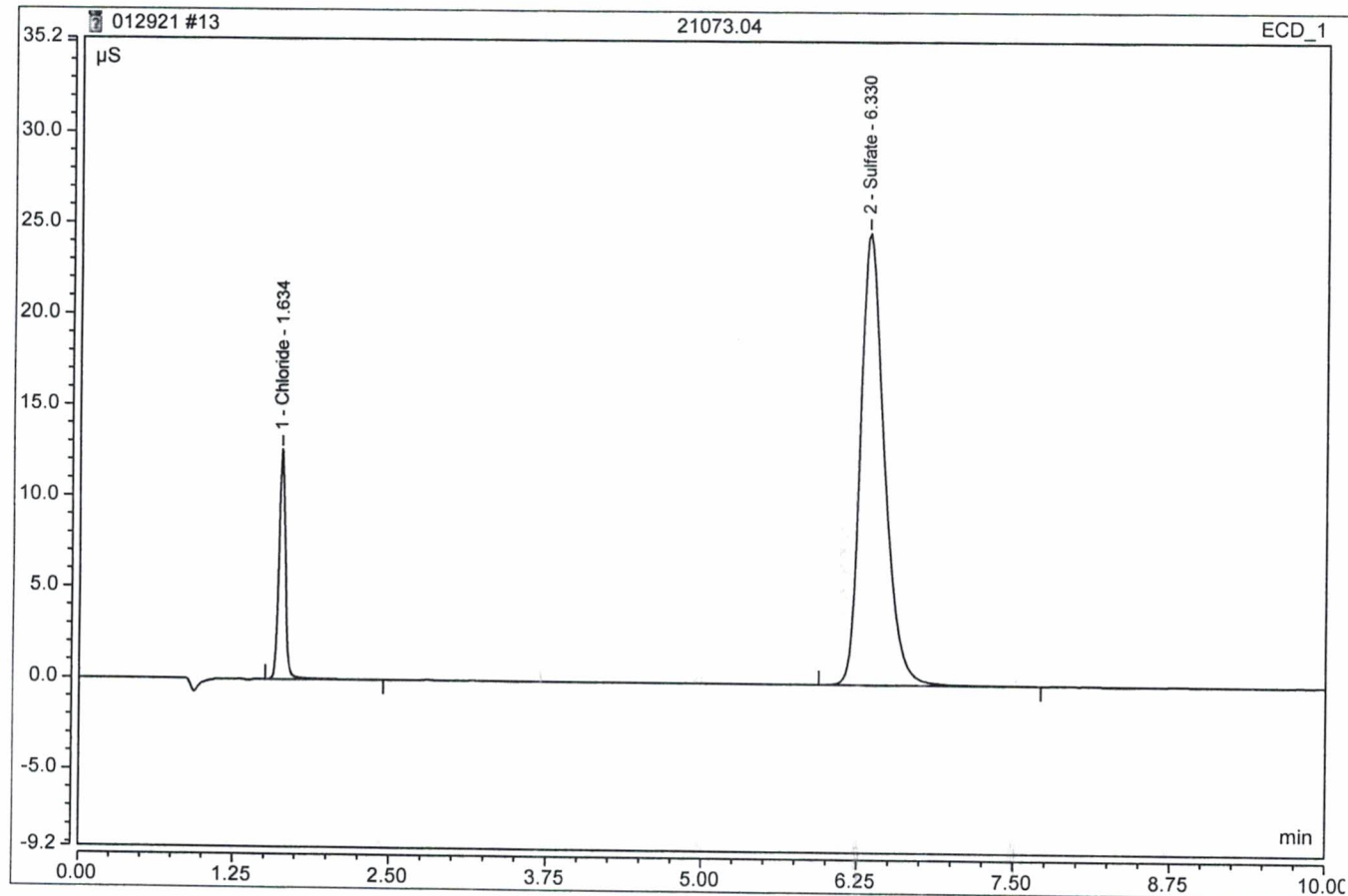
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.63	Chloride	M	0.827	13.646	70.3231
2	6.45	Sulfate	M	0.457	2.139	56.6726
TOTAL:				1.28	15.79	127.00





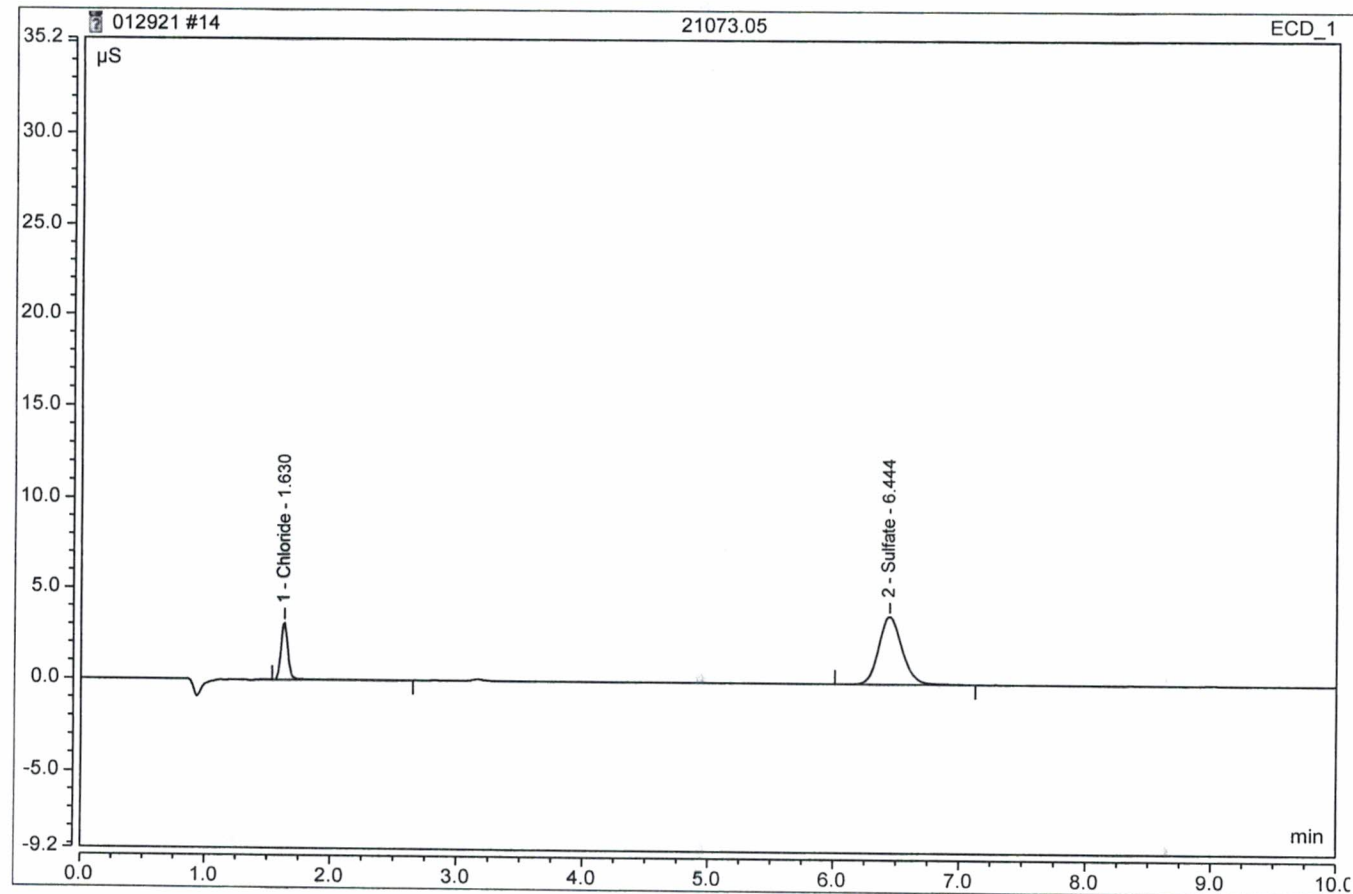
Sample Name:	21073.04	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	10.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 08:56	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



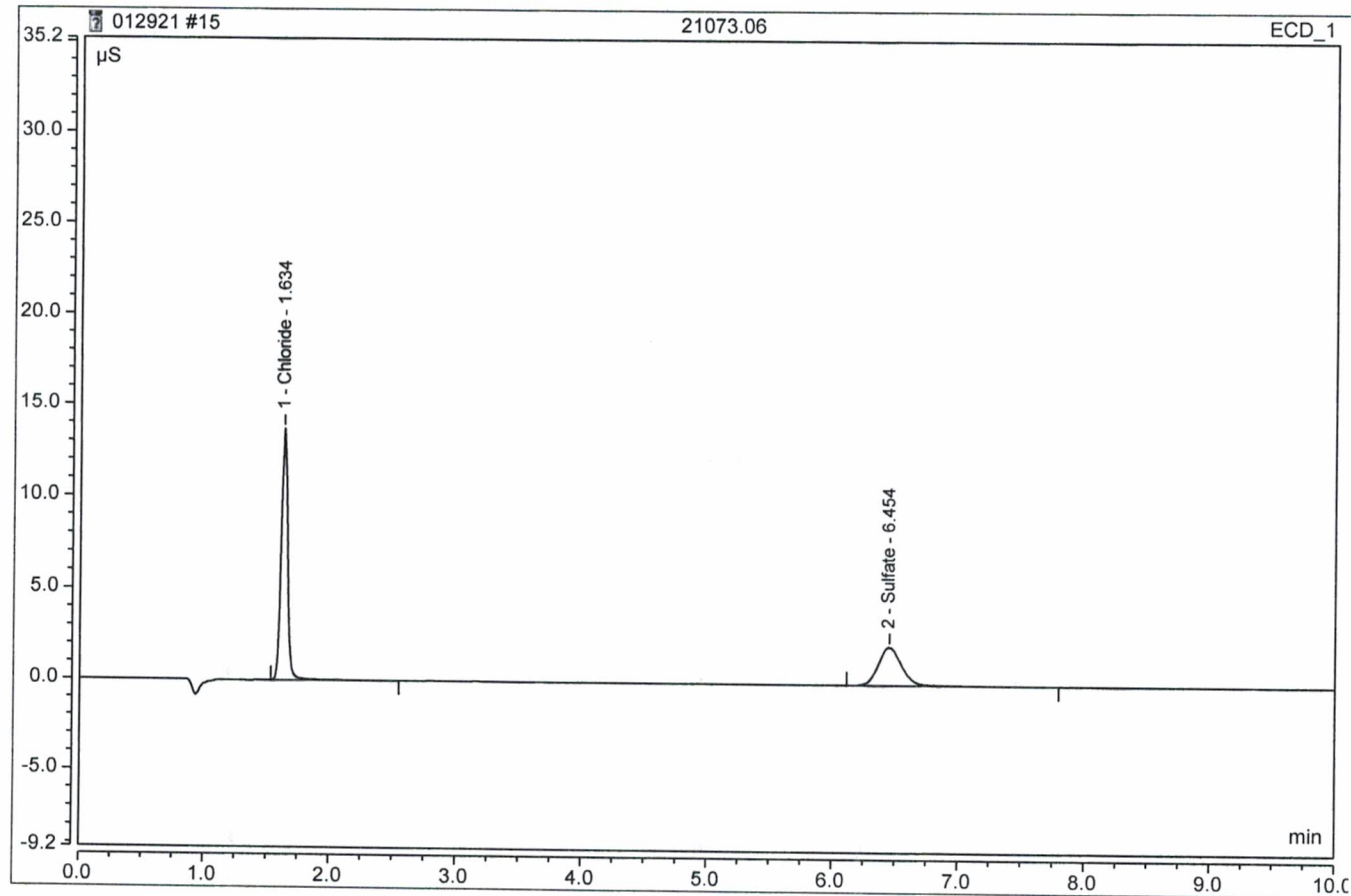
Sample Name:	21073.05	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	20.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 09:07	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



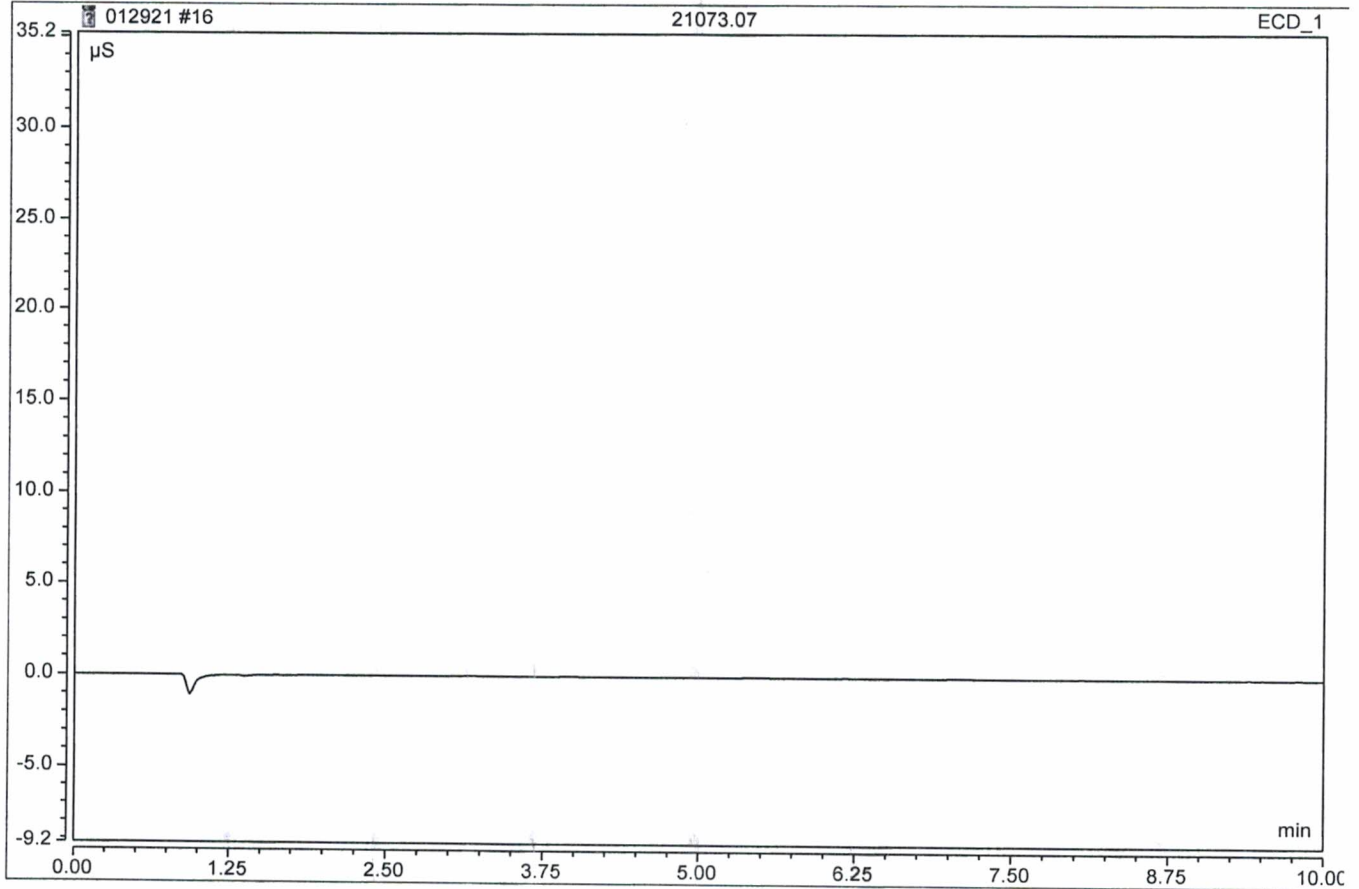
Sample Name:	21073.06	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	10.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 09:17	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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

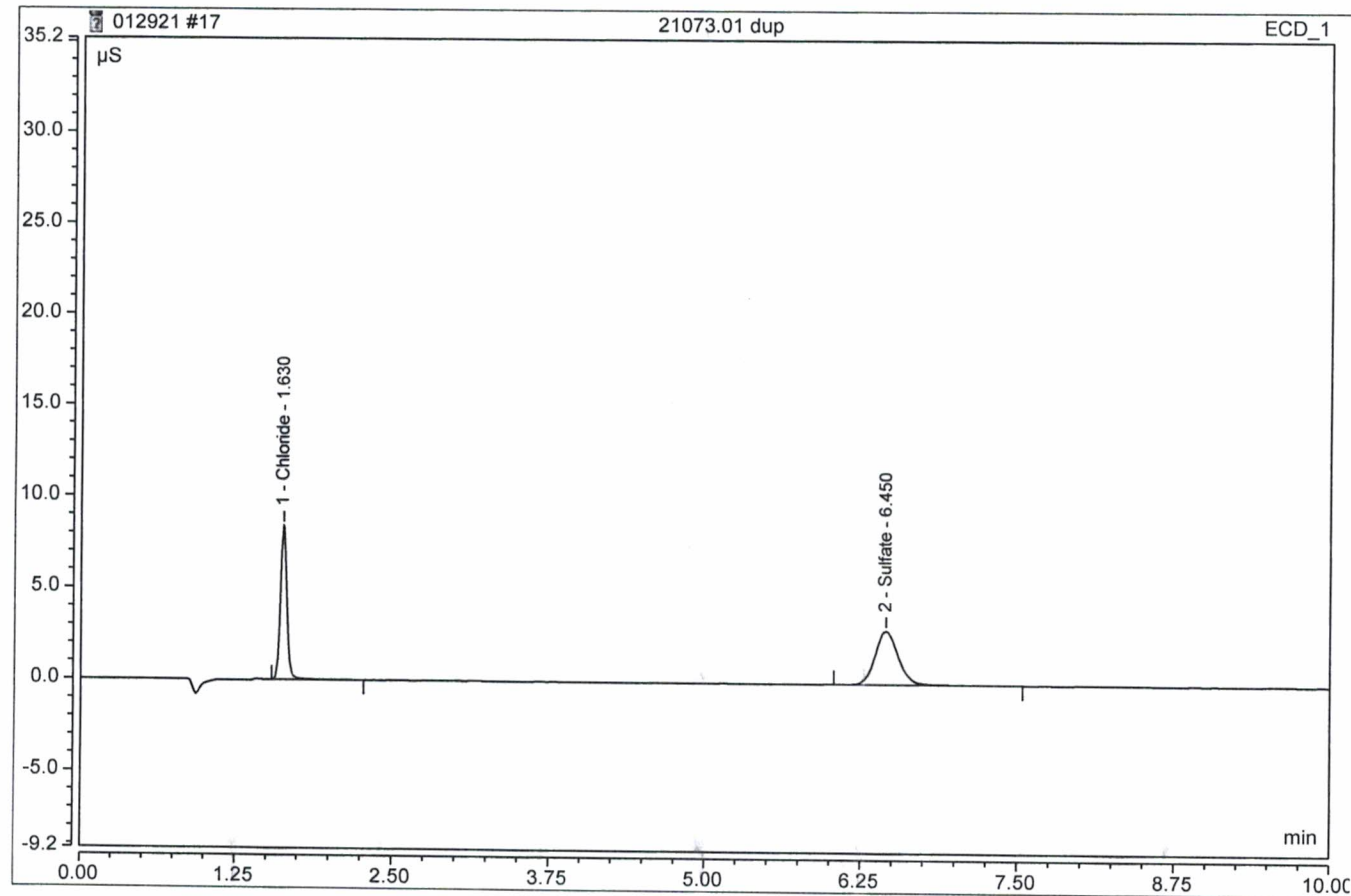
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount n.a.
TOTAL:				0.00	0.00	0.00





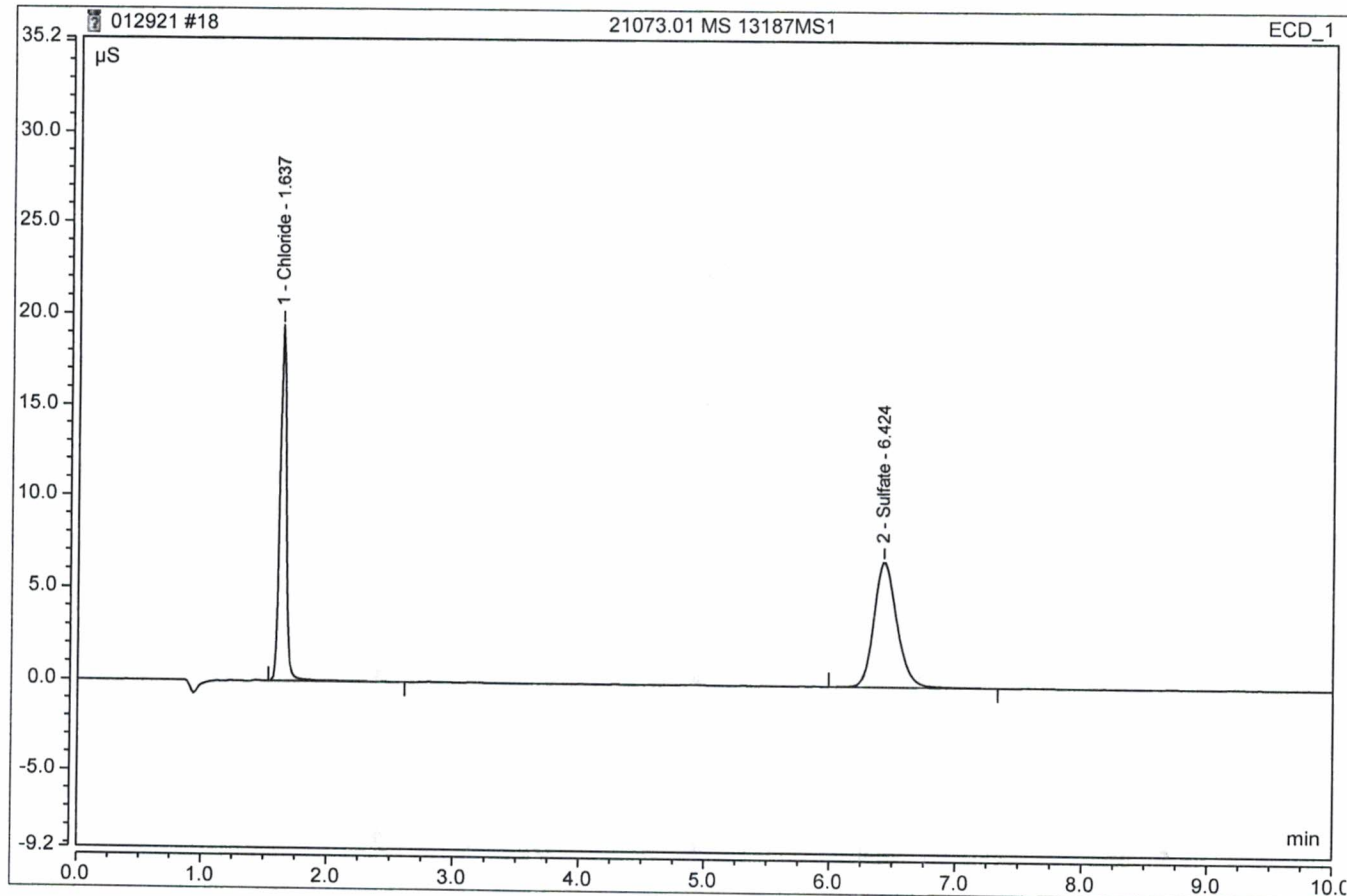
Sample Name:	21073.01 dup	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	10.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 09:37	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



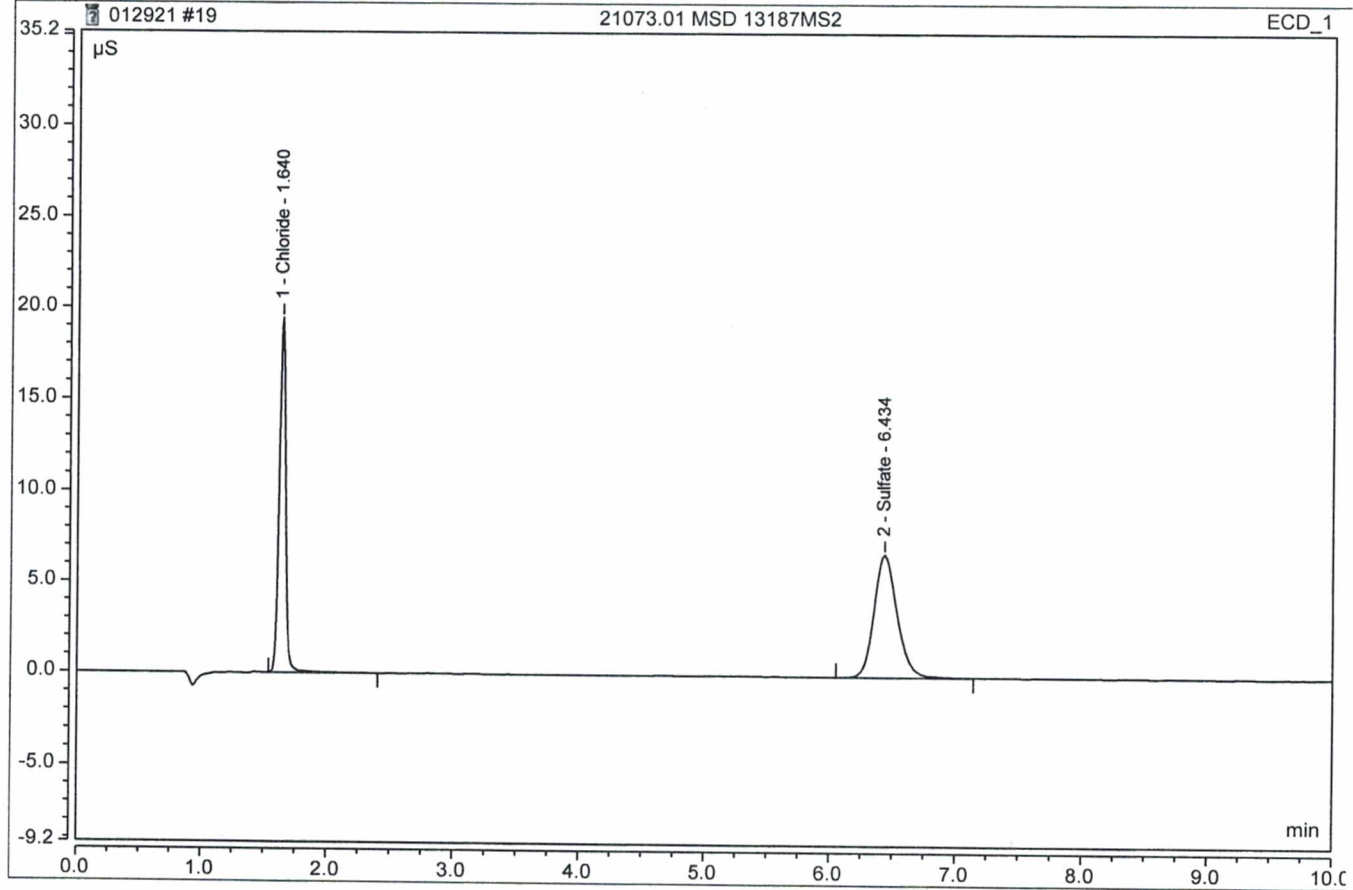
Sample Name:	21073.01 MS 13187MS1	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 09:47	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.64	Chloride	M	1.169	19.436	5 9.8329 - 4.4 = 1082
2	6.42	Sulfate	M	1.429	6.737	10 17.7225 - 7.8 = 992
TOTAL:				2.60	26.17	27.56



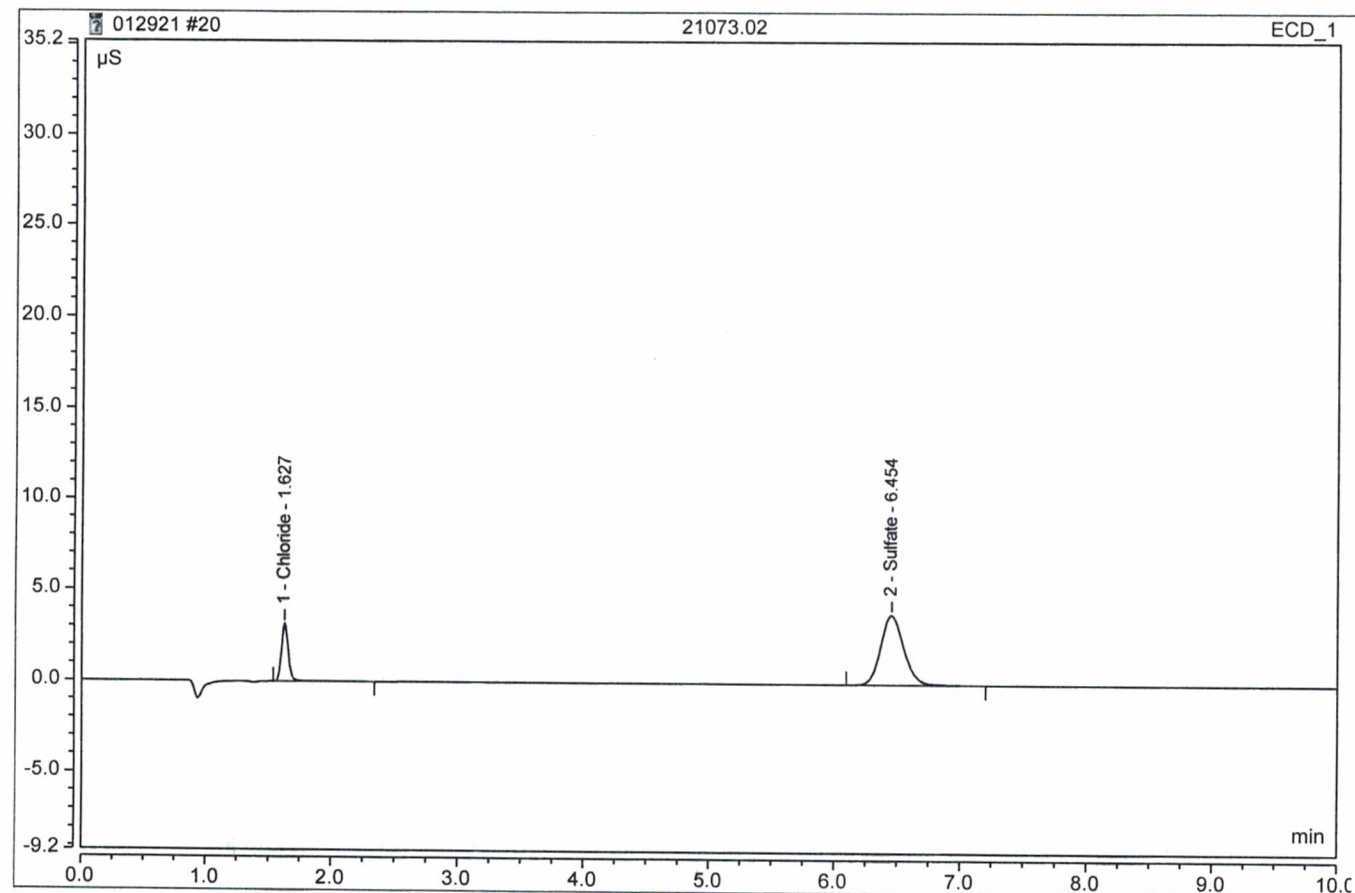
Sample Name:	21073.01 MSD 13187MS2	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 09:57	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.64	Chloride	M	1.170	19.440	5 9.8385 - 4.4 = 108.8
2	6.43	Sulfate	M	1.429	6.742	10 17.7258 - 7.8 = 99.8
TOTAL:				2.60	26.18	27.56



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

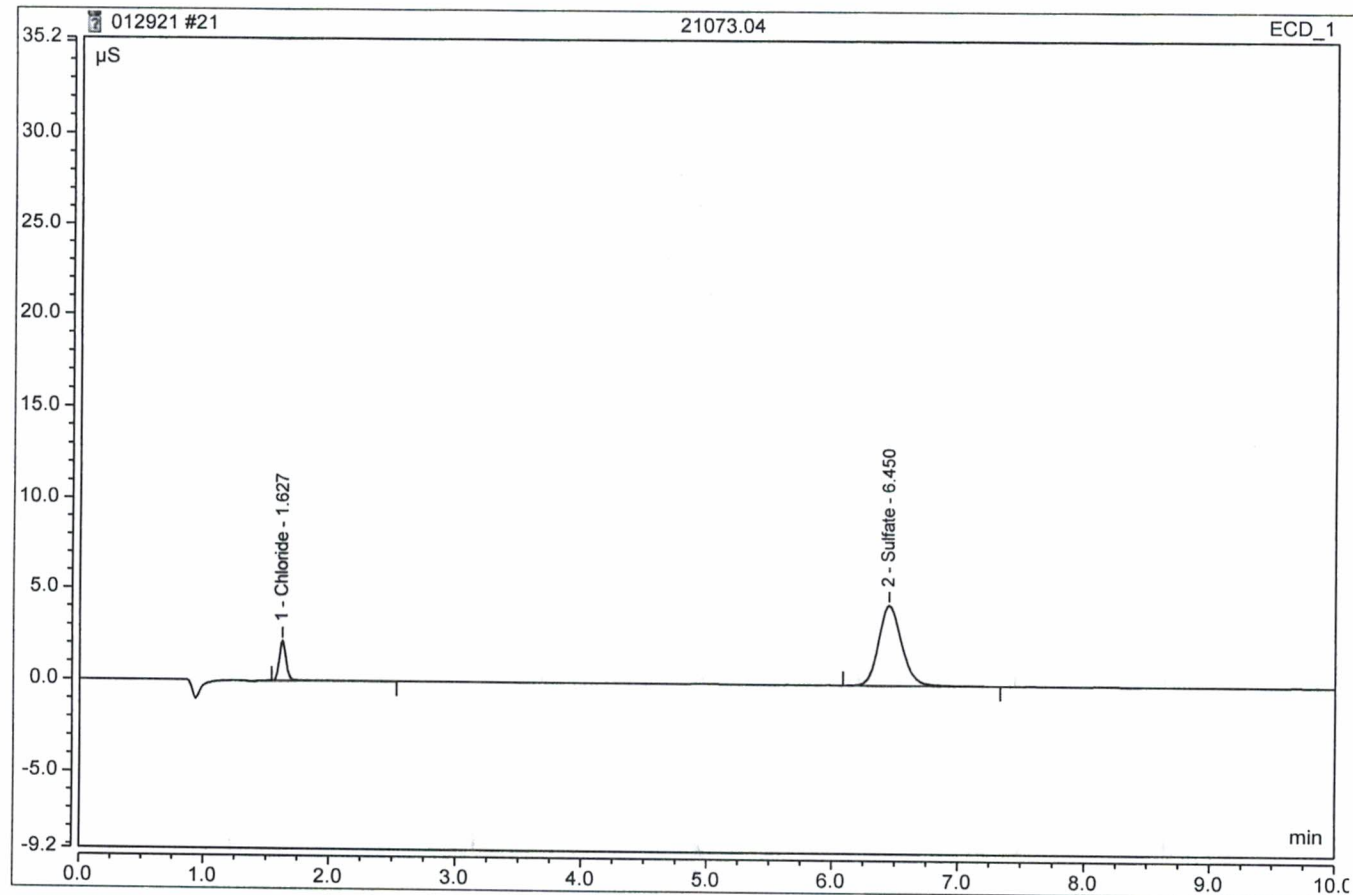
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.63	Chloride	M	0.201	3.152	94.8587
2	6.45	Sulfate	M	0.815	3.820	505.5537
TOTAL:				1.02	6.97	600.41





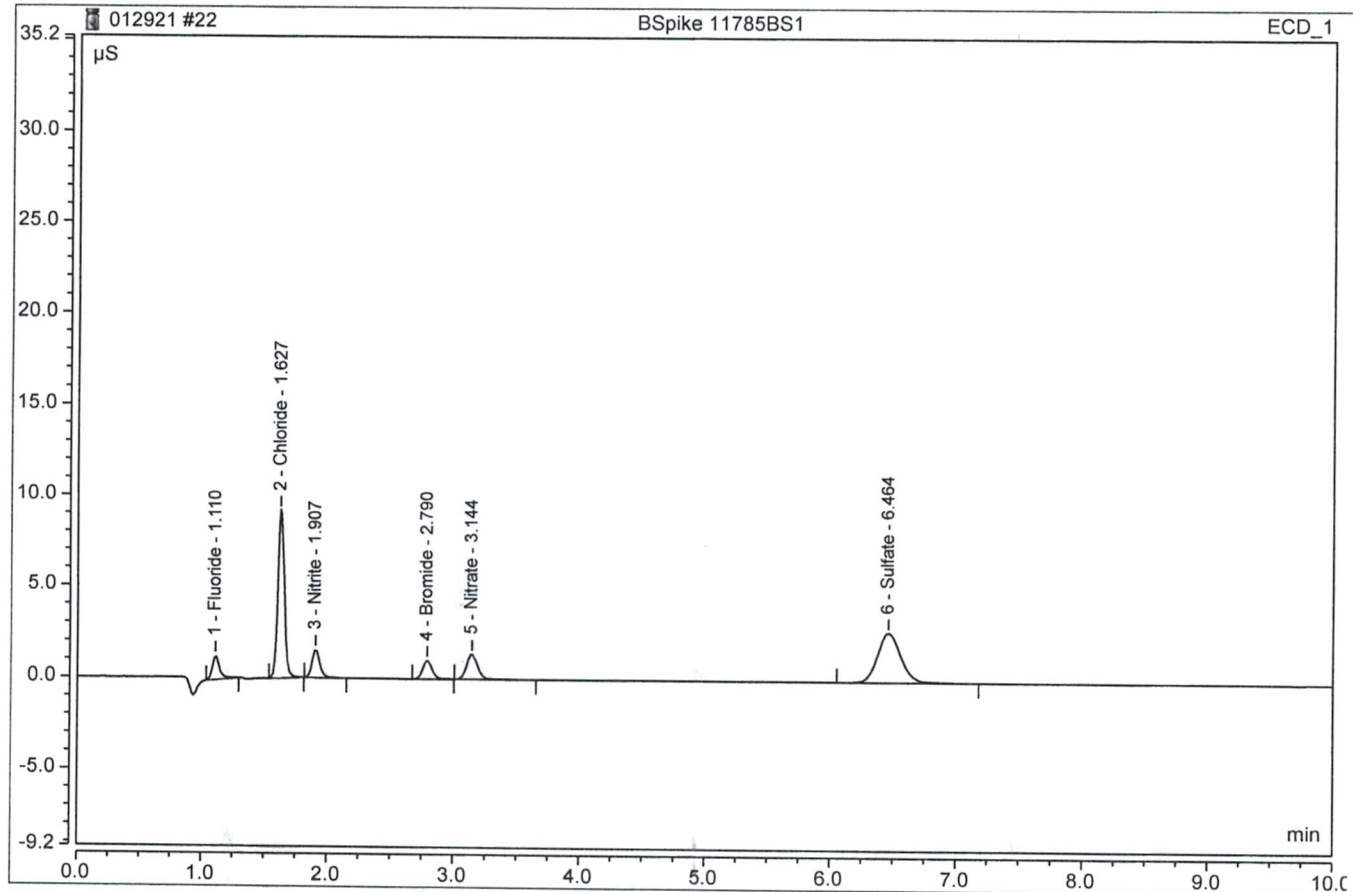
Sample Name:	21073.04	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	50.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 10:17	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



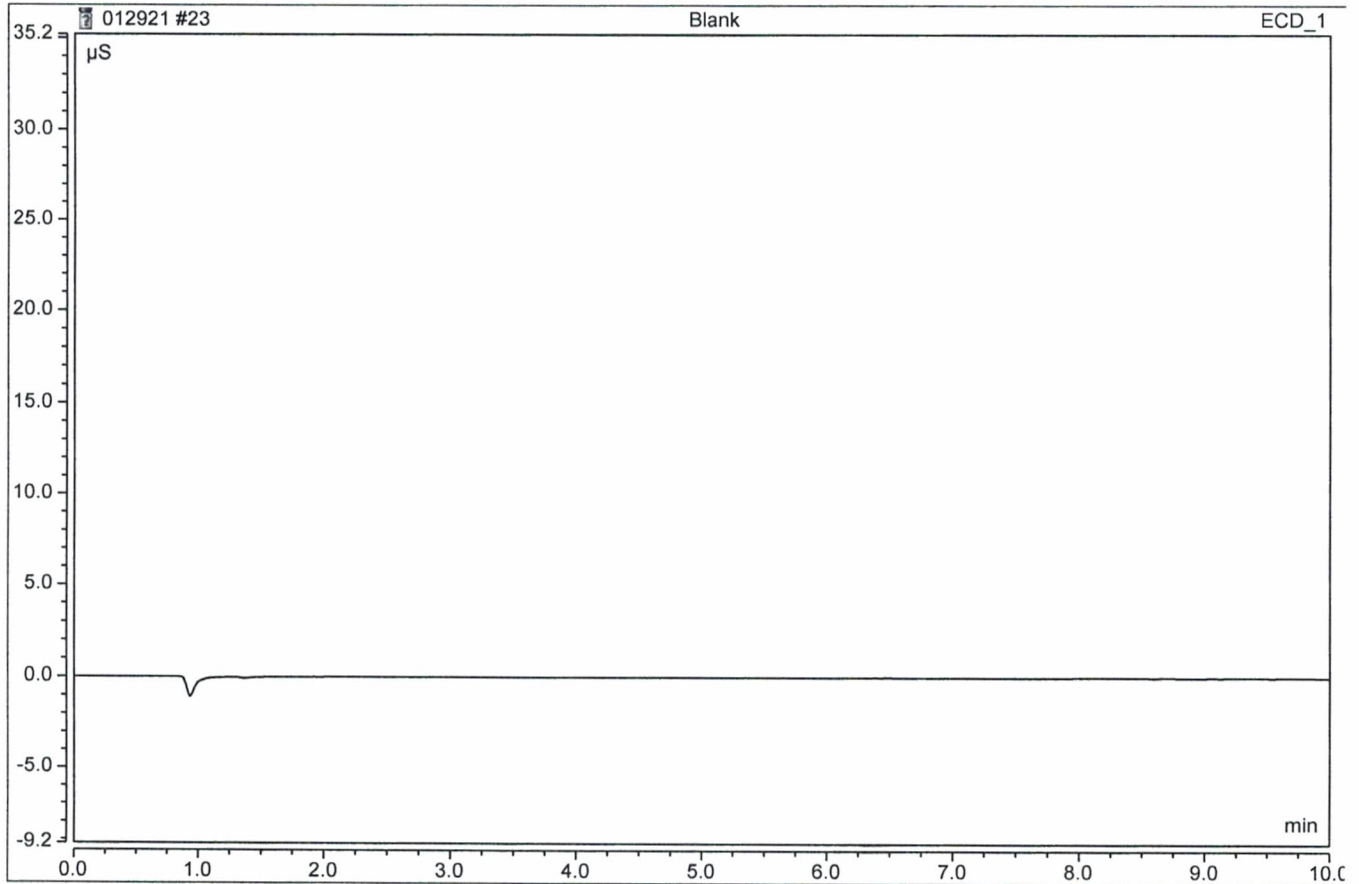
Sample Name:	BSpoke 11785BS1	Inj. Vol.:	5000.00
Injection Type:	Check Standard	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 10:27	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.083	1.286	0.4943
2	1.63	Chloride	M	0.549	9.212	4.7527
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	7.1778
<b>TOTAL:</b>				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 $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount n.a.
TOTAL:				0.00	0.00	0.00



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
	BSpoke 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 13190M	Unknown		12	5000	New Instrument Method	Anion	Finished
	21073.01 MSD 13190M	Unknown		13	5000	New Instrument Method	Anion	Finished
	BSpoke 11785BS1	Check Standard		14	5000	New Instrument Method	Anion	Finished
	Blank	Unknown		15	5000	New Instrument Method	Anion	Finished

CAL ID# ICSA120320CAL

FL210129-W1-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 -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal4	12/3/2020 10:16:46 AM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	1132Cal5	12/3/2020 10:26:48 AM -0		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	
	BSpoke 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 13190M	1/29/2021 3:05:29 PM -0		1.0000	1.0000	1.0000		Jeff Phifer	
	BSpoke 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	

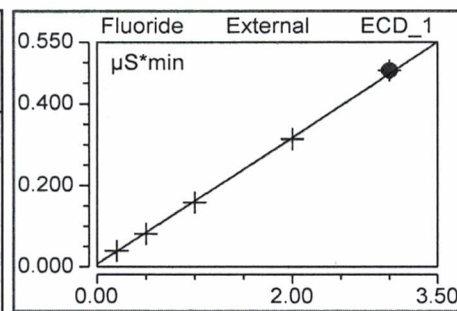
Name	Re-injections	Spike Group
water blank	0	
1132Cal1	0	
1132Cal2	0	
1132Cal3	0	
1132Cal4	0	
1132Cal5	0	
Blank	0	
BSpike 11785BS1	0	
LCS 11785LCS1	0	
21073.01	0	
21073.02	0	
21073.03	0	
21073.04	0	
21073.05	0	
21073.06	0	
21073.07	0	
21073.01 dup	0	
21073.01 MS 13190M	0	
21073.01 MSD 13190M	0	
BSpike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

**Calibration Batch Report**  
**CAL ID# ICSA120320CAL**

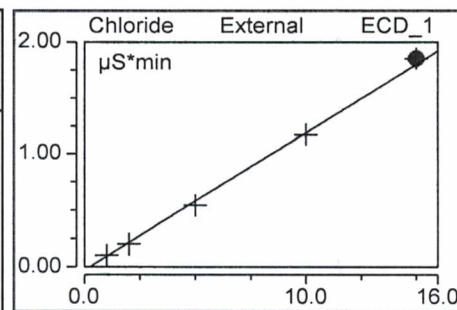
Sequence:	0129212	Injection Volume:	5,000.00
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	03-Dec-2020 / 10:26	Column:	AS4A-SC 038777

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
<b>AVERAGE:</b>				-0.0045	0.1482	0.0000	99.8975

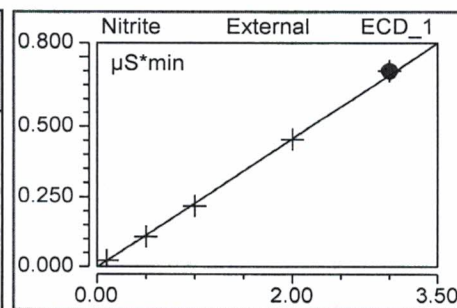
Injection Name	Ret.Time min	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
1132Cal1	Fluoride 1.110	Fluoride 0.0393	Fluoride 0.542	Fluoride 0.211
1132Cal2	1.110	0.0813	1.238	0.481
1132Cal3	1.110	0.1585	2.515	0.978
1132Cal4	1.110	0.3139	5.172	1.978
1132Cal5	1.107	0.4807	7.992	3.052
<b>Average</b>	1.110			
<b>Rel. Std. Dev.</b>	0.136 %			



Injection Name	Ret.Time min	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
1132Cal1	Chloride 1.624	Chloride 0.1031	Chloride 1.709	Chloride 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
<b>Average</b>	1.628			
<b>Rel. Std. Dev.</b>	0.392 %			

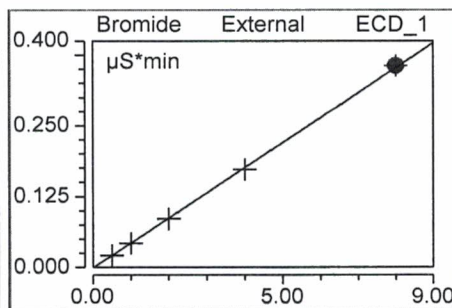


Injection Name	Ret.Time min	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
1132Cal1	Nitrite 1.904	Nitrite 0.0218	Nitrite 0.300	Nitrite 0.106
1132Cal2	1.904	0.1075	1.532	0.480
1132Cal3	1.904	0.2176	3.154	0.961
1132Cal4	1.907	0.4531	6.640	1.988
1132Cal5	1.910	0.6997	10.351	3.064
<b>Average</b>	1.906			
<b>Rel. Std. Dev.</b>	0.155 %			



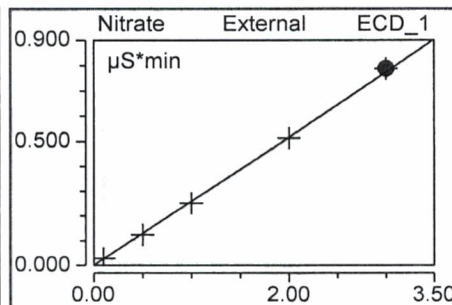


Injection Name	Ret. Time min ECD 1	Area μS*min ECD 1	Height μS ECD 1	Amount ECD 1
	Bromide	Bromide	Bromide	Bromide
1132Cal1	2.784	0.0213	0.253	0.511
1132Cal2	2.774	0.0428	0.502	0.997
1132Cal3	2.777	0.0860	0.996	1.976
1132Cal4	2.780	0.1724	2.034	3.932
1132Cal5	2.777	0.3559	4.227	8.085
<b>Average</b>	<b>2.778</b>			
<b>Rel. Std. Dev.</b>	<b>0.139 %</b>			

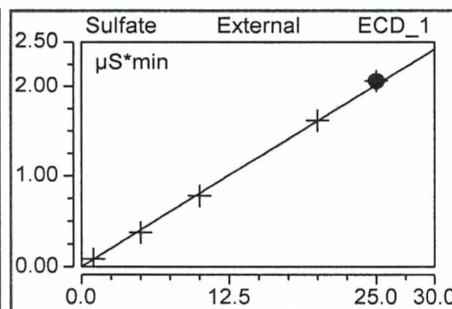


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Injection Name	Ret. Time min ECD 1	Area μS*min ECD 1	Height μS ECD 1	Amount ECD 1
	Nitrate	Nitrate	Nitrate	Nitrate
1132Cal1	3.140	0.0282	0.292	0.106
1132Cal2	3.124	0.1240	1.269	0.478
1132Cal3	3.124	0.2513	2.537	0.972
1132Cal4	3.120	0.5141	5.169	1.991
1132Cal5	3.107	0.7881	7.936	3.054
<b>Average</b>	<b>3.123</b>			
<b>Rel. Std. Dev.</b>	<b>0.382 %</b>			

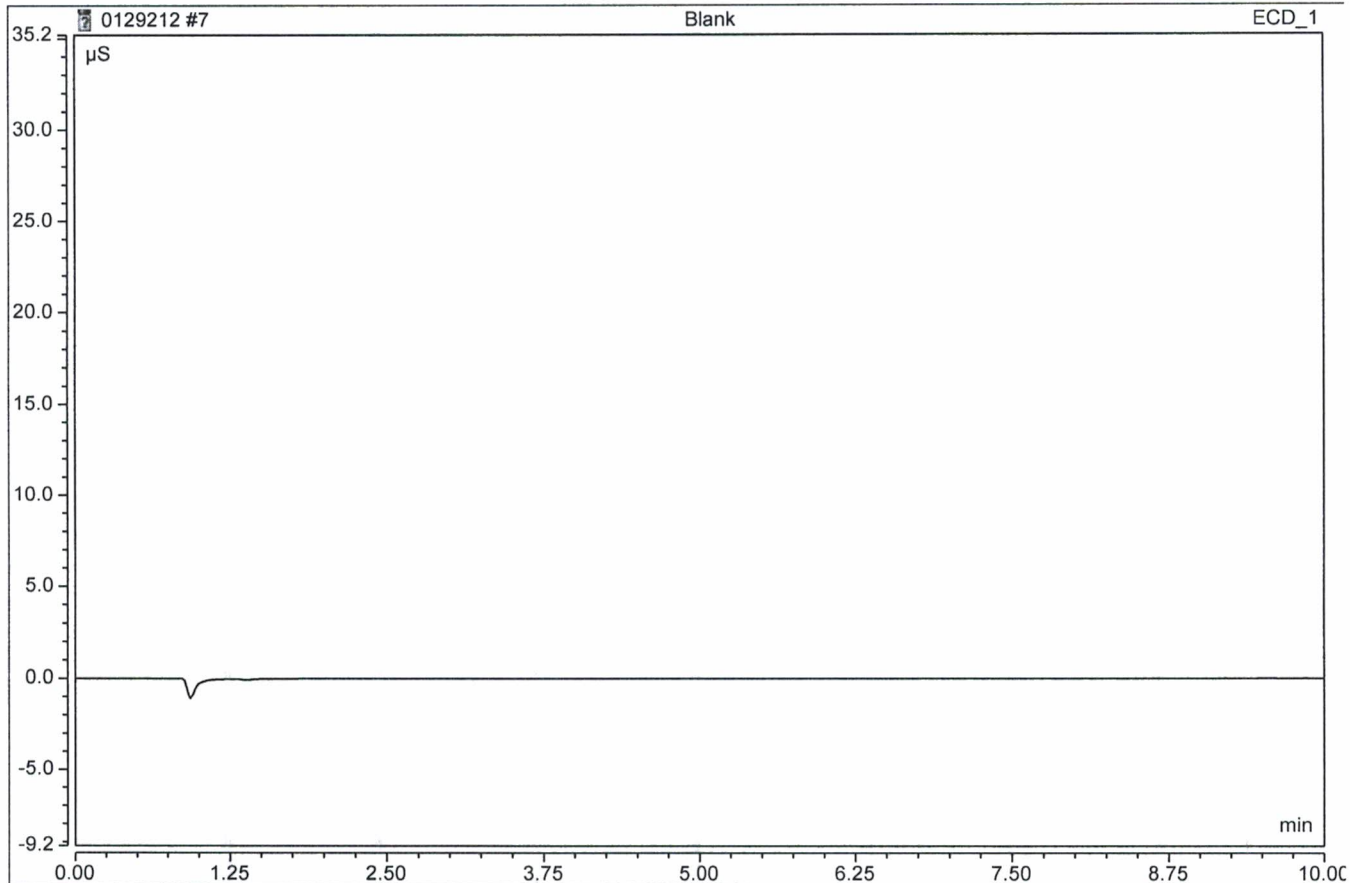


Injection Name	Ret. Time min ECD 1	Area μS*min ECD 1	Height μS ECD 1	Amount ECD 1
	Sulfate	Sulfate	Sulfate	Sulfate
1132Cal1	6.510	0.0866	0.394	1.074
1132Cal2	6.504	0.3774	1.750	4.680
1132Cal3	6.490	0.7785	3.633	9.654
1132Cal4	6.460	1.6169	7.566	20.051
1132Cal5	6.447	2.0595	9.609	25.540
<b>Average</b>	<b>6.482</b>			
<b>Rel. Std. Dev.</b>	<b>0.426 %</b>			



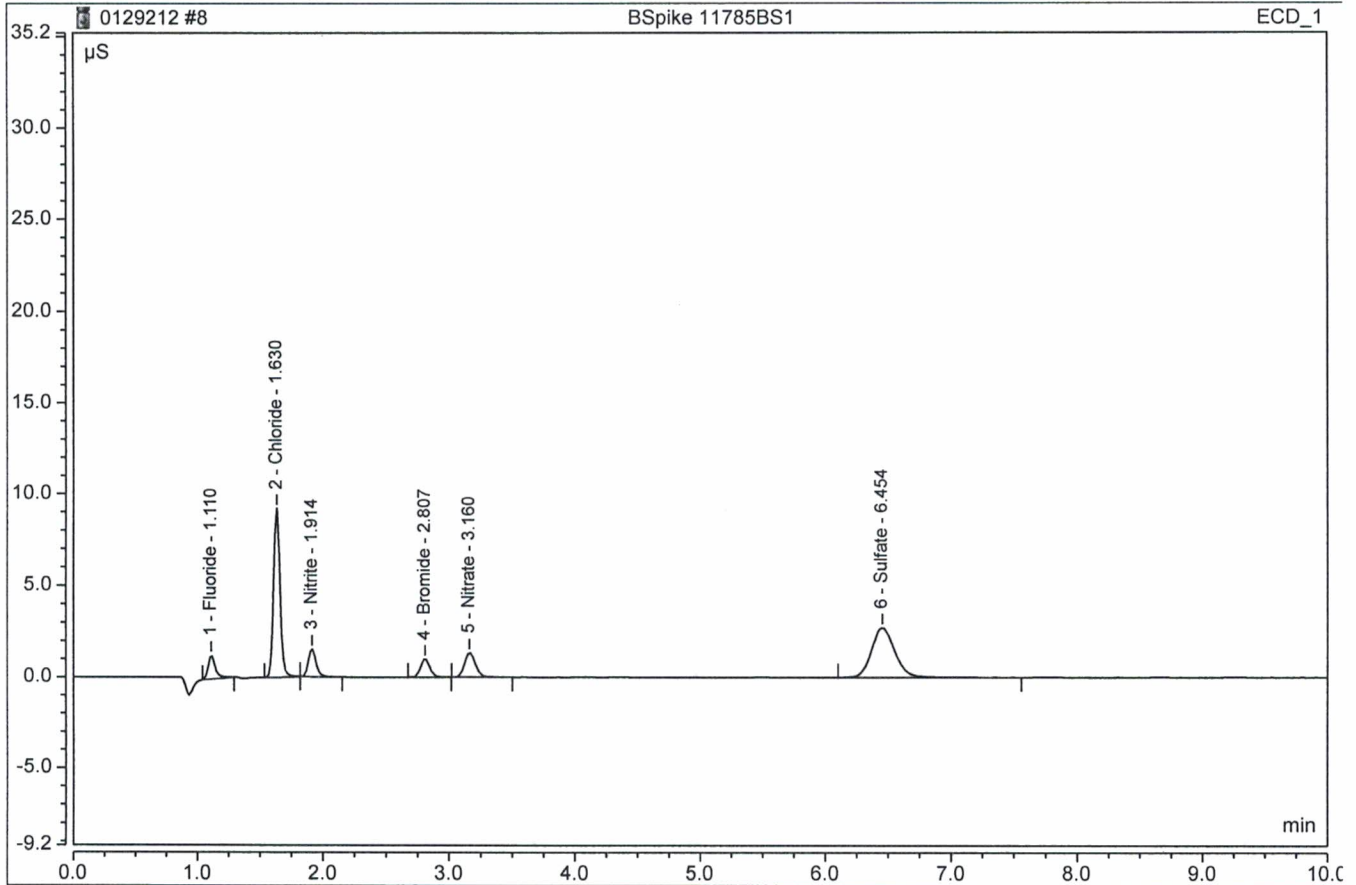
Sample Name:	Blank	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 13:02	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount n.a.
TOTAL:				0.00	0.00	0.00



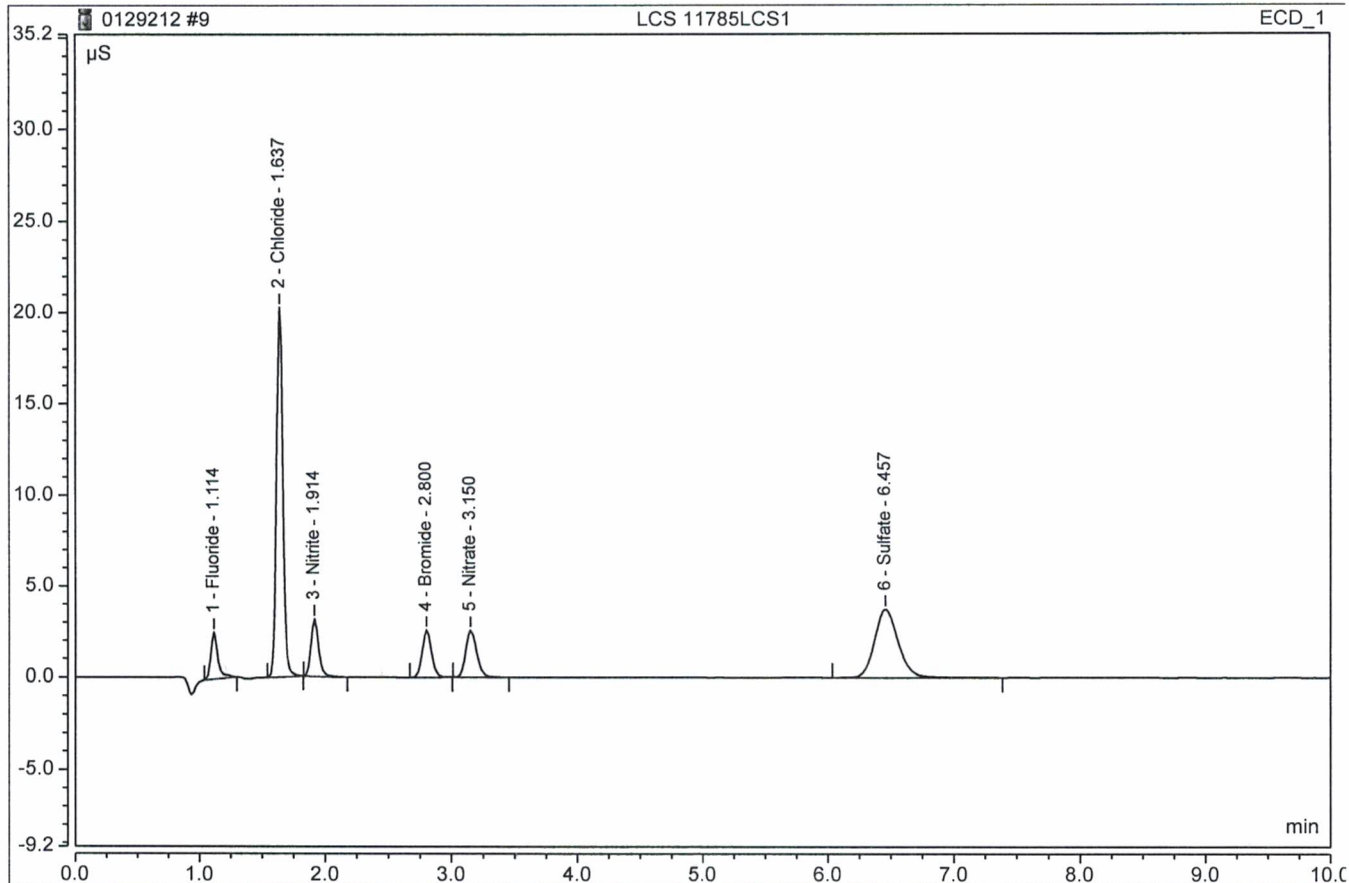
Sample Name:	BSpoke 11785BS1	Inj. Vol.:	5000.00
Injection Type:	Check Standard	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 13:14	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.085	1.304	0.5022
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

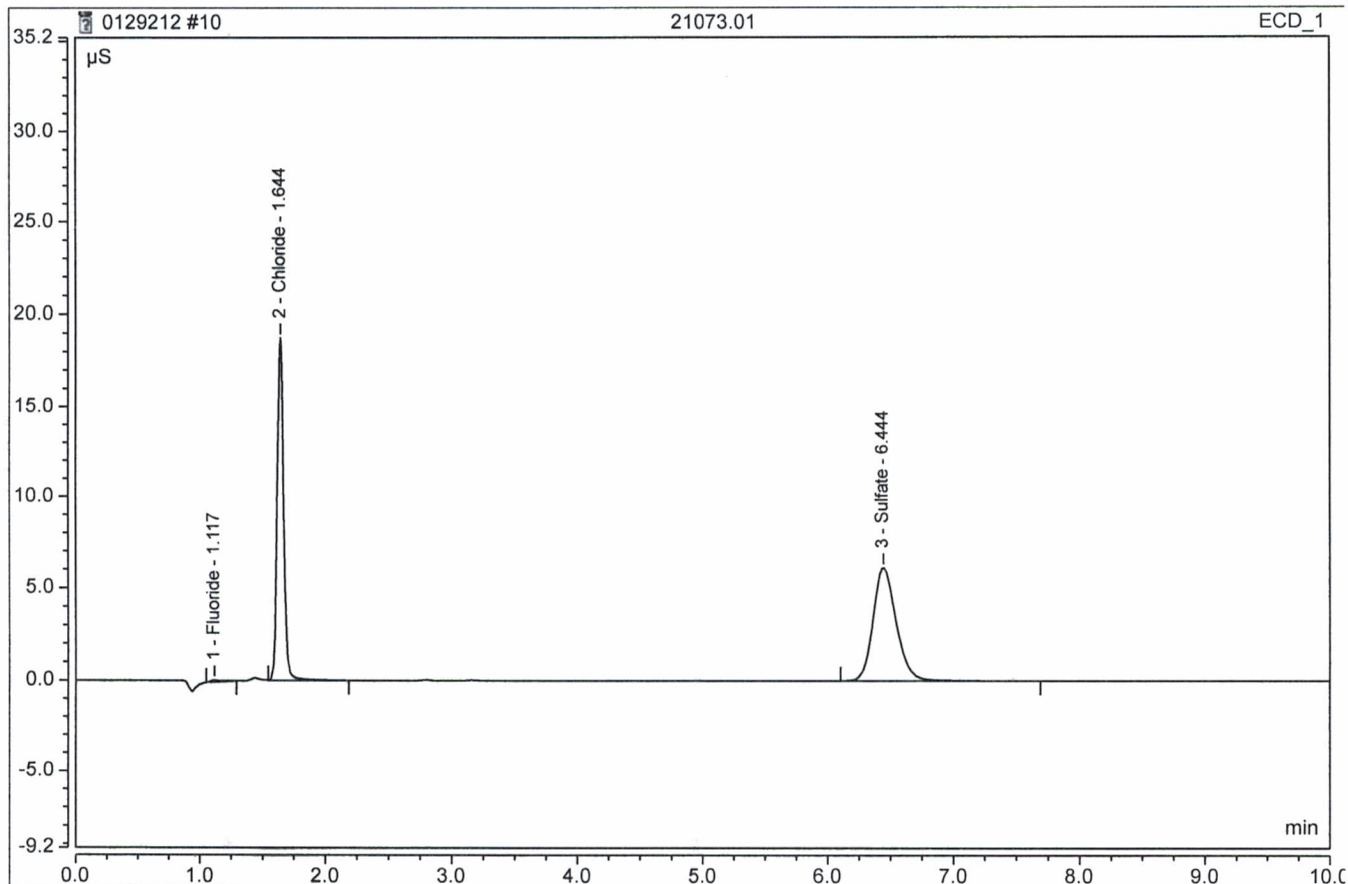
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.162	2.527	1.0036
2	1.64	Chloride	M	1.206	20.280	10.1322
3	1.91	Nitrite	M	0.216	3.121	0.9547
4	2.80	Bromide	M	0.220	2.558	5.0085
5	3.15	Nitrate	M	0.250	2.537	0.9676
6	6.46	Sulfate	M	0.804	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

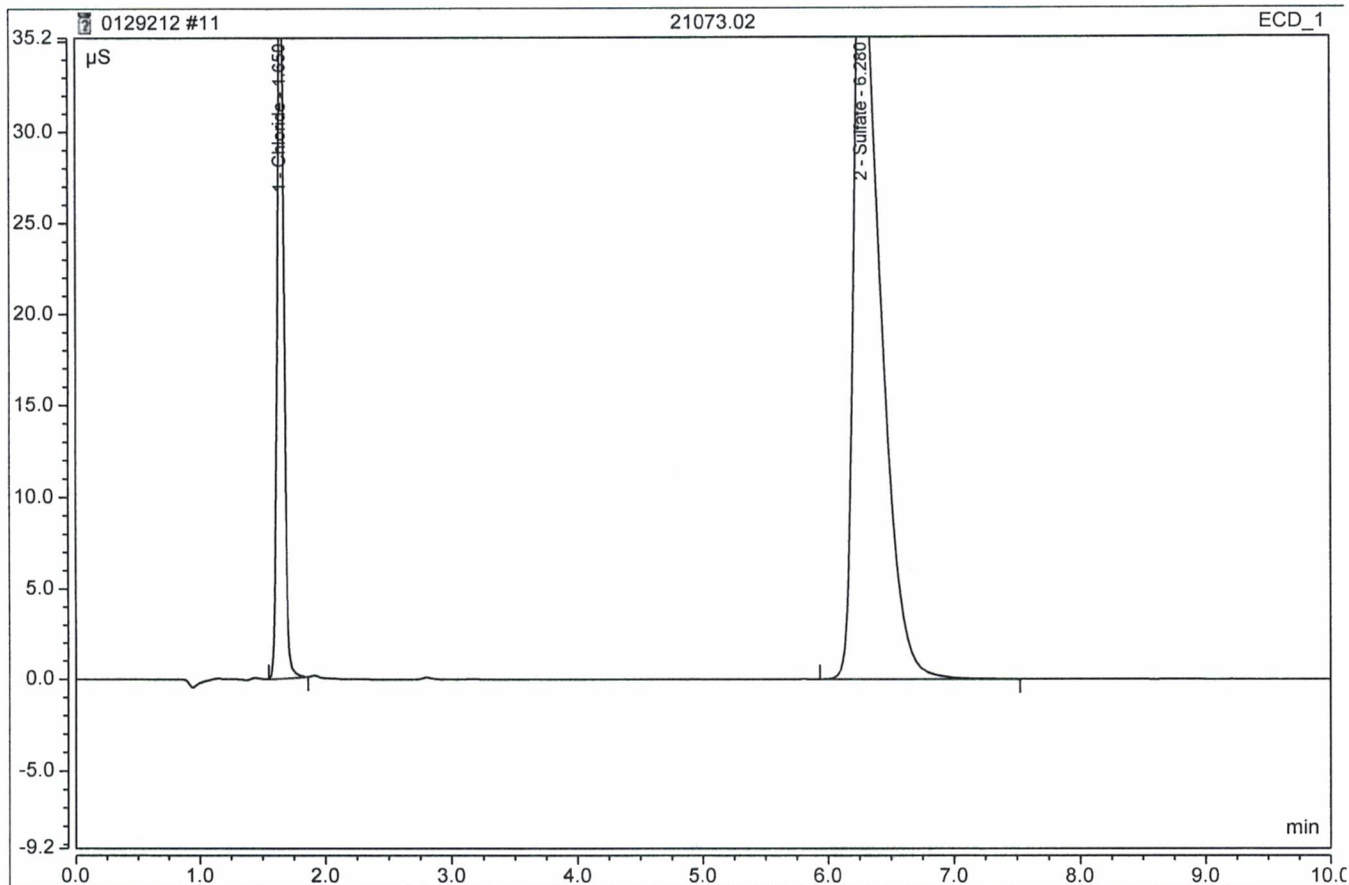
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.12	Fluoride	M	0.011	0.111	0.1470
2	1.64	Chloride	M	1.105	18.722	46.5421
3	6.44	Sulfate	M	1.302	6.118	80.7126
<b>TOTAL:</b>				2.42	24.95	127.40





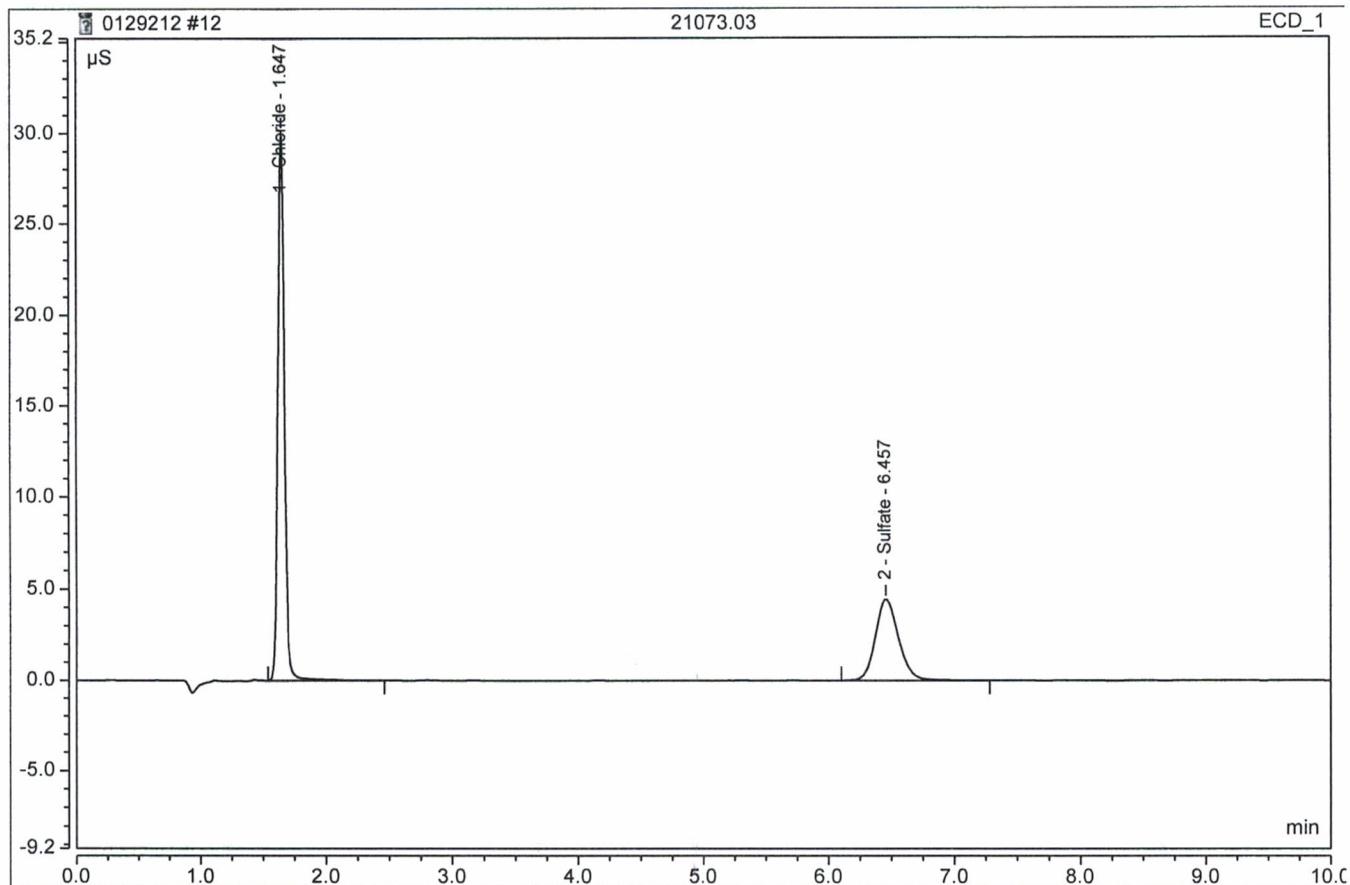
Sample Name:	21073.02	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	5.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 13:45	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	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



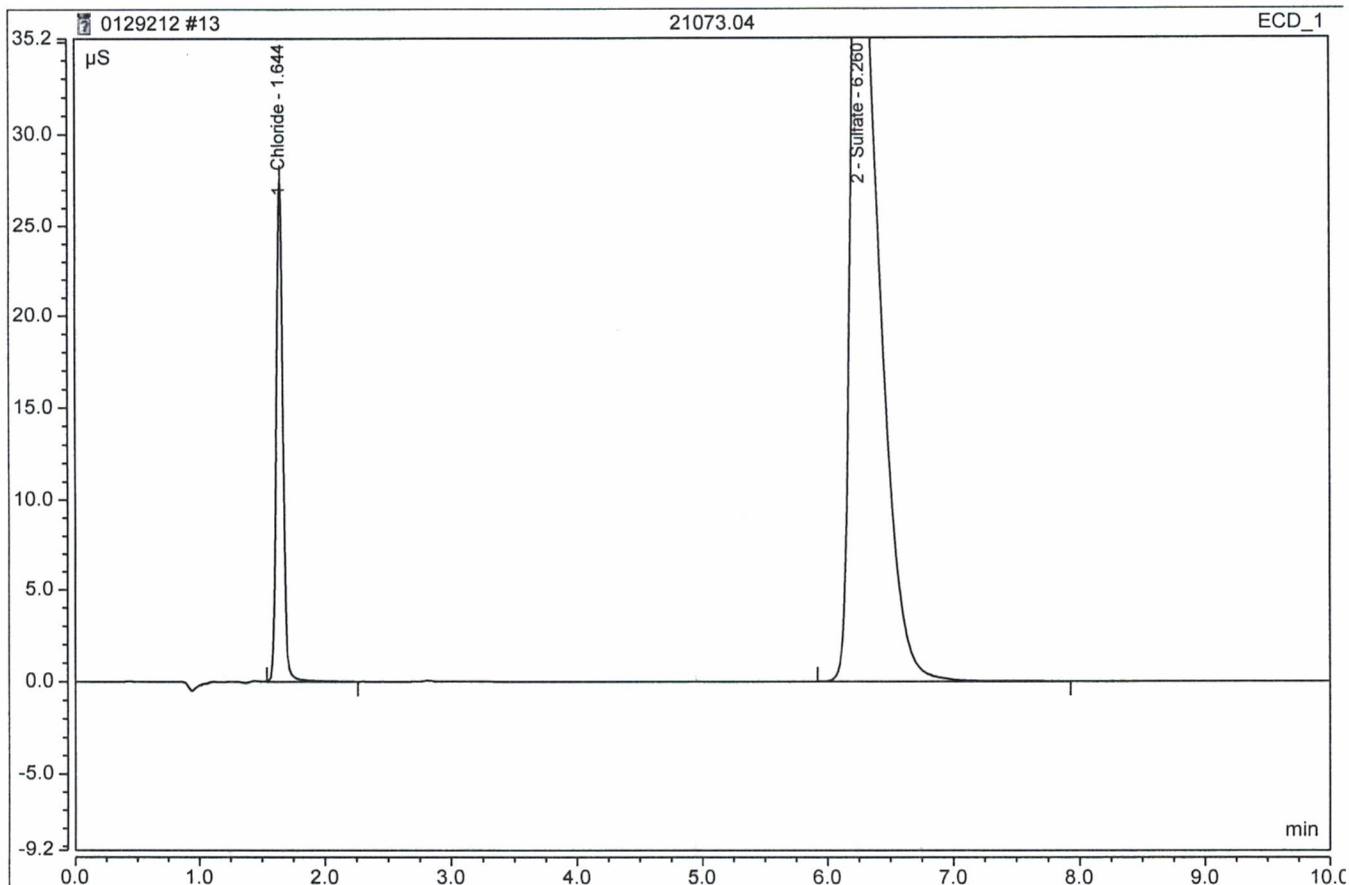
Sample Name:	21073.03	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	5.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 13:55	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



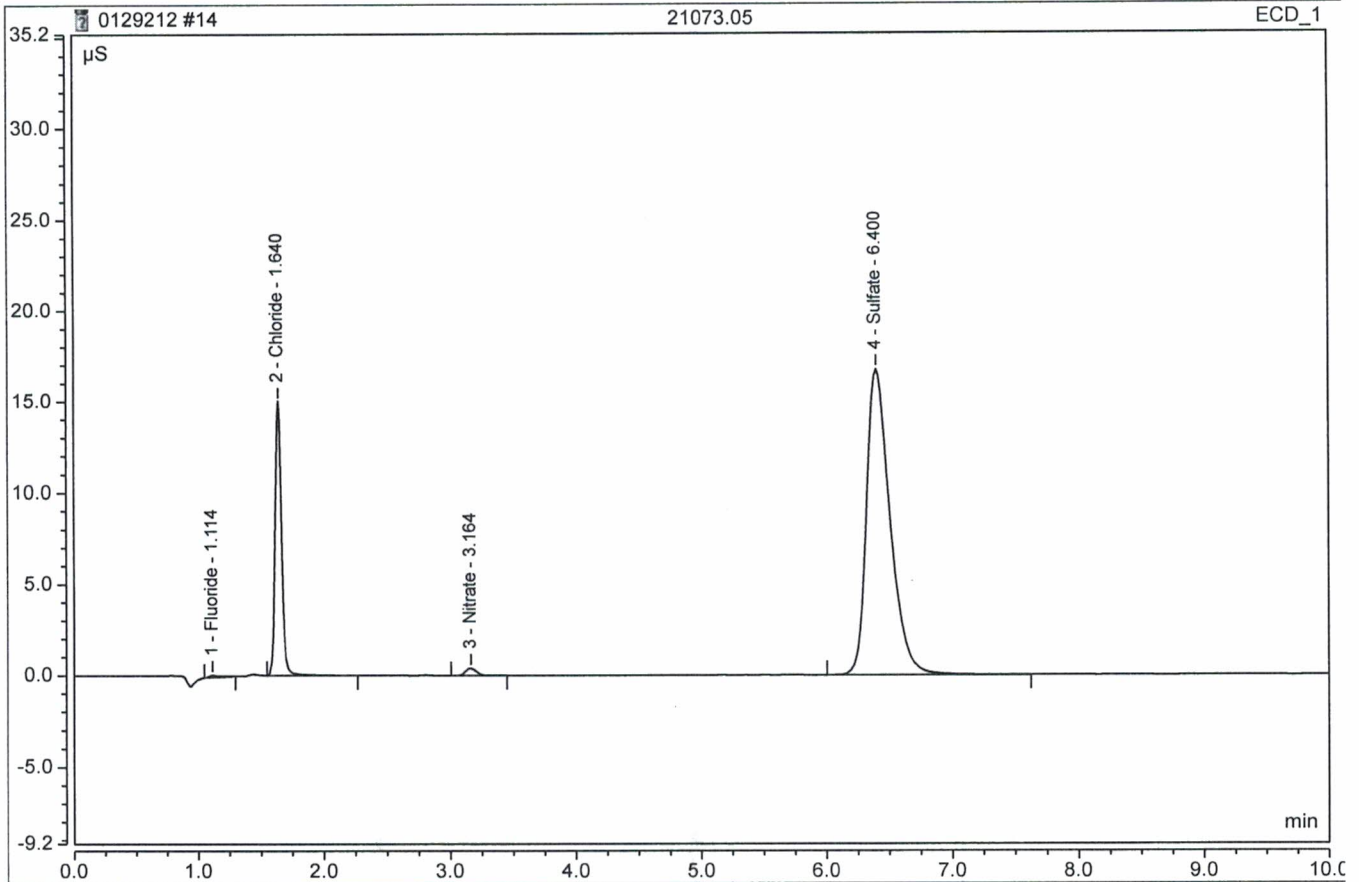
Sample Name:	21073.04	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	5.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 14:05	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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

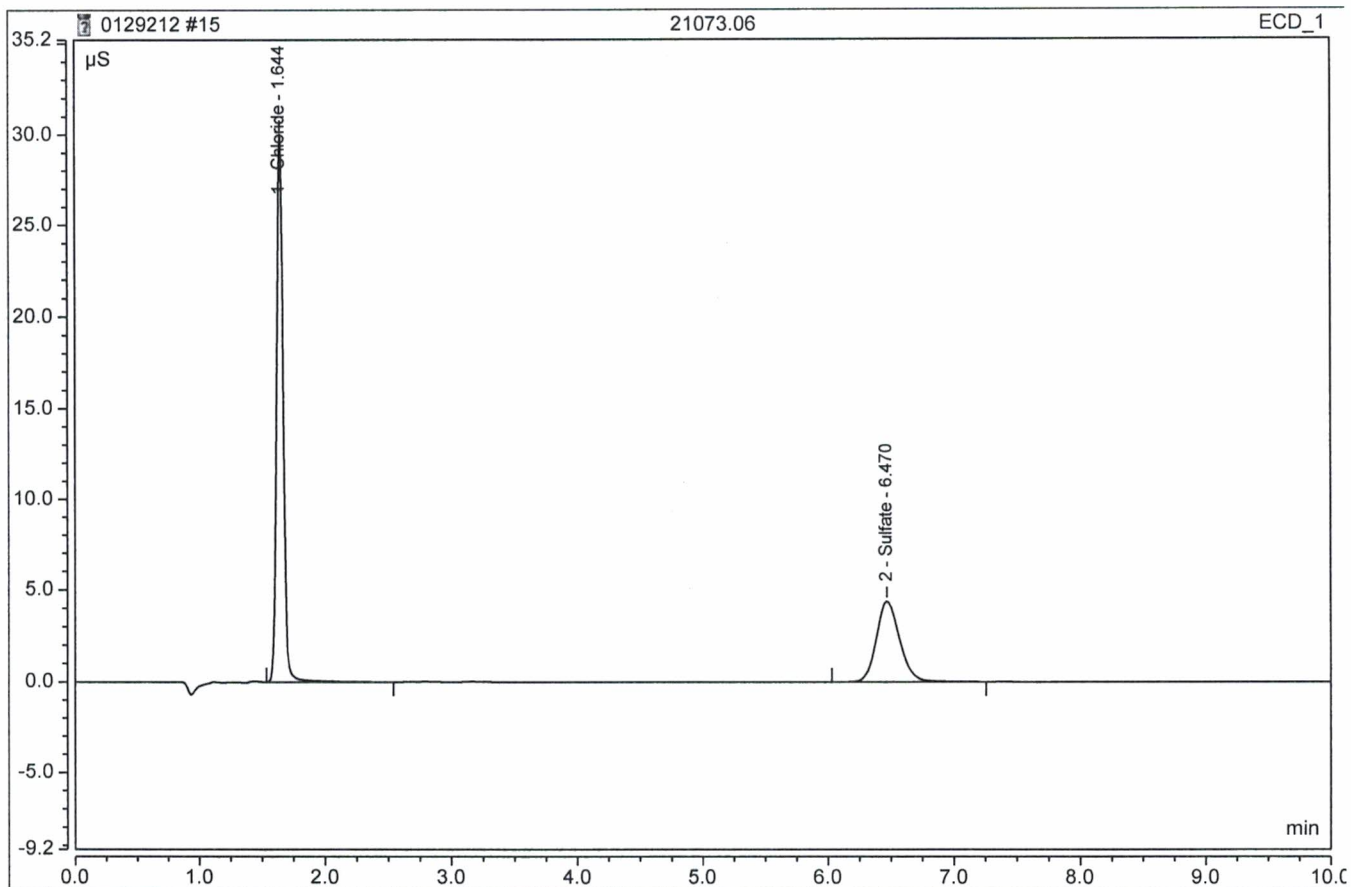
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.011	0.125	0.1429
2	1.64	Chloride	M	0.896	15.003	37.9853
3	3.16	Nitrate	M	0.040	0.403	0.7660
4	6.40	Sulfate	M	3.613	16.734	224.0262
TOTAL:				4.56	32.26	262.92





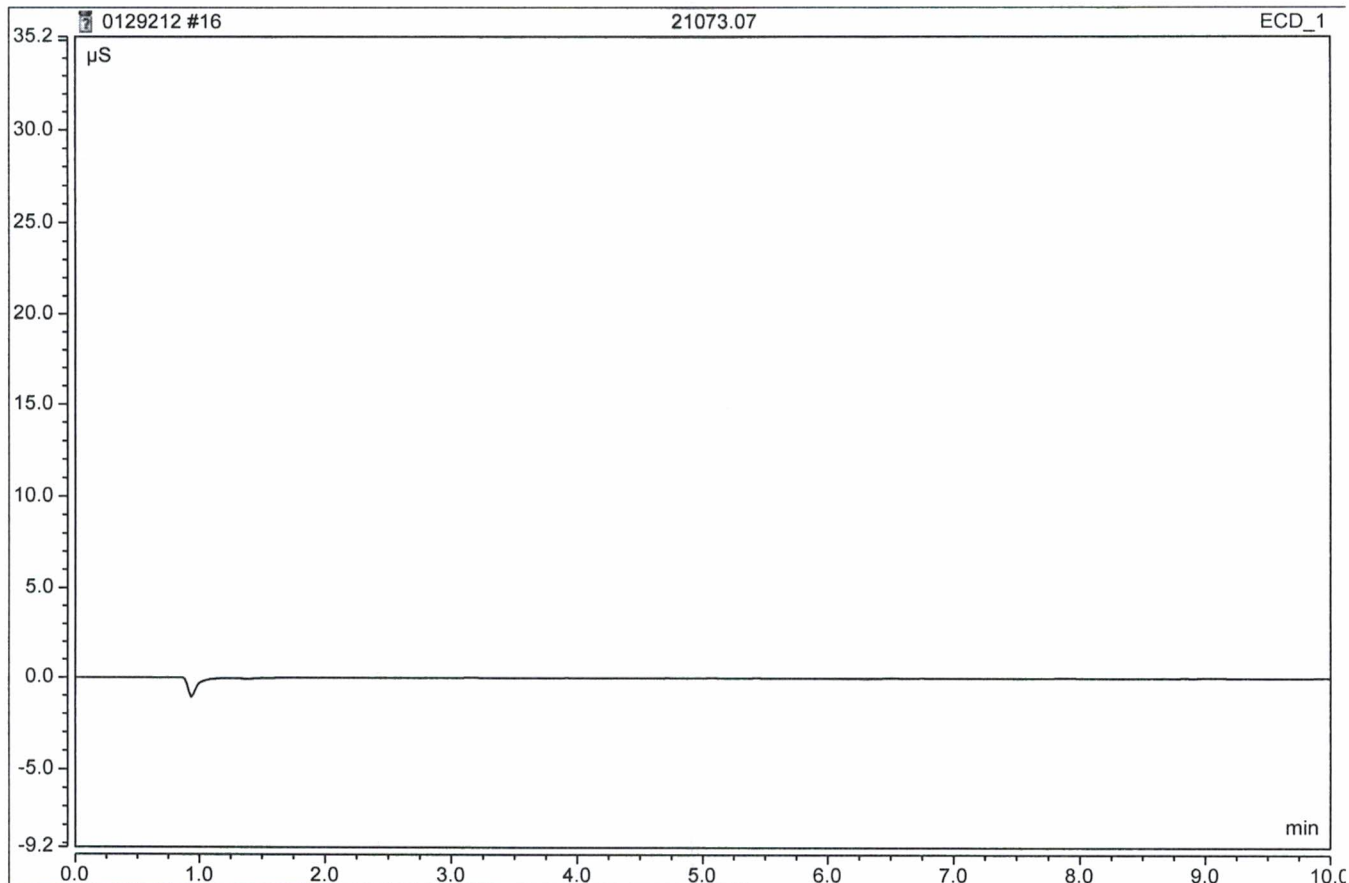
Sample Name:	21073.06	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	5.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 14:25	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



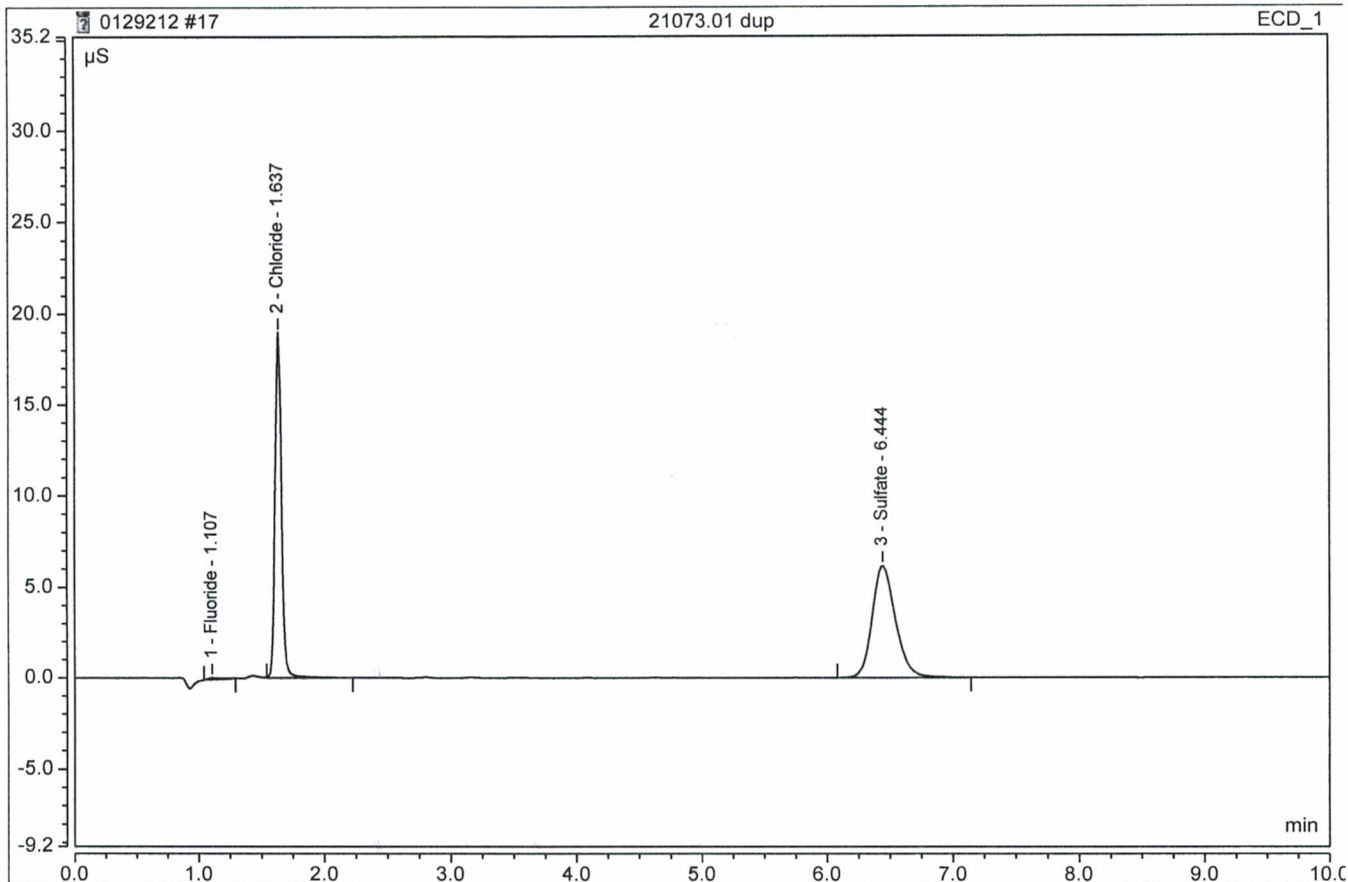
Sample Name:	21073.07	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	2.5000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 14:35	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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

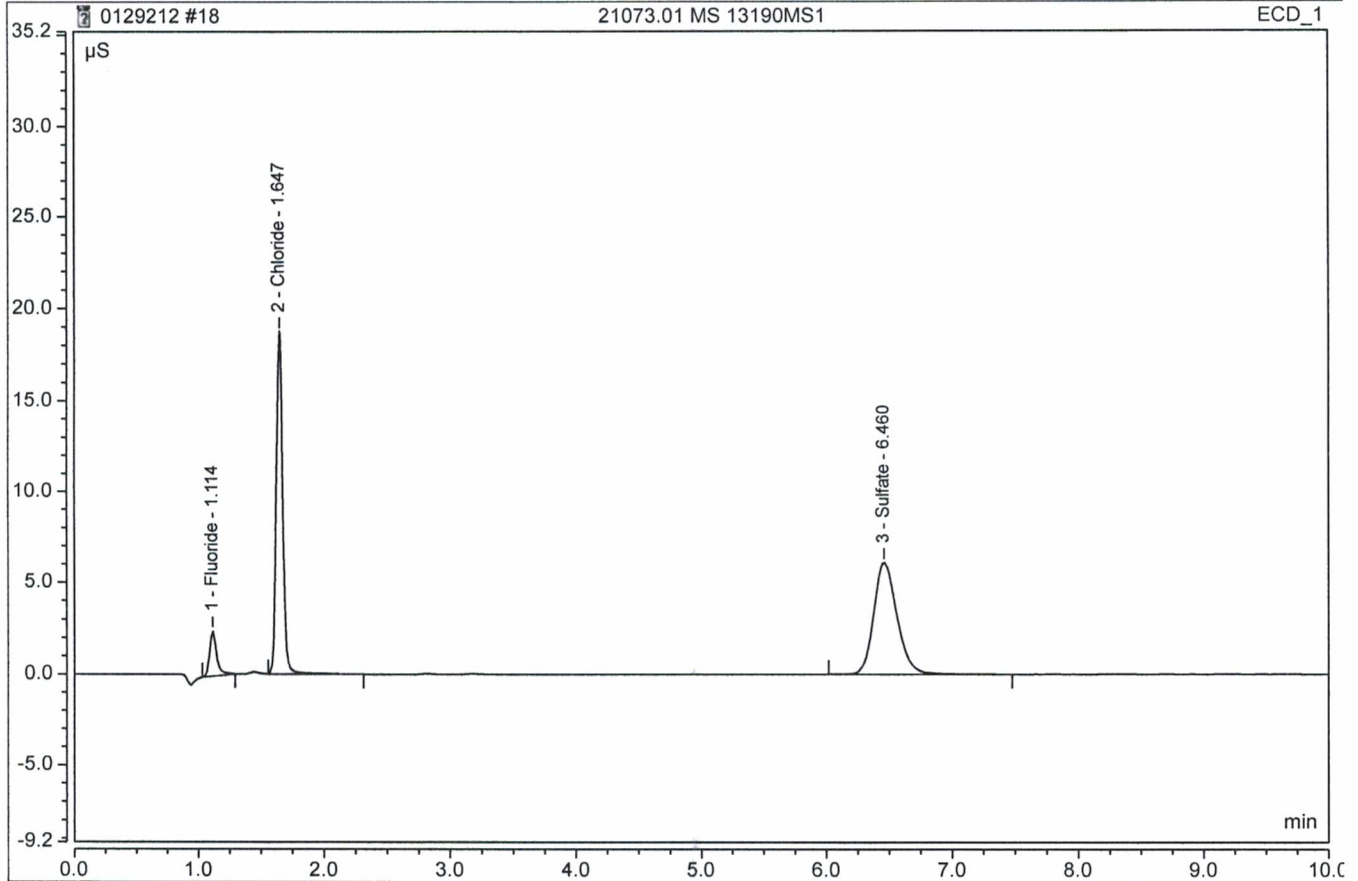
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.011	0.101	0.1376
2	1.64	Chloride	M	1.127	18.972	47.4313
3	6.44	Sulfate	M	1.317	6.183	81.6511
TOTAL:				2.45	25.26	129.22



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 $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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 - 0.03 = 9.33

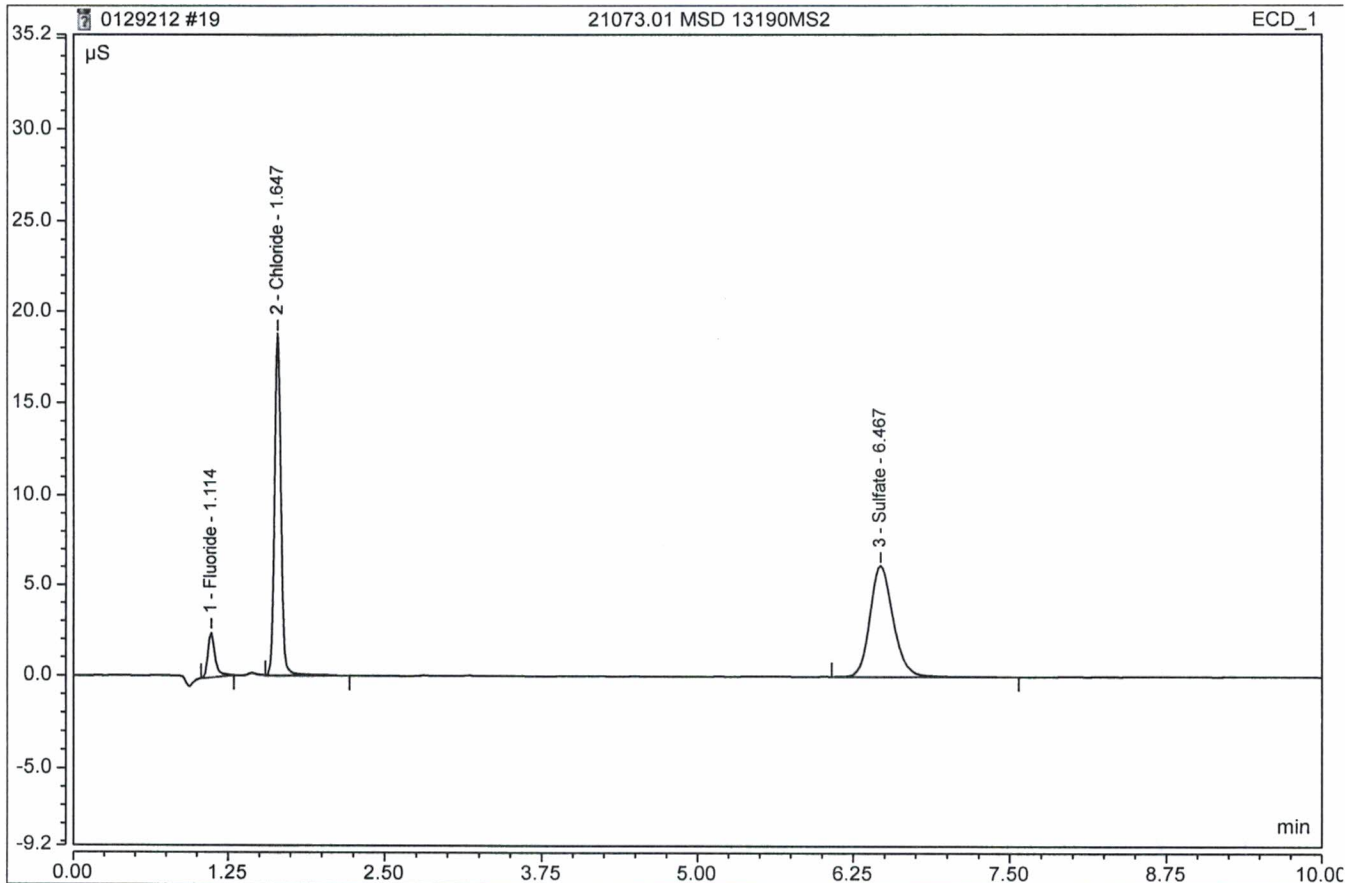




Sample Name:	21073.01 MSD 13190MS2	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 15:05	Column:	AS4A-SC 038777

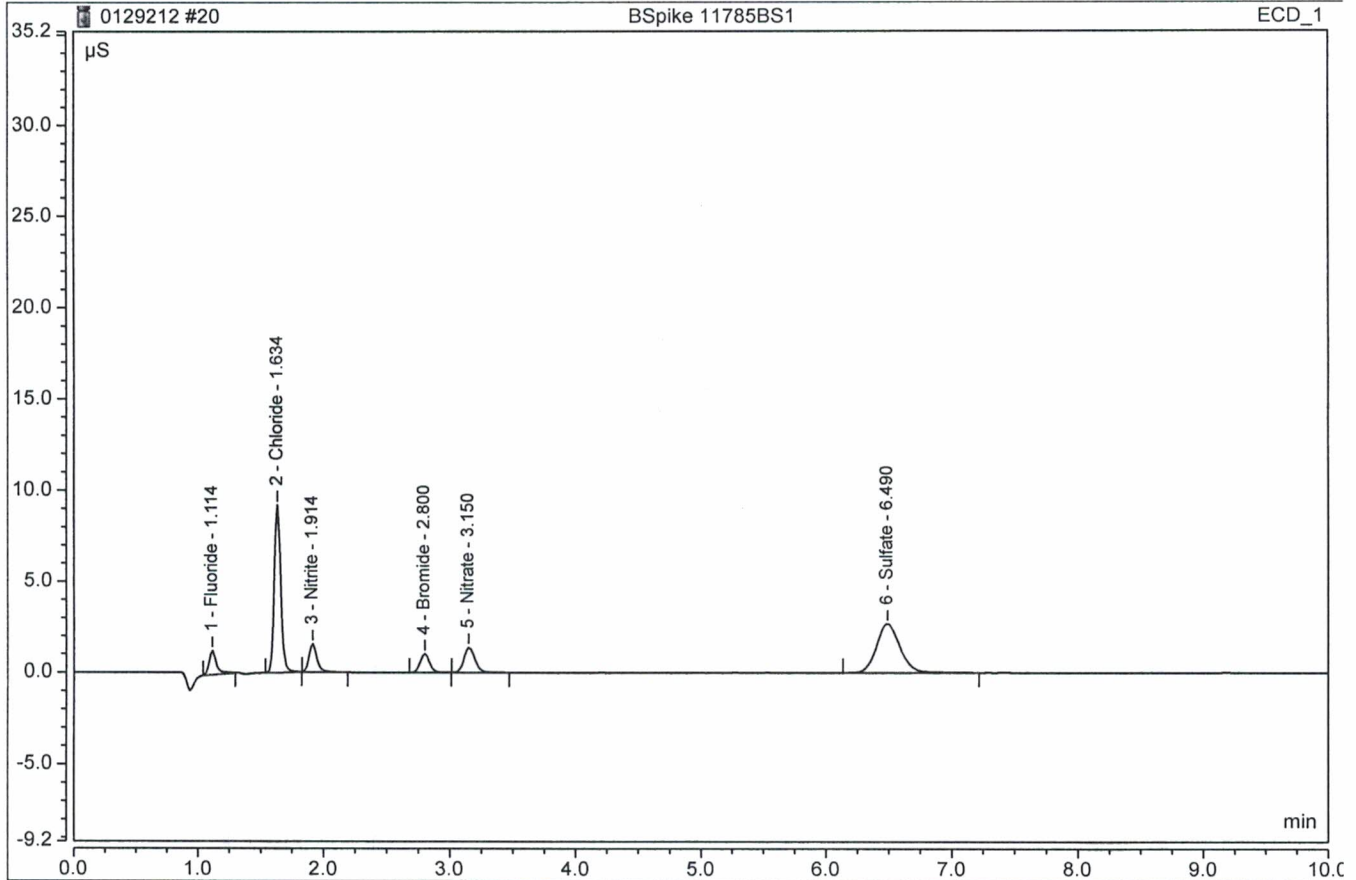
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.156	2.447	0.9640
2	1.65	Chloride	M	1.114	18.753	9.3787
3	6.47	Sulfate	M	1.310	6.107	16.2401
TOTAL:				2.58	27.31	26.58

93 ?



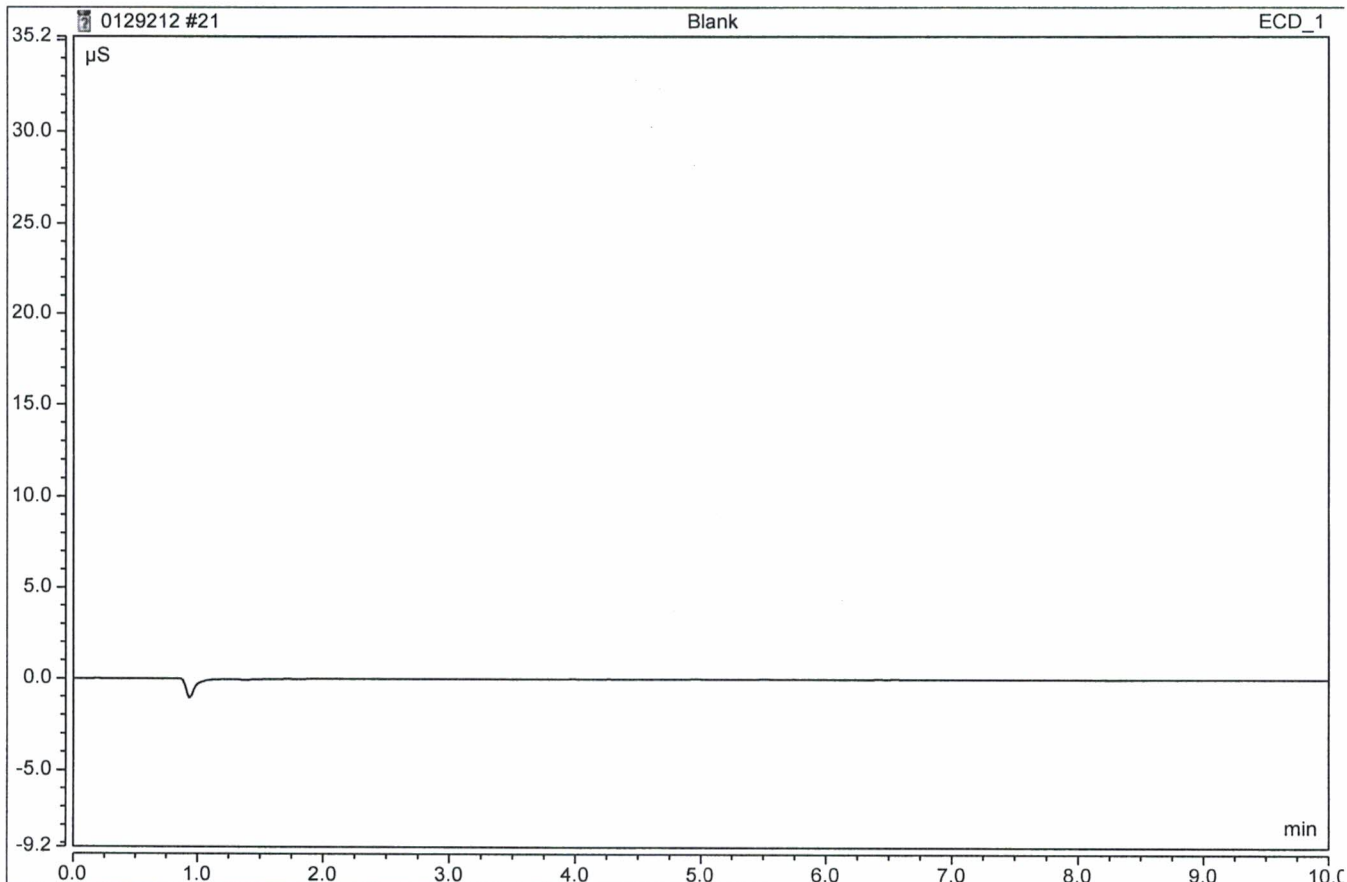
Sample Name:	BSpoke 11785BS1	Inj. Vol.:	5000.00
Injection Type:	Check Standard	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	29-Jan-2021 / 15:15	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.084	1.293	0.4980
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 $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount n.a.
TOTAL:				0.00	0.00	0.00



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

CALID# 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	

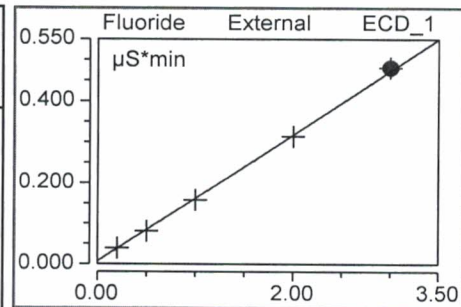


**Calibration Batch Report**  
**CAL ID# ICSA120320CAL**

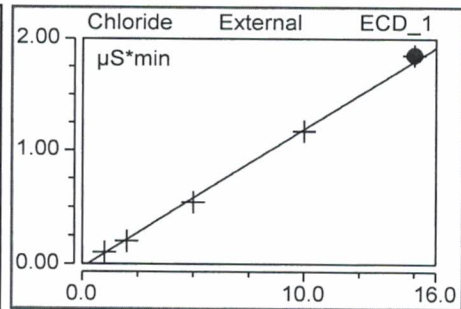
Sequence:	Cal 120320	Injection Volume:	5,000.00
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	03-Dec-2020 / 10:26	Column:	AS4A-SC 038777

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
<b>AVERAGE:</b>				-0.0045	0.1482	0.0000	99.8975

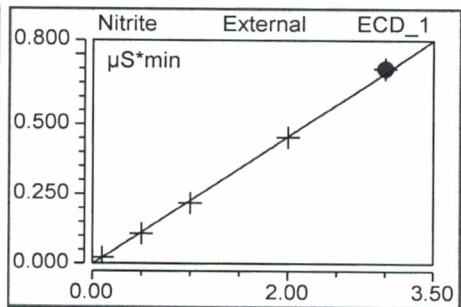
Injection Name	Ret.Time min	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
1132Cal1	1.110	0.0393	0.542	0.211
1132Cal2	1.110	0.0813	1.238	0.481
1132Cal3	1.110	0.1585	2.515	0.978
1132Cal4	1.110	0.3139	5.172	1.978
1132Cal5	1.107	0.4807	7.992	3.052
<b>Average</b>	1.110			
<b>Rel. Std. Dev.</b>	0.136 %			



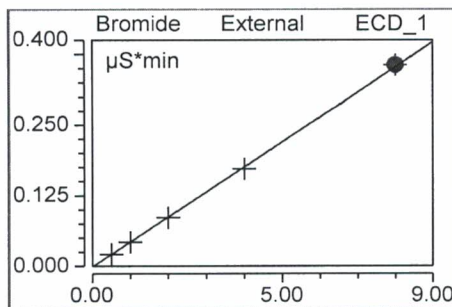
Injection Name	Ret.Time min	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
1132Cal1	1.624	0.1031	1.709	1.096
1132Cal2	1.620	0.2008	3.339	1.897
1132Cal3	1.627	0.5421	9.147	4.694
1132Cal4	1.630	1.1742	19.854	9.874
1132Cal5	1.637	1.8531	30.972	15.439
<b>Average</b>	1.628			
<b>Rel. Std. Dev.</b>	0.392 %			



Injection Name	Ret.Time min	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	Amount
	ECD 1	ECD 1	ECD 1	ECD 1
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
<b>Average</b>	1.906			
<b>Rel. Std. Dev.</b>	0.155 %			

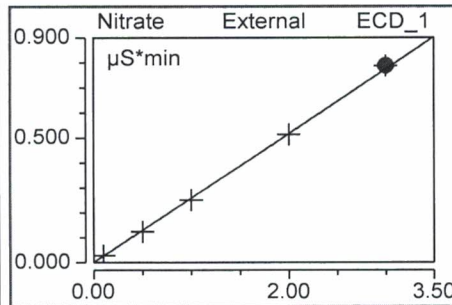


Injection Name	Ret. Time min ECD 1	Area μS*min ECD 1	Height μS ECD 1	Amount ECD 1
1132Cal1	2.784	0.0213	0.253	0.511
1132Cal2	2.774	0.0428	0.502	0.997
1132Cal3	2.777	0.0860	0.996	1.976
1132Cal4	2.780	0.1724	2.034	3.932
1132Cal5	2.777	0.3559	4.227	8.085
<b>Average</b>	2.778			
<b>Rel. Std. Dev.</b>	0.139 %			

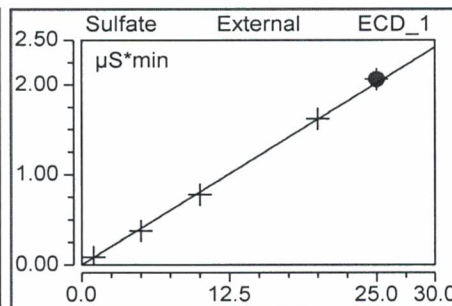


*(Handwritten signature)*

Injection Name	Ret. Time min ECD 1	Area μS*min ECD 1	Height μS ECD 1	Amount ECD 1
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
<b>Average</b>	3.123			
<b>Rel. Std. Dev.</b>	0.382 %			



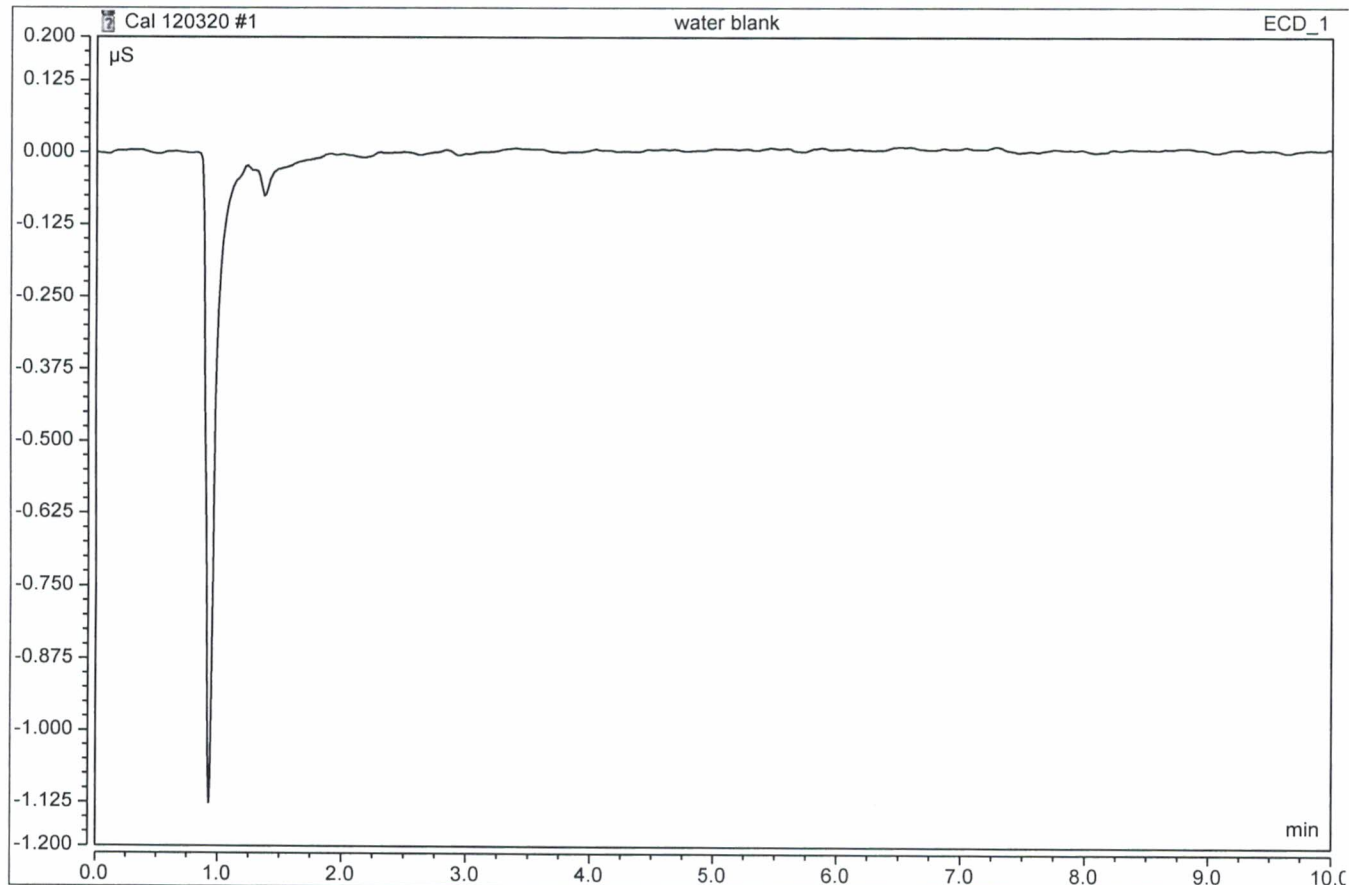
Injection Name	Ret. Time min ECD 1	Area μS*min ECD 1	Height μS ECD 1	Amount ECD 1
1132Cal1	6.510	0.0866	0.394	1.074
1132Cal2	6.504	0.3774	1.750	4.680
1132Cal3	6.490	0.7785	3.633	9.654
1132Cal4	6.460	1.6169	7.566	20.051
1132Cal5	6.447	2.0595	9.609	25.540
<b>Average</b>	6.482			
<b>Rel. Std. Dev.</b>	0.426 %			





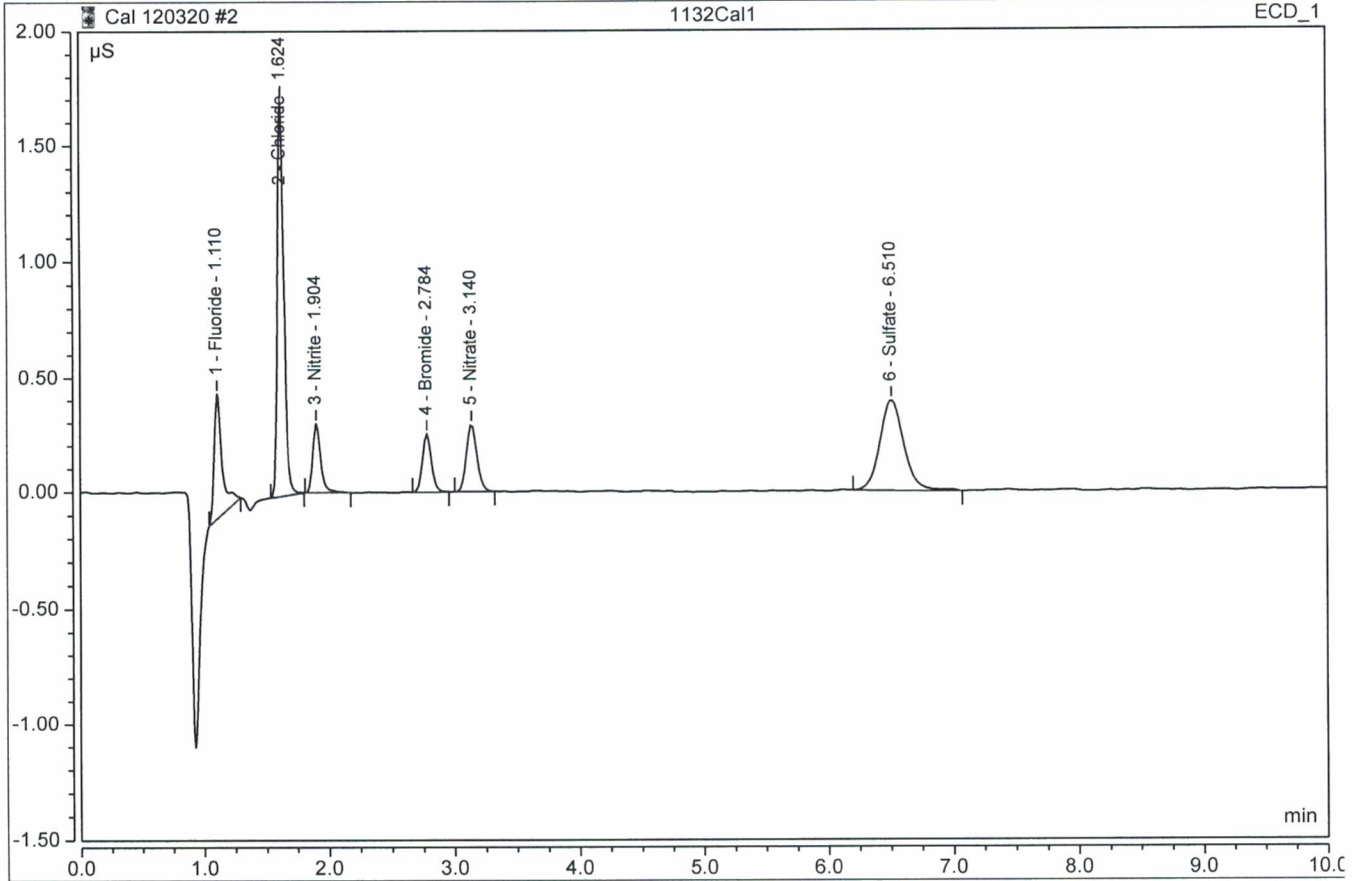
Sample Name:	water blank	Inj. Vol.:	5000.00
Injection Type:	Unknown	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	03-Dec-2020 / 09:34	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount n.a.
TOTAL:				0.00	0.00	0.00



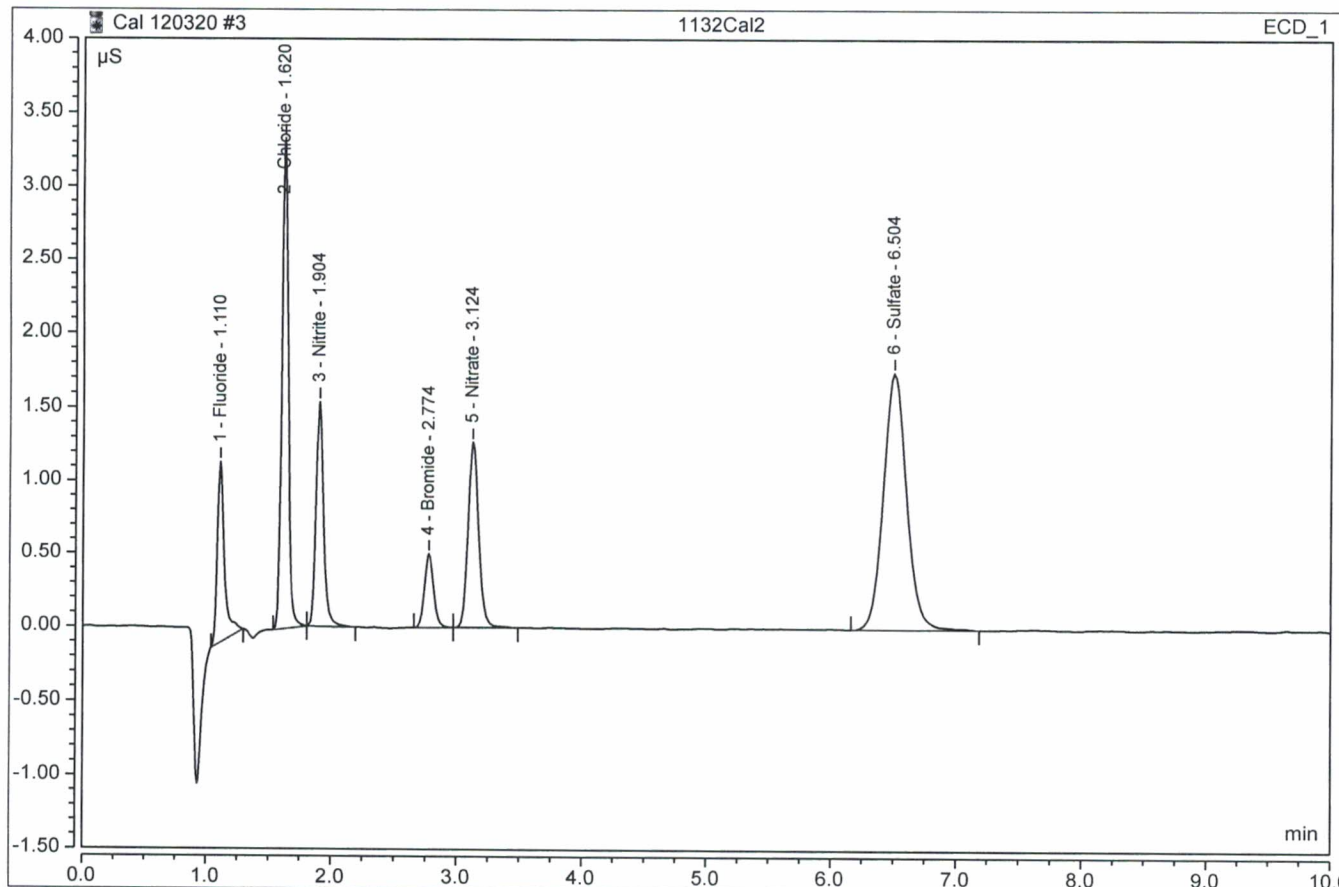
Sample Name:	1132Cal1	Inj. Vol.:	5000.00
Injection Type:	Calibration Standard	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	03-Dec-2020 / 09:46	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	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



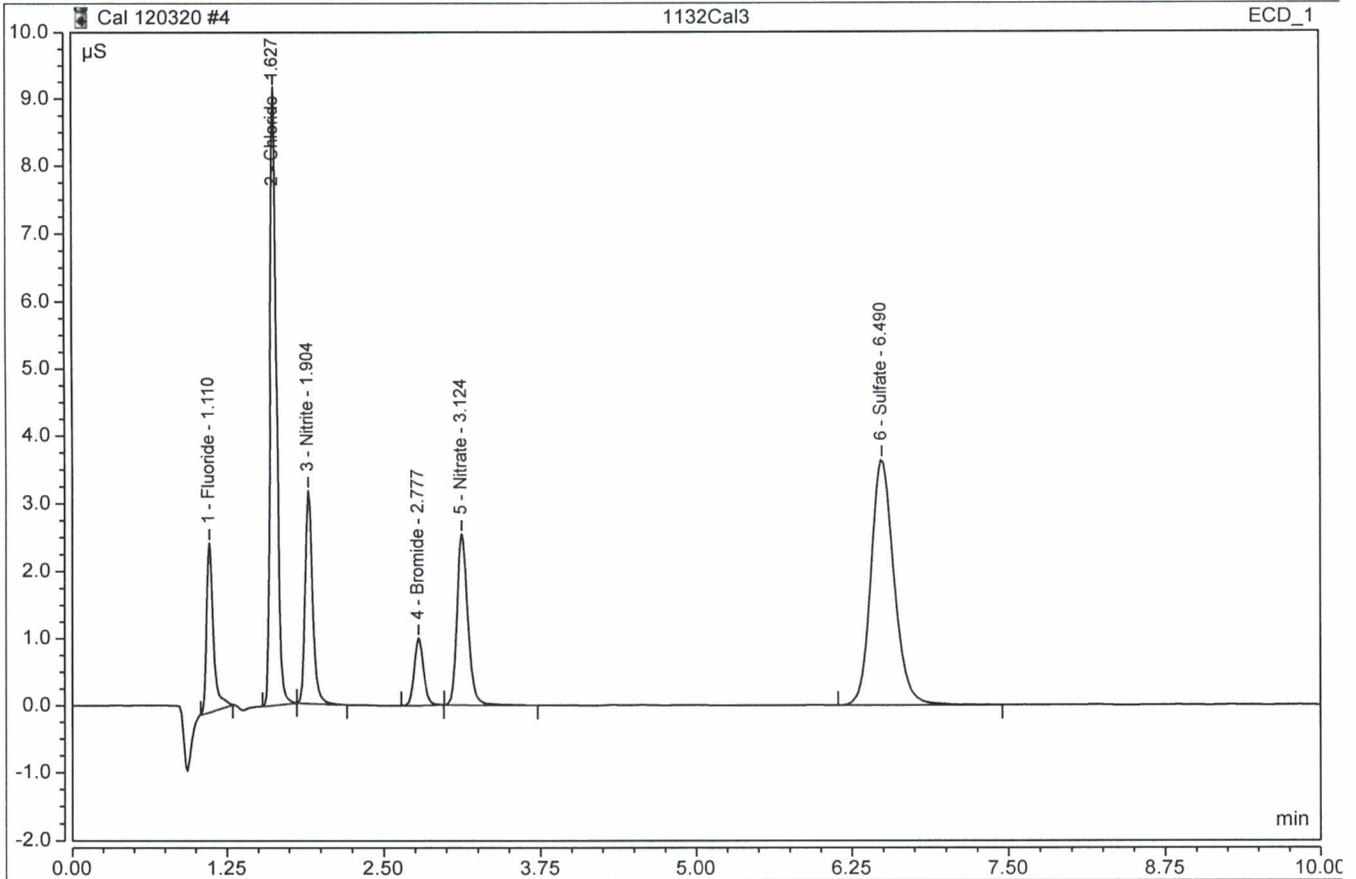
Sample Name:	1132Cal2	Inj. Vol.:	5000.00
Injection Type:	Calibration Standard	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	03-Dec-2020 / 09:56	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S} \cdot \text{min}$	Height $\mu\text{S}$	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

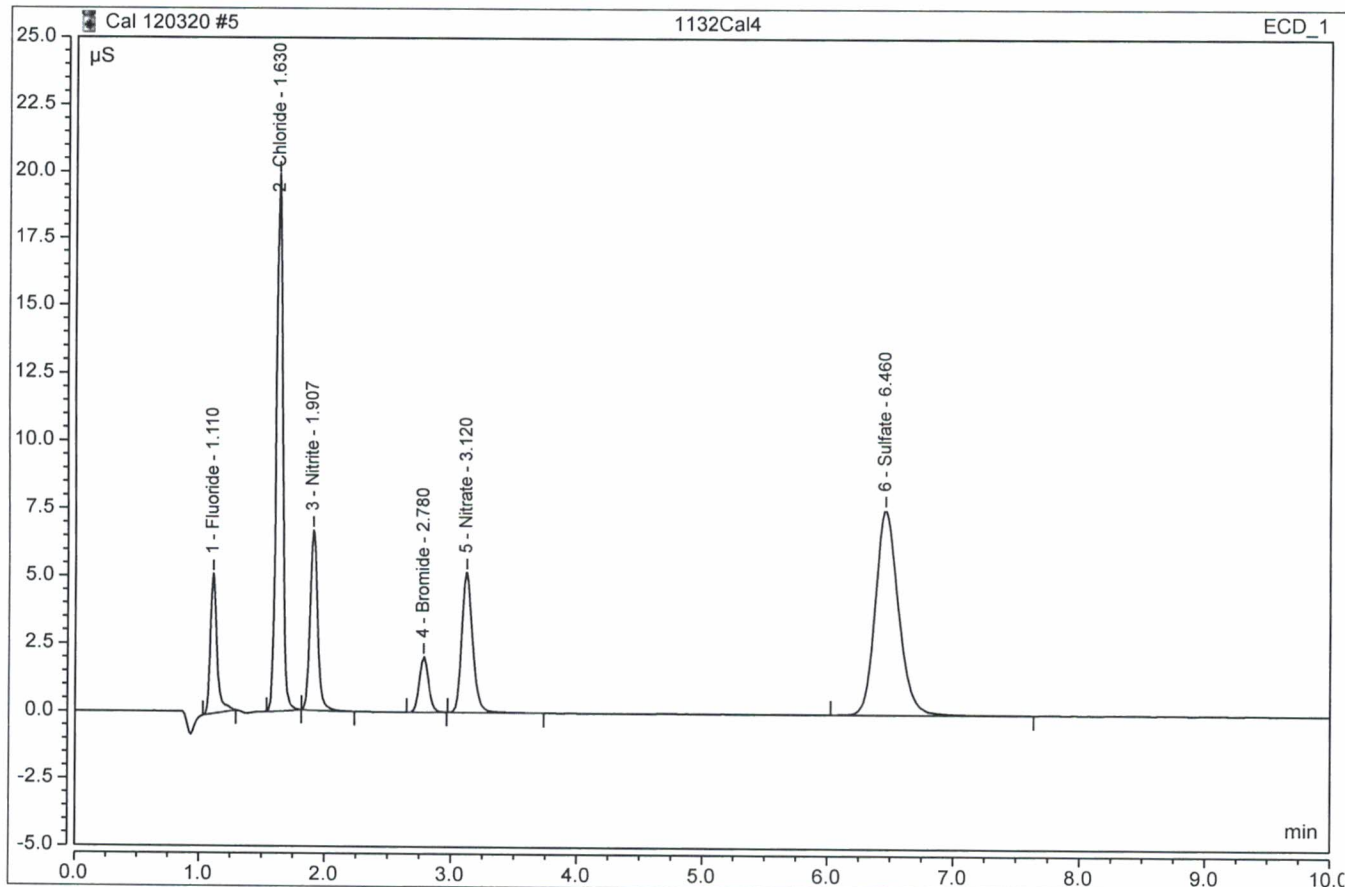
No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.159	2.515	0.9780
2	1.63	Chloride	M	0.542	9.147	4.6938
3	1.90	Nitrite	M	0.218	3.154	0.9607
4	2.78	Bromide	M	0.086	0.996	1.9756
5	3.12	Nitrate	M	0.251	2.537	0.9717
6	6.49	Sulfate	M	0.779	3.633	9.6543
TOTAL:				2.03	21.98	19.23





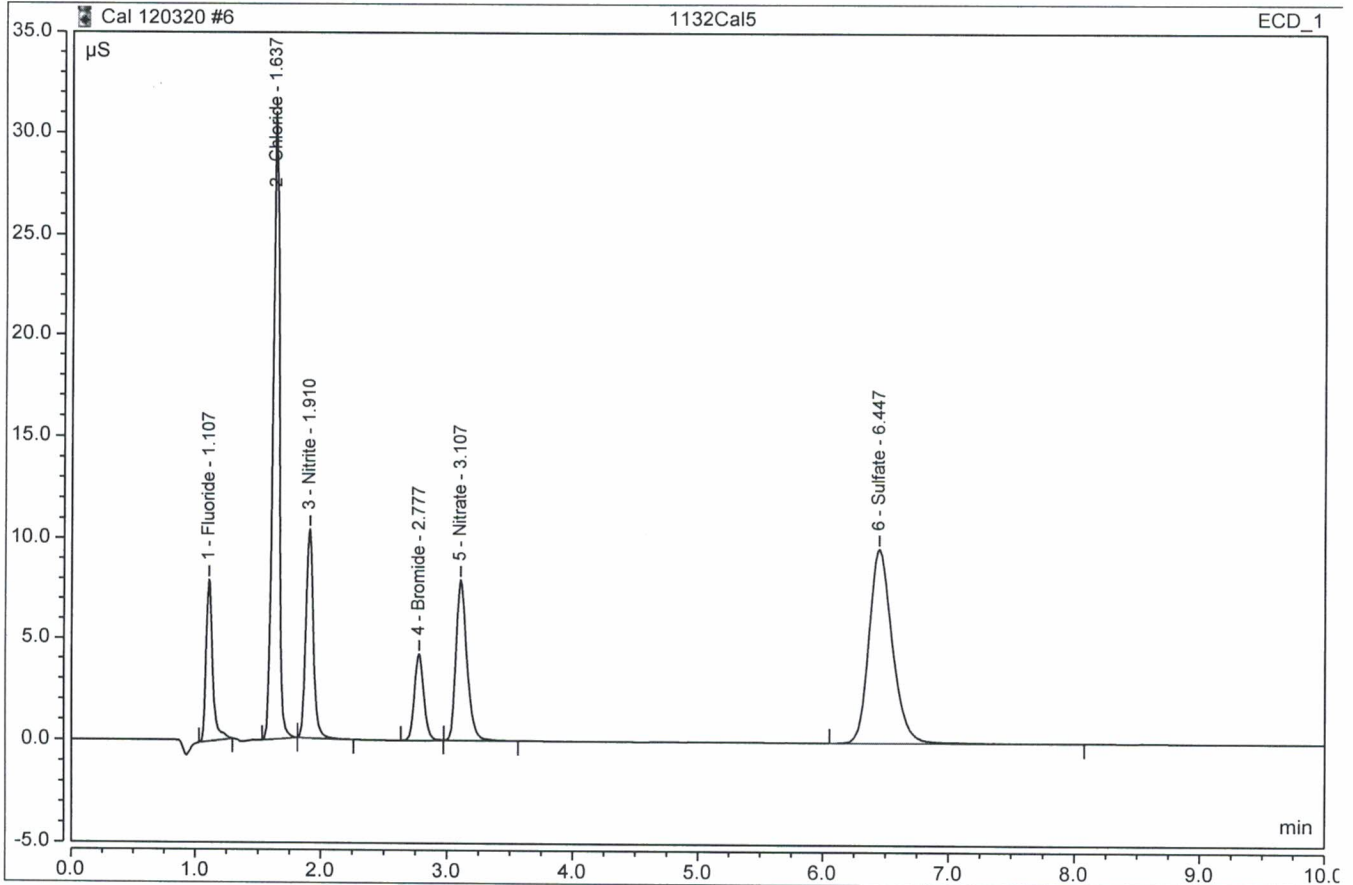
Sample Name:	1132Cal4	Inj. Vol.:	5000.00
Injection Type:	Calibration Standard	Dilution Factor:	1.0000
Instrument Method:	New Instrument Method	Operator:	Jeff Phifer
Inj. Date / Time:	03-Dec-2020 / 10:16	Column:	AS4A-SC 038777

No.	Time min	Peak Name	Peak Type	Area $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.314	5.172	1.9783
2	1.63	Chloride	M	1.174	19.854	9.8743
3	1.91	Nitrite	M	0.453	6.640	1.9884
4	2.78	Bromide	M	0.172	2.034	3.9317
5	3.12	Nitrate	M	0.514	5.169	1.9910
6	6.46	Sulfate	M	1.617	7.566	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 $\mu\text{S}\cdot\text{min}$	Height $\mu\text{S}$	Amount
1	1.11	Fluoride	M	0.481	7.992	3 3.0519
2	1.64	Chloride	M	1.853	30.972	15 15.4391
3	1.91	Nitrite	M	0.700	10.351	3 3.0643
4	2.78	Bromide	M	0.356	4.227	8 8.0848
5	3.11	Nitrate	M	0.788	7.936	3 3.0538
6	6.45	Sulfate	M	2.060	9.609	25 25.5400
TOTAL:				6.24	71.09	58.23



# Total Suspended Solids

TSS: VLIMS Code: 4630; EPA Method: 2540D

Date Started: 28 JAN 21  
 Time Started: 1530  
 Analyst: AB  
 Batch ID: TSS 210128  
 Temperature: 102°C  
 Time in Oven: 4:10

Date Finished: 28 JAN 21  
 Time Finished: 1940  
 Reviewed by: BB  
 Review Date: 2/15/2021  
 Balance ID: I3  
 Oven ID/Thermometer ID: 05/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		<del>0.30</del> ND	<del>0.30</del> 1.00	N	
LCS Lot									
8216-09	YE	100	0.1200	0.1250		50	10.0		
21051.01	YF	200	0.1180	0.1223		<del>21.50</del> 22	5.00		
Dup									
.01	YG	200	0.1198	0.1238		20	5.00		
21045.01	YH	610	0.1240	0.1240		<del>0.00</del> ND	1.64		
21058.01	YI	150 250	0.1224	0.1249		<del>16.67</del> 17	6.67		
21073.01	YJ	500	0.1173	0.1242		<del>13.80</del> 14	2.00		
.02	YK	1000	0.1194	0.1293		<del>9.90</del> 10	1.00		
.03	YL	1000	0.1200	0.1211		<del>1.10</del> ND	1.00		
.04	YM	1000	0.1165	0.1239		<del>7.40</del> 7	1.00		
.05	YN	1000	0.1160	0.1158		<del>0.20</del> ND	1.00		
.06	YP	1000	0.1172	0.1180		<del>0.80</del> ND	1.00		
.07	YQ	1000	0.1169	0.1162		<del>0.70</del> ND	1.00		

LCS value = 57.8 mg/L

Acceptance Criteria (mg/L): 45.7-65.6 mg/L

% Rec = 86.5%

Acceptance Criteria (%): 79.1-113%

% RPD = 7.2% \*

Acceptance Criteria: ± 5% of average

*Sample was chunky*



# Total Dissolved Solids

TDS: VLIMS Code: 4615; EPA Method: 2540C

Date Started: 28 JAN 21  
 Time Started: 1745  
 Analyst: Ag  
 Batch ID: TDS210128  
 Temperature: 180°C  
 Time in Oven: 68:25

Date Finished: 31 JAN 21  
 Time Finished: 1410  
 Reviewed by: BB  
 Review Date: 2/15/2021  
 Balance ID: I30  
 Oven ID/Thermometer ID: 012/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	3.7263			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			1290*
							1292

LCS value =  $\frac{457.2 \mu\text{K}}{57.8 \mu\text{K}} \times 315 \text{ mg/L}$   
 % Rec = 98.9%  
 % RPD = 1.8%

Acceptance Criteria (mg/L):  $45.7 - 65.6 \mu\text{K}$   
 Acceptance Criteria (%):  $79.1 - 115\%$   
 Acceptance Criteria:  $\pm 5\%$  of average





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 Phone (517) 332-0167 Fax (517) 332-4034  
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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.

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 Assessment 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)**

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives							Total Metals	F- undistilled, Cl-, SO4	Radium 226	Radium 228	TDS	TSS	Certifications
	DATE	TIME				NONE	HCl	HNO3	H2SO4	NHOH	MeOH	OTHER							
21073.01	01/27/21	1226	MW-1 L101070-01	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water
.02	01/27/21	1556	MW-2 -02	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES
.03	01/27/21	1021	MW-4 -03	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Project Locations
.04	01/27/21	1636	MW-5 -04	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Detroit <input type="checkbox"/> New York
.05	01/27/21	1421	MW-6 -05	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Other
.06	01/27/21	1021	MW-4 Duplicate -06	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Special Instructions
.07	01/27/21	730	Field Blank -07	DI	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Metals to analyse:

RELINQUISHED BY: *[Signature]*  Sampler DATE **1-28-21** TIME **12:30**  
 RECEIVED BY: *[Signature]* DATE **1/28/21** TIME **12:30**

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME  
 RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME  
 SEAL NO. SEAL INTACT YES  NO  INITIALS  
 NOTES: TEMP. ON ARRIVAL **2.4**



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

**REPORT TO** **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME <b>Project Management Team</b>				CONTACT NAME <b>Julie Teague</b>				<input checked="" type="checkbox"/> RAME			
COMPANY <b>Merit Laboratories</b>				COMPANY <b>Merit Laboratories</b>							
ADDRESS <b>2680 East Lansing Drive</b>				ADDRESS <b>2680 East Lansing Drive</b>							
CITY <b>East Lansing</b>			STATE <b>MI</b>	ZIP CODE <b>48823</b>		CITY <b>East Lansing</b>			STATE <b>MI</b>	ZIP CODE <b>48823</b>	
PHONE NO. <b>517-332-0167</b>		FAX NO.		P.O. NO.		PHONE NO. <b>517-332-0167</b>		E-MAIL ADDRESS <b>juliet@meritlabs.com</b>			
E-MAIL ADDRESS <b>results@meritlabs.com</b>				QUOTE NO.				<b>ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)</b>			

PROJECT NO./NAME <b>S21073</b>				SAMPLER(S) - PLEASE PRINT/SIGN NAME							
--------------------------------	--	--	--	-------------------------------------	--	--	--	--	--	--	--

TURNAROUND TIME REQUIRED <input type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> OTHER _____											
DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL II <input type="checkbox"/> LEVEL III <input checked="" type="checkbox"/> LEVEL IV <input type="checkbox"/> EDD <input type="checkbox"/> OTHER _____											

MATRIX CODE:	GW=GROUNDWATER	WW=WASTEWATER	S=SOIL	L=LIQUID	SD=SOLID	# Containers & Preservatives						
	SL=SLUDGE	DW=DRINKING WATER	O=OIL	WP=WPE	A=AIR	W=WASTE						

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	MeOH	OTHER	Radium 226*	Radium 228**	Certifications		Project Locations		Special Instructions
	DATE	TIME													<input type="checkbox"/> OHIO VAP	<input type="checkbox"/> Drinking Water	<input type="checkbox"/> DoD	<input type="checkbox"/> NPDES	
	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 & provide Radium 226/228 combined results on the report
	1/27/20	1421	S21073.05	GW	2			2					✓	✓					
	1/27/20	1021	S21073.06	GW	2			2					✓	✓					
	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 <i>Sam Smith</i>				<input type="checkbox"/> Sampler				DATE <b>1/28/21</b>		TIME <b>1700</b>		RELINQUISHED BY: SIGNATURE/ORGANIZATION _____				DATE _____		TIME _____	
RECEIVED BY: SIGNATURE/ORGANIZATION <i>UPS</i>								DATE <b>1/28/21</b>		TIME <b>1700</b>		RECEIVED BY: SIGNATURE/ORGANIZATION _____				DATE _____		TIME _____	
RELINQUISHED BY: SIGNATURE/ORGANIZATION _____								DATE _____		TIME _____		SEAL NO. _____		SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>		INITIALS _____		NOTES: TEMP. ON ARRIVAL _____	
RECEIVED BY: SIGNATURE/ORGANIZATION _____								DATE _____		TIME _____		SEAL NO. _____		SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>		INITIALS _____			

# 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. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # IR 2.4 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun                 |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped  |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box                        |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |

## Chain of Custody

- |     |  |  |
|-----|--|--|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out  |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab                               |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC                                      |
| 09. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: GEL UPS# 1Z4664770363502504 |

## Preservation

- |     |  |   |
|-----|--|---|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation        |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab?    |

## Bottle Conditions

- |     |  |   |
|-----|--|---|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact                            |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used       |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used                            |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received             |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration         |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time         |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: S21073      Submitted: 01/28/2021 12:36

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

Client: BWL01 (Board of Water & Light)

Project: Erickson AM EPA Assessment 2

Initial Preservation Check: 01/28/2021 13:05 SRS

Phone: 517-702-6372      FAX:  
Email: Environmental\_Laboratory@LBWL.com

Preservation Recheck (E200.8): N/A

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

Invoice to  
 Attention: Kelly Gleason  
 Address: Board of Water & Light  
 PO Box 13007  
 Lansing, MI 48901

Phone: 517-702-6372      FAX:  
 Email: Environmental\_Laboratory@LBWL.com

Phone: 517-702-6372      FAX: 517-702-6373  
 Email: kelly.gleason@lbwl.com

Contacts:  
 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



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.

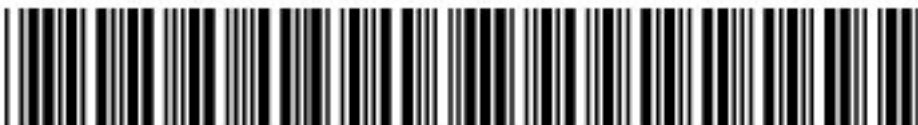
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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



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# 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:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink, appearing to read "Sam Hogan". The signature is written in a cursive style with a large, stylized initial "S".

Samuel Hogan for  
Lindsay Fabra  
Project Manager

# **Chain of Custody and Supporting Documentation**



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

533686

**REPORT TO**

CONTACT NAME Project Management Team

COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing

PHONE NO. 517-332-0167

E-MAIL ADDRESS results@meritlabs.com

**CHAIN OF CUSTODY RECORD**

CONTACT NAME Julie Teague

COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing

PHONE NO. 517-332-0167

E-MAIL ADDRESS juliet@meritlabs.com

**INVOICE TO**

EP-NAME

STATE MI

ZIP CODE 48823

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

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=WPIPE A=AIR W=WASTE

MERIT LAB NO. FOR LAB USE ONLY	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	# Containers & Preservatives								
								H <sub>2</sub> O	H <sub>2</sub> O <sub>2</sub>	NaOH	MeOH	OTHER				
	1/27/20	1226		S21073.01	GW	2		2								
	1/27/20	1556		S21073.02	GW	2		2								
	1/27/20	1021		S21073.03	GW	2		2								
	1/27/20	1636		S21073.04	GW	2		2								
	1/27/20	1421		S21073.05	GW	2		2								
	1/27/20	1021		S21073.06	GW	2		2								
	1/27/20	0730		S21073.07 (Field Blank)	L	2		2								

Certifications	
<input type="checkbox"/> OHIO VAP	<input type="checkbox"/> Drinking Water
<input type="checkbox"/> DoD	<input type="checkbox"/> NPDES
Project Locations	
<input type="checkbox"/> Detroit	<input type="checkbox"/> New York
<input type="checkbox"/> 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: *Sam Smith* DATE: 1/28/21 TIME: 1:00

RECEIVED BY: *UPS* DATE: 1/28/21 TIME: 1:00

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

RECEIVED BY: *A. Ryan* DATE: 2/1/21 TIME: 10:10

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

533696

<b>Client:</b>	MEKI	<b>SDG/AR/COC/Work Order:</b>	
<b>Received By:</b>	AJA	<b>Date Received:</b>	2/1/21
<b>Carrier and Tracking Number</b>		Circle Applicable: FedEx Express    FedEx Ground <u>UPS</u> Field Services    Courier    Other LZ 466 477 03 6350 2504	
<b>Suspected Hazard Information</b>	Yes <input type="checkbox"/> No <input type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
A) Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___	
B) Did the client designate the samples are to be received as radioactive?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	COC notation or radioactive stickers on containers equal client designation.	
C) Did the RSO classify the samples as radioactive?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/Hr Classified as: Rad 1    Rad 2    Rad 3	
D) Did the client designate samples are hazardous?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	COC notation or hazard labels on containers equal client designation.	
E) Did the RSO identify possible hazards?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If D or E is yes, select Hazards below. PCB's    Flammable    Foreign Soil    RCRA    Asbestos    Beryllium    Other:	
<b>Sample Receipt Criteria</b>		Yes <input type="checkbox"/> NA <input type="checkbox"/> No <input type="checkbox"/>	<b>Comments/Qualifiers (Required for Non-Conforming Items)</b>
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Circle Applicable:    Seals broken    Damaged container    Leaking container    Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Circle Applicable:    Client contacted and provided COC    COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Preservation Method: Wet Ice    Ice Packs    Dry ice <u>None</u> Other: *all temperatures are recorded in Celsius    TEMP: <u>21°</u>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Temperature Device Serial #: <u>IR1-21</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Circle Applicable:    Seals broken    Damaged container    Leaking container    Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
			Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
			Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___
8	Samples received within holding time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Circle Applicable:    No dates on containers    No times on containers    COC missing info    Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Circle Applicable:    No container count on COC    Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> NA <input type="checkbox"/> No	Circle Applicable:    Not relinquished    Other (describe)
<b>Comments (Use Continuation Form if needed):</b>			

PM (or PMA) review: Initials SH Date 2/1/21 Page 1 of 1

# Laboratory Certifications

**List of current GEL Certifications as of 22 February 2021**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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

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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: S21073.01	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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: 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	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: S21073.04      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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## 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

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: February 25, 2021

Page 1 of 2

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
<b>Rad Gas Flow</b>											
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							
<b>Rad Ra-226</b>											
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

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 533686

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
J											
J											
K											
L											
M											
M											
N/A											
NI											
ND											
NJ											
Q											
R											
U											
UI											
UJ											
UL											
X											
Y											
^											
h											

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:**  
2090241

**Product:**  
GFC28RAL

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

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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	Comments:
WORK 1951-B	Barium-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 18-FEB-2021 00:00
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	

### 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

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

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
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													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		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	Recovery %	Recovery Error %
			Alpha	Beta										
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

<b>Results</b>																
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	<b>0.8503</b>	54.78%	0.2400	0.1314	0.9121	0.9372		SAMPLE				
2	1.3882	0.9801	3	2.1540	<b>0.7131</b>	88.82%	0.1840	0.1634	1.2412	1.2540		SAMPLE				
3	1.5419	1.0886	3	2.3493	<b>-0.9574</b>	64.67%	-0.2780	0.1797	1.2129	1.2130		SAMPLE				
4	0.8212	0.5797	3	1.3309	<b>3.2024</b>	17.51%	0.9340	0.1617	1.0863	1.3568		SAMPLE				
5	0.7646	0.5398	3	1.2465	<b>1.7198</b>	26.34%	0.5153	0.1351	0.8839	0.9853		SAMPLE				
6	1.1347	0.8011	3	1.7819	<b>0.9558</b>	56.79%	0.2660	0.1510	1.0635	1.0901		SAMPLE				
7	1.1595	0.8186	3	1.8233	<b>0.4044</b>	129.15%	0.1087	0.1403	1.0236	1.0286		SAMPLE				
8	0.9520	0.6721	3	1.5126	<b>-0.9702</b>	34.61%	-0.2880	0.0995	0.6573	0.6574		MB				
9	0.9238	0.6522	3	1.4757	<b>1.1370</b>	41.48%	0.3320	0.1376	0.9237	0.9667	533686004.1	DUP	95.2%			
10	0.6990	0.4935	3	1.1588	<b>58.2949</b>	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. Deuk 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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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

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 : 2087787  
 Analyst : MIC02086  
 Prep Date : 2/22/2021  
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
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	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 Ingrowth End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
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

<b>Results</b>																
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	<b>0.5041</b>	35.45%	0.4333	0.1528	0.3483	0.3578		SAMPLE				
2	0.1394	0.0984	1	0.3238	<b>0.2962</b>	42.94%	0.2333	0.1000	0.2488	0.2529		SAMPLE				
3	0.3508	0.2476	1	0.6381	<b>0.5237</b>	42.66%	0.3667	0.1528	0.4276	0.4444		SAMPLE				
4	0.3458	0.2442	1	0.6458	<b>0.7872</b>	32.32%	0.5000	0.1599	0.4933	0.5114		SAMPLE				
5	0.1446	0.1021	1	0.3358	<b>0.2633</b>	47.63%	0.2000	0.0943	0.2433	0.2487		SAMPLE				
6	0.2797	0.1975	1	0.5223	<b>0.2971</b>	55.67%	0.2333	0.1291	0.3222	0.3270		SAMPLE				
7	0.2689	0.1898	1	0.5210	<b>0.3769</b>	47.75%	0.2667	0.1247	0.3455	0.3569		SAMPLE				
8	0.3313	0.2339	1	0.5910	<b>0.2052</b>	82.85%	0.1667	0.1374	0.3317	0.3346		MB				
9	0.2112	0.1491	1	0.4092	<b>0.4071</b>	37.55%	0.3667	0.1374	0.2991	0.3053	533686001.1	DUP	21.3%			
10	0.2728	0.1926	1	0.5286	<b>33.3605</b>	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	<b>28.3718</b>	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



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**  
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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. #:

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Maya Murshak  
Technical Director





## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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

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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



# Analytical Laboratory Report

Final Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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



# Analytical Laboratory Report

Final Report

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
<b>Sample Receiving</b>		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 2.3
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
<b>Chain of Custody</b>		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL UPS# 1Z4664770363100948
<b>Preservation</b>		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
<b>Bottle Conditions</b>		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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

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

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Sampling #1

Initial Preservation Check: 05/05/2021 09:49 SRS

Phone: 517-702-6372      FAX:  
Email: Environmental\_Laboratory@LBWL.com

Preservation Recheck (E200.8): 05/06/2021 14:09 SRS

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			



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

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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.

CONTACT NAME **Kelly Gleason**  SAME  
 COMPANY  
 ADDRESS  
 CITY STATE ZIP CODE  
 PHONE NO. E-MAIL ADDRESS **Kelly.Gleason@lbwl.com**

**ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)**

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 GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID  
 CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

# Containers & Preservatives  
 Total Metals  
 F- undistilled, Cl-, SO4, TDS  
 Radium 226  
 Radium 228  
 TSS  
 Certifications  
 OHIO VAP  Drinking Water  
 DoD  NPDES  
 Project Locations  
 Detroit  New York  
 Other  
 Special Instructions

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	MeOH	MeOH	OTHER	Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS								
	DATE	TIME																							
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 *[Signature]*  Sampler DATE **5-5-21** TIME **0930**  
 RECEIVED BY: SIGNATURE/ORGANIZATION *[Signature]* 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



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.

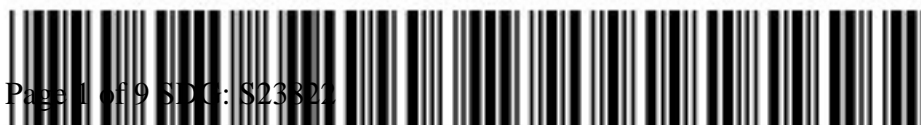
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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





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# 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:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink, appearing to read "Sam Hogan". The signature is written in a cursive, somewhat stylized font.

Samuel Hogan  
Project Manager

# **Chain of Custody and Supporting Documentation**

543765

C.O.C. PAGE # 1 OF 1

2680 East Lansing Dr., East Lansing, MI 48823  
 Phone (517) 332-0167 Fax (517) 332-4034  
 www.meritlabs.com



**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

**CHAIN OF CUSTODY RECORD**

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

**INVOICE TO**

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

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 I  LEVEL II  LEVEL III  LEVEL IV  EDD  OTHER

MATRIX CODE: GW=GROUNDWATER W=WASTEWATER S=SOIL L=LIQUID SD=SOLID  
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

MATRIX CODE	YEAR	DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HOI	HNO	H50	NHO	HOH	OTHER
	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				

RELINQUISHED BY:	SIGNATURE/Organization	DATE	TIME
RECEIVED BY:	<i>[Signature]</i>	5/5/21	1700
RELINQUISHED BY:	<i>[Signature]</i>	5/5/21	1700
RECEIVED BY:	<i>[Signature]</i>	5/5/21	1700

RELINQUISHED BY:	SIGNATURE/Organization	DATE	TIME
RECEIVED BY:	<i>[Signature]</i>	5/7/21	1620

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>MERI</u>		SDG/AR/COC/Work Order: <u>543765</u>	
Received By: <u>[Signature]</u>		Date Received: <u>5/7/21</u>	
Carrier and Tracking Number		Circle Applicable: FedEx Express    FedEx Ground    UPS    Field Services    Courier    Other <u>124664770363100948</u>	
Suspected Hazard Information		Yes	No
A) Shipped as a DOT Hazardous?			<input checked="" type="checkbox"/>
B) Did the client designate the samples are to be received as radioactive?			<input checked="" type="checkbox"/>
C) Did the RSO classify the samples as radioactive?			<input checked="" type="checkbox"/>
D) Did the client designate samples are hazardous?			<input checked="" type="checkbox"/>
E) Did the RSO identify possible hazards?			<input checked="" type="checkbox"/>
Sample Receipt Criteria		Yes	NA
1 Shipping containers received intact and sealed?		<input checked="" type="checkbox"/>	
2 Chain of custody documents included with shipment?		<input checked="" type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		<input checked="" type="checkbox"/>	
4 Daily check performed and passed on IR temperature gun?		<input checked="" type="checkbox"/>	
5 Sample containers intact and sealed?		<input checked="" type="checkbox"/>	
6 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>	
7 Do any samples require Volatile Analysis?			<input checked="" type="checkbox"/>
8 Samples received within holding time?		<input checked="" type="checkbox"/>	
9 Sample ID's on COC match ID's on bottles?		<input checked="" type="checkbox"/>	
10 Date & time on COC match date & time on bottles?		<input checked="" type="checkbox"/>	
11 Number of containers received match number indicated on COC?		<input checked="" type="checkbox"/>	
12 Are sample containers identifiable as GEL provided by use of GEL labels?			<input checked="" type="checkbox"/>
13 COC form is properly signed in relinquished/received sections?		<input checked="" type="checkbox"/>	
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials NRG Date 5/10/21 Page 1 of 1

# Laboratory Certifications



**List of current GEL Certifications as of 03 June 2021**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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: 

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	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: 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	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: 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	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: 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	Project: MERI00120
Sample ID: 543765004	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		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	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: 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	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: 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	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: 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      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: 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**



# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 3, 2021

Page 1 of 2

**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
<b>Rad Gas Flow</b>											
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							
<b>Rad Ra-226</b>											
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	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

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## QC Summary

Workorder: 543765

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
J											
J											
K											
L											
M											
M											
N/A											
NI											
ND											
NJ											
Q											
R											
U											
UI											
UJ											
UL											
X											
Y											
^											
h											

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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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	Comments:
WORK 1951-B	Barium-133	.1 mL	Pipet Id: RAD-GFC-1795419
REGNT 3098468	RGF-1.5M Ammonium Sulfate	10 mL	Data Entry Date2: 25-MAY-2021 00:00
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 Substrate	5 mL	
REGNT 3293878	RGF-50% Potassium Carbonate	2 mL	
REGNT 3294537	2M HCL	20 mL	
REGNT 3298457.20	Lot #DGA0021	2 g	

### 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

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

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
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													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		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	Recovery %	Sample Recovery Error %
			Alpha	Beta										
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	Critical	Required	Sample Act.		Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample	Sample	RPD	RER	Nominal	Recovery
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.						
1	1.2972	0.9158	3	2.0158	<b>3.4721</b>	20.91%	0.9427	0.1964	1.4176	1.6640		SAMPLE				
2	0.7645	0.5398	3	1.2635	<b>0.1496</b>	228.44%	0.0407	0.0929	0.6700	0.6710		SAMPLE				
3	0.9508	0.6713	3	1.5397	<b>0.7596</b>	61.28%	0.1927	0.1180	0.9119	0.9316		SAMPLE				
4	1.3473	0.9512	3	2.1649	<b>2.8872</b>	26.61%	0.5500	0.1459	1.5016	1.6679		SAMPLE				
5	0.8178	0.5774	3	1.3293	<b>0.7258</b>	56.09%	0.2080	0.1166	0.7972	0.8181		SAMPLE				
6	1.0458	0.7384	3	1.6506	<b>1.1293</b>	45.83%	0.3247	0.1485	1.0126	1.0525		SAMPLE				
7	1.1387	0.8039	3	1.7845	<b>-0.9096</b>	47.36%	-0.2573	0.1218	0.8436	0.8437		SAMPLE				
8	1.6724	1.1807	3	2.5747	<b>-0.3610</b>	193.81%	-0.0847	0.1641	1.3713	1.3715		SAMPLE				
9	0.3694	0.2608	1	0.5852	<b>1.696E-03</b>	9353.34%	0.0013	0.1247	0.3110	0.3110		SAMPLE				
10	0.5141	0.3630	1	0.7952	<b>0.5370</b>	46.07%	0.3880	0.1786	0.4844	0.5029		SAMPLE				
11	0.3548	0.2505	1	0.5779	<b>0.1170</b>	138.32%	0.0760	0.1051	0.3172	0.3186		SAMPLE				
12	0.4144	0.2925	1	0.6616	<b>0.2182</b>	88.39%	0.1427	0.1261	0.3780	0.3819		SAMPLE				
13	0.5120	0.3615	1	0.7970	<b>0.0790</b>	283.84%	0.0533	0.1514	0.4393	0.4397		MB				
14	0.7688	0.5428	3	1.2581	<b>0.8971</b>	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	<b>20.8409</b>	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 *A. Beil-Nauman*

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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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

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 : 2125740  
 Analyst : LIN01615  
 Prep Date : 5/11/2021  
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
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	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			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
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

<b>Results</b>																
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	<b>0.5602</b>	24.45%	0.7667	0.1856	0.2658	0.2803		SAMPLE				
2	0.2278	0.1608	1	0.4001	<b>0.3658</b>	37.80%	0.4667	0.1764	0.2710	0.2762		SAMPLE				
3	0.0847	0.0598	1	0.1968	<b>0.4372</b>	26.43%	0.5667	0.1453	0.2197	0.2351		SAMPLE				
4	0.1695	0.1197	1	0.3084	<b>2.1165</b>	11.12%	3.0667	0.3367	0.4554	0.5535		SAMPLE				
5	0.2144	0.1514	1	0.3901	<b>0.3492</b>	39.15%	0.4000	0.1563	0.2676	0.2727		SAMPLE				
6	0.0879	0.0621	1	0.2041	<b>0.3201</b>	31.24%	0.4000	0.1247	0.1956	0.2014		SAMPLE				
7	0.1326	0.0936	1	0.2725	<b>0.6259</b>	24.69%	0.7333	0.1700	0.2843	0.3160		SAMPLE				
8	0.1390	0.0981	1	0.2694	<b>0.2192</b>	43.33%	0.3000	0.1291	0.1849	0.1889		SAMPLE				
9	0.0928	0.0655	0.3	0.1798	<b>0.0976</b>	57.77%	0.2000	0.1155	0.1104	0.1114		SAMPLE				
10	0.0623	0.0440	0.3	0.1446	<b>0.6802</b>	18.94%	1.2000	0.2055	0.2283	0.2710		SAMPLE				
11	0.1102	0.0778	0.3	0.2004	<b>0.5832</b>	18.11%	1.3000	0.2333	0.2052	0.2234		SAMPLE				
12	0.1532	0.1081	0.3	0.2656	<b>0.2958</b>	33.65%	0.6000	0.1944	0.1878	0.1997		SAMPLE				
13	0.1144	0.0807	0.3	0.2216	<b>0.5209</b>	22.07%	0.8667	0.1886	0.2221	0.2376		SAMPLE				
14	0.1405	0.0992	0.3	0.2556	<b>0.2670</b>	35.10%	0.4667	0.1633	0.1831	0.1877		SAMPLE				
15	0.0514	0.0363	0.3	0.1195	<b>0.6868</b>	17.75%	1.4667	0.2261	0.2075	0.2587		SAMPLE				
16	0.1538	0.1086	0.3	0.2666	<b>0.4950</b>	22.85%	1.0000	0.2261	0.2193	0.2329		SAMPLE				
17	0.1015	0.0716	0.3	0.1895	<b>0.0308</b>	158.34%	0.0667	0.1054	0.0954	0.0957		MB				
18	0.0534	0.0377	0.3	0.1241	<b>0.4541</b>	19.73%	0.9333	0.1826	0.1741	0.1875	543921003.1	DUP	42.2%			
19	0.4391	0.3100	0.3	1.0199	<b>113.6767</b>	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	<b>13.8561</b>	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



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

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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

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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

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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



# Analytical Laboratory Report

Preliminary Report

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	





# Analytical Laboratory Report

Preliminary Report

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						



# Analytical Laboratory Report

Preliminary Report

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	



# Analytical Laboratory Report

Preliminary Report

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						



# Analytical Laboratory Report

Preliminary Report

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	



# Analytical Laboratory Report

Preliminary Report

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						



# Analytical Laboratory Report

Preliminary Report

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	



# Analytical Laboratory Report

Preliminary Report

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						



# Analytical Laboratory Report

Preliminary Report

**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	





# Analytical Laboratory Report

Preliminary Report

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						



# Analytical Laboratory Report

Preliminary Report

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



# Analytical Laboratory Report

Preliminary Report

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
<b>Sample Receiving</b>		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 3.4
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
<b>Chain of Custody</b>		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC Collection times are different.
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
<b>Preservation</b>		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
<b>Bottle Conditions</b>		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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

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

Initial Preservation Check: 06/15/2021 16:16 MMC

Preservation Recheck (E200.8): N/A

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			



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 Phone (517) 332-0167 Fax (517) 332-4034  
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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.

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)**

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	H <sub>2</sub> O <sub>2</sub>	MnOH	MnOH	OTHER	Total Metals	F- undissolved, Cl-, SO <sub>4</sub> , TDS	Radium 226	Radium 228	TSS	Certifications		Project Locations		Special Instructions
	DATE	TIME																	<input type="checkbox"/> OHIO VAP	<input type="checkbox"/> Drinking Water	<input type="checkbox"/> DoD	<input checked="" type="checkbox"/> NPDES	
25279.01	06/15/21	1411	MW-7 L106052-01	GW	5	3	2							✓	✓	✓	✓	✓					Metals to analyse:
02	06/15/21	1241	MW-8 -02	GW	5	3	2							✓	✓	✓	✓	✓					B, Ca, Sb, As, Ba, Be, Cd, Cr,
03	06/15/21	1051	MW-9 -03	GW	5	3	2							✓	✓	✓	✓	✓					Co, Li, Hg, Mo, Pb, Se, Tl,
04	06/15/21	0859	MW-10 -04	GW	5	3	2							✓	✓	✓	✓	✓					Fe, Cu, Ni, Ag, V, Zn
05	06/15/21	1051	Field Dupe MW-9 -05	GW	5	3	2							✓	✓	✓	✓	✓					Please send a preliminary report
06	06/15/21	0740	Field Blank -06	DI	5	3	2							✓	✓	✓	✓	✓					See attached reporting limits.

RELINQUISHED BY: *[Signature]*  Sampler DATE **6-15-21** TIME **1557**  
 RECEIVED BY: *[Signature]* DATE **6/15/21** TIME **1557**  
 RELINQUISHED BY: DATE TIME  
 RECEIVED BY: DATE TIME

RELINQUISHED BY: DATE TIME  
 RECEIVED BY: DATE TIME  
 SEAL NO. SEAL INTACT INITIALS  
 YES  NO   
 SEAL NO. SEAL INTACT INITIALS  
 YES  NO   
 NOTES: TEMP ON ARRIVAL **3.2**

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

# Reporting Limits to go to Merit with COC

Element	Concentration	Volume	Matrix	Reporting Limit (mg/L)	Time
Sb, total	Antimony	250 mL plastic	Nitric Acid	200.7	6 mos
As, total	Arsenic	250 mL plastic	Nitric Acid	200.8	6 mos
Ba, total	Beryllium	250 mL plastic	Nitric Acid	200.8	6 mos
Be, total	Boron	250 mL plastic	Nitric Acid	200.8	6 mos
B, total	Cadmium	250 mL plastic	Nitric Acid	200.8	6 mos
Cd, total	Calcium	250 mL plastic	Nitric Acid	200.8	6 mos
Ca	Chloride	250 mL plastic	Chill	300.0	28 d
Cl	Chromium	250 mL plastic	Nitric Acid	200.8	6 mos
Cr, total	Cobalt	250 mL plastic	Nitric Acid	200.8	6 mos
Co, total	Copper	250 mL plastic	Nitric Acid	200.8	6 mos
Cu, total	Fluoride	250 mL plastic	None	9056	28 d
F	Iron	250 mL plastic	Nitric Acid	300.0	6 mos
Fe, total	Lead	250 mL plastic	Nitric Acid	200.8	6 mos
Pb, total	Lithium	250 mL plastic	Nitric Acid	200.8	6 mos
Li, total	Mercury	250 mL plastic	HNO3	245.1	28 d
Hg, total	Molybdenum	250 mL plastic	Nitric Acid	200.8	6 mos
Mo, total	Nickel	250 mL plastic	Nitric Acid	200.8	6 mos
Ni, total	Radium 226 and 228 combined	(2) 1 L plastic	HNO3	SM 7500	6 mos
RA226/228	Selenium	250 mL plastic	Nitric Acid	200.8	6 mos
Se, total	Silver	250 mL plastic	Nitric Acid	200.8	6 mos
Ag, total	Sulfate	250 mL plastic	Chill	300.0	28 d
SO4	Thallium	250 mL plastic	Nitric Acid	200.8	6 mos
Tl, total	Total Dissolved Solids	1 L plastic	None	SM 2540C	NA
TDS	Total Suspended Solids	1 L plastic	None	SM 2540D	NA
TSS	Vanadium	250 mL plastic	Nitric Acid	200.8	6 mos
V, total	Zinc	250 mL plastic	Nitric Acid	200.8	6 mos
Zn, total					

RL

0.005
0.002
0.150
0.001
0.04
0.0005
2.5
10
0.005
0.005
0.005
1.0
0.02
0.003
0.005
0.002
0.005
0.005
2.0 combined
0.005
0.0005
10
0.002
20
3
0.005
0.005



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.  
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East Lansing, MI 48823  
  
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Contacts for report questions:  
John Lavery (johnlavery@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. #:

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Maya Murshak  
Technical Director





## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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

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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



# Analytical Laboratory Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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
<b>Sample Receiving</b>		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 4.4
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
<b>Chain of Custody</b>		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
<b>Preservation</b>		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
<b>Bottle Conditions</b>		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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

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

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 07/21/2021 09:05 SRS

Phone: 517-702-6372      FAX:  
 Email: Environmental\_Laboratory@LBWL.com

Preservation Recheck (E200.8): N/A

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			



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

**REPORT TO** **CHAIN OF CUSTODY RECORD** **INVOICE 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.

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

# Containers & Preservatives		Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS

Certifications  
 OHIO VAP  Drinking Water  
 DoD  NPDES  
Project Locations  
 Detroit  New York  
 Other  
Special Instructions

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION		MATRIX	# OF BOTTLES	NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	HNOH	MACH	OTHER	Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS
	DATE	TIME																
26384.01	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						✓	✓	✓	✓	✓

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: **7-21/21 0850** DATE TIME  
SAMPLER  
RECEIVED BY: **7/21/21 0850** DATE TIME

RELINQUISHED BY: DATE TIME  
RECEIVED BY: DATE TIME  
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

## 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	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Chloride	250 mL plastic	mg/L	Chill	300.0	6 mos	2.5
Cl	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	28 d	10
Cr, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Fluoride	250 mL plastic	mg/L	None	9056	6 mos	0.005
F	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	28 d	1.0
Fe, total	Lead	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Mercury	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Molybdenum	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
RA226/228	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Se, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Sulfate	250 mL plastic	mg/L	Chill	300.0	6 mos	0.0005
SO4	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	28 d	10
Tl, total	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	6 mos	0.002
TDS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	20
TSS	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	NA	3
V, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total						6 mos	0.005



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.

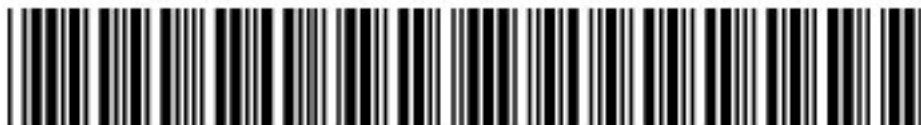
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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



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# 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:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink, appearing to read "Sam Hogan". The signature is written in a cursive, somewhat stylized font.

Samuel Hogan  
Project Manager

# **Chain of Custody and Supporting Documentation**



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

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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  
 E-MAIL ADDRESS: results@meritlabs.com

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: 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

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives							
							NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	MOI	OTHER	
	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					

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications	OHIO VAP	Drinking Water	DoD	NPDES	Project Locations	Detroit	New York	Other	Special Instructions
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	* E903.1 Mod.
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	** 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] DATE: 7/22/21 TIME: 1700  
 RECEIVED BY: [Signature] DATE: 7/22/21 TIME: 1700

RELINQUISHED BY: [Signature] DATE: 7/22/21 TIME: 1700  
 RECEIVED BY: [Signature] DATE: 7/22/21 TIME: 1700

RELINQUISHED BY: [Signature] DATE: 7/22/21 TIME: 1700  
 RECEIVED BY: [Signature] DATE: 7/22/21 TIME: 1700

RELINQUISHED BY: [Signature] DATE: 7/22/21 TIME: 1700  
 RECEIVED BY: [Signature] DATE: 7/22/21 TIME: 1700

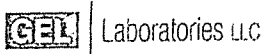
SEAL NO. [ ] SEAL INTRACT YES [ ] NO [ ]  
 INITIALS [ ] INITIALS [ ]

NOTES: [ ]

TEMP. ON ARRIVAL: 20

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

SH



**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>MERT</u>		SDG/AR/COC/Work Order: <u>550670</u>	
Received By: <u>BE</u>		Date Received: <u>7/26/21</u>	
Carrier and Tracking Number		FedEx Express    FedEx Ground <u>(JPS)</u> Field Services    Courier    Other	
		<u>17 466 477 03 6261 2825</u>	
Suspected Hazard Information		Yes	No
A) Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
B) Did the client designate the samples are to be received as radioactive?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample Receipt Criteria		Yes	NA
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials GB    Date 7/27/21    Page 1 of 1

# Laboratory Certifications

**List of current GEL Certifications as of 18 August 2021**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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: 

Name: Kenshalla Oston

Date: 20 AUG 2021

Title: Analyst I

# Sample Data Summary

# GEL LABORATORIES LLC

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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: S26384.01	Project: MERI00120
Sample ID: 550670001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 20-JUL-21 13:56	
Receive Date: 26-JUL-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		3.42	+/-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	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: August 20, 2021

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 Project: Routine Analysis

Client Sample ID: S26384.02	Project: MERI00120
Sample ID: 550670002	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 20-JUL-21 12:31	
Receive Date: 26-JUL-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	-0.103	+/-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	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: August 20, 2021

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 Project: Routine Analysis

Client Sample ID: S26384.03	Project: MERI00120
Sample ID: 550670003	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 20-JUL-21 10:41	
Receive Date: 26-JUL-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	0.286	+/-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	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: August 20, 2021

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 Project: Routine Analysis

Client Sample ID: S26384.04	Project: MERI00120
Sample ID: 550670004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 20-JUL-21 08:56	
Receive Date: 26-JUL-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	-0.994	+/-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	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: August 20, 2021

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 Project: Routine Analysis

Client Sample ID: S26384.05	Project: MERI00120
Sample ID: 550670005	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 20-JUL-21 10:41	
Receive Date: 26-JUL-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	-0.125	+/-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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: 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)	Project: MERI00120
Sample ID: 550670006	Client ID: MERI001
Matrix: Water	
Collect Date: 20-JUL-21 08:05	
Receive Date: 26-JUL-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	-0.0672	+/-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	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: August 20, 2021

Page 1 of 2

**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
<b>Rad Gas Flow</b>											
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							
<b>Rad Ra-226</b>											
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

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 550670

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
J											
J											
K											
L											
M											
M											
N/A											
N1											
ND											
NJ											
Q											
R											
U											
UI											
UJ											
UL											
X											
Y											
^											
h											

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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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	Comments:
WORK 1951-B	Barium-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 04-AUG-2021 00:00
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 Substrate	5 mL	
REGNT 3324266	RGF-7M Nitric Acid	25 mL	



### 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

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

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
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													Calculated Sample Recovery %	Sample Recovery Error %
Pos.	Detector ID	Counting Time (min.)	Gross Counts		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		
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%

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	0.6428	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

Spike S/N : N/A  
 Spike Exp Date : N/A  
 Spike Activity (dpm/ml): N/A  
 Spike Volume Added: N/A

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

LCS S/N : 1965-B  
 LCS Exp Date : 9/24/2021  
 LCS Activity (dpm/ml): 345.40  
 LCS Volume Added: 0.10

Results														2 SIGMA		2 SIGMA	
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	Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD RER	Nominal pCi/L	Recovery		
1	0.2733	0.1929	1	0.4493	<b>0.0427</b>	283.27%	0.0337	0.0954	0.2373	0.2376		SAMPLE					
2	0.3537	0.2497	1	0.5645	<b>-0.1538</b>	91.30%	-0.1180	0.1077	0.2751	0.2752		SAMPLE					
3	1.0076	0.7114	3	1.6375	<b>0.8274</b>	60.05%	0.1927	0.1155	0.9726	0.9952		SAMPLE					
4	0.9519	0.6720	3	1.5523	<b>3.4210</b>	18.69%	0.8217	0.1527	1.2463	1.5147		SAMPLE					
5	1.6460	1.1621	3	2.5200	<b>-0.1031</b>	680.60%	-0.0263	0.1792	1.3753	1.3754		SAMPLE					
6	0.8019	0.5661	3	1.3203	<b>0.2858</b>	129.21%	0.0760	0.0982	0.7238	0.7273		SAMPLE					
7	1.6995	1.1999	3	2.6543	<b>-0.9944</b>	67.31%	-0.1953	0.1314	1.3114	1.3116		SAMPLE					
8	1.2840	0.9065	3	1.9947	<b>-0.1248</b>	436.04%	-0.0343	0.1497	1.0666	1.0667		SAMPLE					
9	0.9453	0.6674	3	1.5215	<b>-0.0672</b>	595.80%	-0.0180	0.1072	0.7850	0.7852		SAMPLE					
10	0.3169	0.2237	1	0.5049	<b>0.1050</b>	136.39%	0.0913	0.1246	0.2807	0.2819		MB					
11	0.3224	0.2277	1	0.5191	<b>2.128E-03</b>	6511.07%	0.0017	0.1085	0.2716	0.2716	550391001.1	DUP	* 0.0%				
12	0.3504	0.2474	1	0.5570	<b>15.4062</b>	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. Smith - Narmca

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:**  
2155852

**Product:**  
LUC26RAL

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

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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
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**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

Procedure Code : LUC26RAL  
 Parmname : Radium-226  
 Required MDA : 1 pCi/L  
 Halfife of Ra-226 : 1600 years  
 Ra-226 Abundance : 1.00  
 Halfife of Rn-222: 3.8235 days

Batch : 2155852  
 Analyst : LIN01615  
 Prep Date : 8/4/2021  
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Counting		Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
					Cell Number	Time (min.)						
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			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
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

<b>Results</b>																
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	<b>0.9226</b>	23.07%	1.0667	0.2261	0.3833	0.4378		SAMPLE				
2	0.1154	0.0815	1	0.2681	<b>0.5254</b>	27.51%	0.5000	0.1374	0.2831	0.2932		SAMPLE				
3	0.1564	0.1104	1	0.3215	<b>0.0671</b>	122.51%	0.0667	0.0816	0.1611	0.1615		SAMPLE				
4	0.1004	0.0709	1	0.2331	<b>1.4010</b>	16.96%	1.5333	0.2309	0.4136	0.5078		SAMPLE				
5	0.0917	0.0647	1	0.2129	<b>0.3894</b>	29.56%	0.4667	0.1333	0.2181	0.2325		SAMPLE				
6	0.1777	0.1254	1	0.3317	<b>0.1887</b>	55.98%	0.2333	0.1291	0.2046	0.2088		SAMPLE				
7	0.2414	0.1704	1	0.4391	<b>0.2621</b>	53.71%	0.2667	0.1414	0.2724	0.2785		SAMPLE				
8	0.2578	0.1820	1	0.4470	<b>0.1660</b>	78.28%	0.2000	0.1563	0.2543	0.2558		SAMPLE				
9	0.2524	0.1782	1	0.4433	<b>0.2316</b>	59.26%	0.2667	0.1563	0.2662	0.2711		SAMPLE				
10	0.2419	0.1708	1	0.4315	<b>0.1498</b>	82.48%	0.1667	0.1374	0.2422	0.2432		MB				
11	0.1827	0.1290	1	0.3540	<b>0.8964</b>	20.89%	0.9333	0.1944	0.3659	0.3892	550391001.1	DUP	2.9%			
12	0.4954	0.3498	1	1.1506	<b>128.4039</b>	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	<b>23.0790</b>	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  
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Contacts for report questions:  
John Lavery (johnlavery@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. #:

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Maya Murshak  
Technical Director



## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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

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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



# Analytical Laboratory Report

Final Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory Report

Final 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



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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
<b>Sample Receiving</b>		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 2.8
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
<b>Chain of Custody</b>		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL UPS# 1Z4664770363164488
<b>Preservation</b>		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
<b>Bottle Conditions</b>		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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			



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 Phone (517) 332-0167 Fax (517) 332-4034  
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

**REPORT TO** **CHAIN OF CUSTODY RECORD** **INVOICE 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.

CONTACT NAME Kelly Gleason  SAME  
 COMPANY  
 ADDRESS  
 CITY STATE ZIP CODE  
 PHONE NO. E-MAIL ADDRESS Kelly.Gleason@lbwl.com

**ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)**

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 GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID  
 CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

# Containers & Preservatives

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	MeOH	OTHER	Total Metals	F- undistilled, Cl-, SO <sub>4</sub> , TDS	Radium 226	Radium 228	TSS	Certifications	Project Locations	Special Instructions
	DATE	TIME																		
26817.01	8/3/21	1352	MW-1 L108012-01	GW	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	<input type="checkbox"/> Detroit <input type="checkbox"/> New York	Metals to analyse:
.02		1659	MW-2 -02	GW	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES		B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		1028	MW-3 -03	GW	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Co, Li, Hg, Mo, Pb, Se, Tl,
.04		1201	MW-4 -04	GW	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Fe, Cu, Ni, Ag, V, Zn
.05		1728	MW-5 -05	GW	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Please send a preliminary report
.06		1526	MW-6 -06	GW	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
.07		1201	Field Dupe MW-4 -07	GW	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
.08		0745	Field Blank -08	DI	5	3	2						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

RELINQUISHED BY: *[Signature]* DATE 8-4-21 TIME 0944  
 SIGNATURE/ORGANIZATION  
 RECEIVED BY: *[Signature]* DATE 8-4-21 TIME 0845  
 SIGNATURE/ORGANIZATION

RELINQUISHED BY: DATE TIME  
 SIGNATURE/ORGANIZATION  
 RECEIVED BY: DATE TIME  
 SIGNATURE/ORGANIZATION

SEAL NO. SEAL INTACT YES  NO  INITIALS  
 SEAL NO. SEAL INTACT YES  NO  INITIALS

NOTES: TEMP. ON ARRIVAL 2.8



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 Lavery (johnlavery@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. #:

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Maya Murshak  
Technical Director



## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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



# Analytical Laboratory Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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	



# Analytical Laboratory Report

Final Report

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

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

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Submitted:08/25/2021 08:42 Login User: MMC

Phone: 517-702-6372 FAX:  
 Email: Environmental\_Laboratory@LBWL.com

Selection	Description	Note
-----------	-------------	------

**Sample Receiving**

- |     |  |  |        |
|-----|--|--|--------|
| 01. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer #        | IR 4.0 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun                 |        |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped  |        |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box                        |        |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |        |

**Chain of Custody**

- |     |  |  |                             |
|-----|--|--|-----------------------------|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out                |                             |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab   |                             |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC          |                             |
| 09. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: | GEL UPS# 1Z4664770363322851 |

**Preservation**

- |     |  |   |  |
|-----|--|---|--|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation        |  |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |  |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab?    |  |

**Bottle Conditions**

- |     |  |   |  |
|-----|--|---|--|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact                            |  |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used       |  |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used                            |  |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received             |  |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration         |  |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time         |  |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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

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

Initial Preservation Check: 08/25/2021 08:57 MMC

Preservation Recheck (E200.8): N/A

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			





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

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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.

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

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives							Total Metals	F- undissolved, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Certifications	Project Locations	Special Instructions
	DATE	TIME				NONE	HCl	HNO3	H2SO4	NH4OH	MeOH	OTHER								
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]*  Sampler DATE **8/25/21** TIME **0842**  
 RECEIVED BY: *[Signature]* DATE **8/25/21** TIME **0842**

RELINQUISHED BY: DATE TIME  
 RECEIVED BY: DATE TIME  
 SEAL NO. SEAL INTACT YES  NO  INITIALS  
 SEAL NO. SEAL INTACT YES  NO  INITIALS  
 NOTES: TEMP. ON ARRIVAL **4.0**

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

## 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



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.

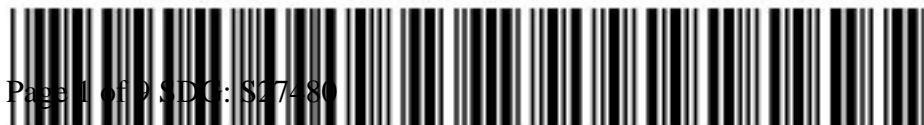
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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

Purchase Order: GELP20-0018  
Enclosures



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# 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.

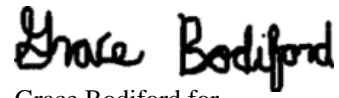
**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink that reads "Grace Bodiford". The script is cursive and somewhat stylized.

Grace Bodiford for  
Samuel Hogan  
Project Manager

# **Chain of Custody and Supporting Documentation**



553997

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

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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  
 E-MAIL ADDRESS: results@meritlabs.com

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: 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=WPIPE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives								
							NONE	HCl	HNO3	H2SO4	NaOH	H2O2	OTHER		
	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							

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications	Project Locations	Special Instructions
<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	<input type="checkbox"/> DoD <input type="checkbox"/> NPDES	* E903.1 Mod.
<input type="checkbox"/> Detroit <input type="checkbox"/> New York	<input type="checkbox"/> Other _____	** E904.0/SW 9320 Mod.
<input type="checkbox"/> Radium 226**	<input type="checkbox"/> Radium 228**	Please use calculation product & provide Radium 226/228 combined results on the report
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(No Ice needed)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	** Subcontracted to
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	GEL Laboratories, Inc.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2040 Savage Road
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Charleston, SC 29407

RELINQUISHED BY: [Signature] DATE: 8/25/21 TIME: 1100  
 RECEIVED BY: [Signature] DATE: 8/25/21 TIME: 1100  
 SEAL NO. \_\_\_\_\_ SEAL INTACT YES  NO   
 INITIALS \_\_\_\_\_ INITIALS \_\_\_\_\_  
 TEMP. ON ARRIVAL \_\_\_\_\_

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

SH

SAMPLE RECEIPT & REVIEW FORM

Client: MERI SDC/AR/COC/Work Order: 553997  
Received By: BE Date Received: 8/27/21

Carrier and Tracking Number: 17 466 477 03 6332 2851  
FedEx Express FedEx Ground (UPS) Field Services Courier Other

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?  Yes  No Hazard Class Shipped: \_\_\_\_\_ UN#: \_\_\_\_\_  
If UN2910, Is the Radioactive Shipment Survey Compliant? Yes \_\_\_ No \_\_\_  
B) Did the client designate the samples are to be received as radioactive?  Yes  No COC notation or radioactive stickers on containers equal client designation.  
C) Did the RSO classify the samples as radioactive?  Yes  No 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?  Yes  No COC notation or hazard labels on containers equal client designation.  
E) Did the RSO identify possible hazards?  Yes  No If D or E is yes, select Hazards below.  
PCBs Flammable Foreign Soil RCRA Asbestos Beryllium Other:

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry Ice <u>(None)</u> Other: _____ *all temperatures are recorded in Celsius
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR2-21</u> TEMP: <u>23</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Preservation added, Lot#: _____ If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected: _____
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers <u>No times on containers</u> COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials NRL Date 8/31/21 Page 1 of 1

# Laboratory Certifications

**List of current GEL Certifications as of 23 September 2021**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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

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## 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

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## 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	Project: MERI00120
Sample ID: 553997002	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 24-AUG-21 12:36	
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	0.114	+/-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	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: 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

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## Certificate of Analysis

Report Date: September 24, 2021

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 Project: Routine Analysis

Client Sample ID: S27480.04	Project: MERI00120
Sample ID: 553997004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 24-AUG-21 09:16	
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	0.187	+/-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	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: 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

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## 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

Page 1 of 2

**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
<b>Rad Gas Flow</b>											
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							
<b>Rad Ra-226</b>											
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

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 553997

Page 2 of 2

Parname	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.										
NI	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:**  
2169339

**Product:**  
GFC28RAL

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

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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	Comments:
WORK 1951-B	Barium-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 07-SEP-2021 00:00
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	

### 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

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

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
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													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		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	Recovery %	Recovery Error %
			Alpha	Beta										
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

**Spike S/N :** 1965-B  
**Spike Exp Date :** 8/22/2022  
**Spike Activity (dpm/ml):** 341.54  
**Spike Volume Added:** 0.10

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

**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	Critical	Required	Sample Act.		Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample	Sample	RPD	RER	Nominal	Recovery
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.						
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	Uncertainty	Uncertainty						
1	1.4566	1.0284	3	2.2375	<b>0.5350</b>	121.59%	0.1480	0.1799	1.2748	1.2819		SAMPLE				
2	0.9899	0.6989	3	1.5877	<b>0.1140</b>	380.16%	0.0300	0.1140	0.8492	0.8497		SAMPLE				
3	1.2119	0.8556	3	1.9021	<b>-0.3589</b>	138.70%	-0.0940	0.1303	0.9754	0.9756		SAMPLE				
4	0.9244	0.6526	3	1.4927	<b>0.1874</b>	219.40%	0.0500	0.1097	0.8060	0.8074		SAMPLE				
5	1.2859	0.9078	3	2.0067	<b>1.6503</b>	38.85%	0.4320	0.1675	1.2545	1.3218		SAMPLE				
6	1.5407	1.0878	3	2.4212	<b>1.8674</b>	41.19%	0.3800	0.1563	1.5058	1.5774		SAMPLE				
7	0.8463	0.5975	3	1.3923	<b>-0.2131</b>	161.19%	-0.0540	0.0870	0.6730	0.6732		SAMPLE				
8	0.8861	0.6256	3	1.4114	<b>-0.1197</b>	310.68%	-0.0373	0.1160	0.7287	0.7288		SAMPLE				
9	0.9468	0.6684	3	1.5325	<b>0.0861</b>	480.11%	0.0220	0.1056	0.8099	0.8101		SAMPLE				
10	1.0316	0.7283	3	1.6364	<b>0.3764</b>	124.23%	0.1047	0.1300	0.9164	0.9213		SAMPLE				
11	1.2460	0.8797	3	1.9293	<b>0.4215</b>	132.09%	0.1240	0.1638	1.0910	1.0962		SAMPLE				
12	1.4752	1.0415	3	2.2567	<b>-0.5607</b>	108.28%	-0.1613	0.1746	1.1896	1.1897		SAMPLE				
13	1.2499	0.8825	3	1.9370	<b>1.4269</b>	42.70%	0.4147	0.1767	1.1916	1.2458		SAMPLE				
14	0.9099	0.6424	3	1.4471	<b>0.4794</b>	88.14%	0.1477	0.1301	0.8280	0.8367		SAMPLE				
15	1.1574	0.8171	3	1.8106	<b>-0.7277</b>	62.11%	-0.2063	0.1281	0.8852	0.8853		SAMPLE				
16	0.9298	0.6565	3	1.4951	<b>0.0158</b>	2535.09%	0.0043	0.1099	0.7845	0.7847		MB				
17	1.2761	0.9010	3	1.9828	<b>-0.1098</b>	493.50%	-0.0303	0.1497	1.0616	1.0617	554098008.1	DUP	* 0.0%			
18	2.5836	1.8240	3	4.0365	<b>104.4721</b>	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	<b>47.5158</b>	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 9/23/21*

# **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 - Wakeman*

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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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

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 : 2169340  
 Analyst : LIN01615  
 Prep Date : 9/7/2021  
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
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	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			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
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

<b>Results</b>																
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	<b>0.7661</b>	20.84%	0.9333	0.1944	0.3127	0.3319		SAMPLE				
2	0.2073	0.1463	1	0.3697	<b>0.4366</b>	31.80%	0.5667	0.1795	0.2711	0.2793		SAMPLE				
3	0.1521	0.1074	1	0.2947	<b>0.2665</b>	41.14%	0.3333	0.1333	0.2089	0.2183		SAMPLE				
4	0.1068	0.0754	1	0.2195	<b>0.1833</b>	44.31%	0.2667	0.1155	0.1555	0.1613		SAMPLE				
5	0.1034	0.0730	1	0.2125	<b>0.4214</b>	25.69%	0.6333	0.1599	0.2085	0.2208		SAMPLE				
6	0.1084	0.0765	1	0.2229	<b>0.4420</b>	25.57%	0.6333	0.1599	0.2187	0.2306		SAMPLE				
7	0.0804	0.0568	1	0.1868	<b>0.1220</b>	53.39%	0.1667	0.0882	0.1266	0.1289		SAMPLE				
8	0.1669	0.1179	1	0.3234	<b>0.3802</b>	33.73%	0.4333	0.1453	0.2499	0.2573		SAMPLE				
9	0.2161	0.1526	1	0.3932	<b>0.2933</b>	44.92%	0.3333	0.1491	0.2571	0.2617		SAMPLE				
10	0.1670	0.1179	1	0.3119	<b>0.3042</b>	37.49%	0.4000	0.1491	0.2222	0.2278		SAMPLE				
11	0.0762	0.0538	1	0.1771	<b>0.3008</b>	30.75%	0.4333	0.1291	0.1757	0.1864		SAMPLE				
12	0.1093	0.0772	1	0.2247	<b>0.6332</b>	21.59%	0.9000	0.1856	0.2559	0.2831		SAMPLE				
13	0.1053	0.0743	1	0.2164	<b>0.4291</b>	25.60%	0.6333	0.1599	0.2123	0.2241		SAMPLE				
14	0.1829	0.1291	1	0.3263	<b>0.4986</b>	27.03%	0.7333	0.1944	0.2590	0.2737		SAMPLE				
15	0.1780	0.1256	1	0.3323	<b>0.5941</b>	25.13%	0.7333	0.1826	0.2899	0.3049		SAMPLE				
16	0.1351	0.0954	1	0.2777	<b>0.7248</b>	21.56%	0.8333	0.1795	0.3060	0.3237		SAMPLE				
17	0.2426	0.1713	1	0.4260	<b>0.2504</b>	53.36%	0.3000	0.1599	0.2616	0.2644		MB				
18	0.1913	0.1351	1	0.3413	<b>0.2608</b>	43.65%	0.3667	0.1599	0.2228	0.2262	554098009.1	DUP	94.2%			
19	1.0310	0.7279	1	1.8105	<b>145.6933</b>	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	<b>24.3717</b>	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



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

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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. \_\_\_\_\_

CONTACT NAME **Julie Teague**  RAME

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**

**ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)**

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 \_\_\_\_\_

									Radium 226*	Radium 228**								
	# Containers & Preservatives	NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER										

MATRIX GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID  
 CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives								Radium 226*	Radium 228**																						
	DATE	TIME				NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER																									
	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: **Gary Smith**  Sampler DATE **8/25/21** TIME **1100**

SIGNATURE/ORGANIZATION \_\_\_\_\_

RECEIVED BY: **UPS** DATE **8/25/21** TIME **1100**

SIGNATURE/ORGANIZATION \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

SIGNATURE/ORGANIZATION \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

SIGNATURE/ORGANIZATION \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

SIGNATURE/ORGANIZATION \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

SIGNATURE/ORGANIZATION \_\_\_\_\_

SEAL NO. \_\_\_\_\_ SEAL INTACT \_\_\_\_\_ INITIALS \_\_\_\_\_

YES  NO

SEAL NO. \_\_\_\_\_ SEAL INTACT \_\_\_\_\_ INITIALS \_\_\_\_\_

YES  NO

NOTES: \_\_\_\_\_ TEMP. ON ARRIVAL \_\_\_\_\_



# 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.  
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Contacts for report questions:  
John Lavery (johnlavery@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. #:

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Maya Murshak  
Technical Director



## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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

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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



# Analytical Laboratory Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	





# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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

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

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Submitted:09/29/2021 10:20 Login User: SRS

Phone: 517-702-6372 FAX:  
 Email: Environmental\_Laboratory@LBWL.com

Selection	Description	Note
-----------	-------------	------

**Sample Receiving**

- |     |  |  |        |
|-----|--|--|--------|
| 01. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer #        | IR 2.1 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun                 |        |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped  |        |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box                        |        |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |        |

**Chain of Custody**

- |     |  |  |                             |
|-----|--|--|-----------------------------|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out                |                             |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab   |                             |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC          |                             |
| 09. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: | GEL UPS# 1Z4664770361274756 |

**Preservation**

- |     |  |   |  |
|-----|--|---|--|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation        |  |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |  |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab?    |  |

**Bottle Conditions**

- |     |  |   |  |
|-----|--|---|--|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact                            |  |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used       |  |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used                            |  |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received             |  |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration         |  |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time         |  |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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

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

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Initial Preservation Check: 09/29/2021 10:36 SRS

Phone: 517-702-6372      FAX:  
Email: Environmental\_Laboratory@LBWL.com

Preservation Recheck (E200.8): N/A

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			



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

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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.

CONTACT NAME **Kelly Gleason**  SAME  
 COMPANY  
 ADDRESS  
 CITY STATE ZIP CODE  
 PHONE NO. E-MAIL ADDRESS **Kelly.Gleason@lbwl.com**

**ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)**

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 GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID  
 CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

# Containers & Preservatives  
 Total Metals F- undistilled, Cl-, SO4, TDS Radium 226 Radium 228 TSS  
 Certifications  OHIO VAP  Drinking Water  DoD  NPDES  
 Project Locations  Detroit  New York  Other  
 Special Instructions

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION		MATRIX	# OF BOTTLES	NONE	HCl	HNO3	H2SO4	NaOH	MACH	OTHER	Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS					
	DATE	TIME																					
28686.01	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]* DATE **9/29/21** TIME **1020**  
 RECEIVED BY: *[Signature]* DATE **9/29/21** TIME **1020**

RELINQUISHED BY: DATE TIME  
 RECEIVED BY: DATE TIME  
 SEAL NO. SEAL INTACT YES  NO  INITIALS NOTES TEMP ON ARRIVAL **2.1**



## 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	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Chloride	250 mL plastic	mg/L	Chill	300.0	6 mos	2.5
Cl	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	28 d	10
Cr, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Fluoride	250 mL plastic	mg/L	None	9056	6 mos	0.005
F	Iron	250 mL plastic	mg/L	None	245.1	28 d	1.0
Fe, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.02
Pb, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Mercury	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Molybdenum	250 mL plastic	mg/L	HNO3	200.8	6 mos	0.0002
Mn, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	28 d	0.005
Ni, total	Radium 226 and 228 combined	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Selenium	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Sulfate	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Thallium	250 mL plastic	mg/L	Chill	300.0	6 mos	0.0005
Tl, total	Total Dissolved Solids	1 L plastic	mg/L	Nitric Acid	200.8	28 d	10
TDS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540C	6 mos	0.002
TSS	Vanadium	250 mL plastic	mg/L	None	SM 2540D	NA	20
V, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	NA	3
Zn, total			mg/L	Nitric Acid	200.8	6 mos	0.005



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.

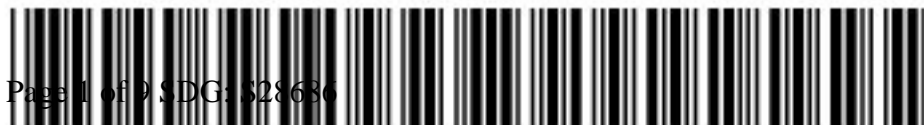
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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

Purchase Order: GELP20-0018  
Enclosures



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# 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.

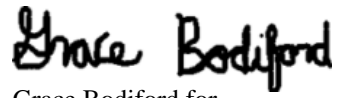
**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink that reads "Grace Bodiford". The script is cursive and somewhat stylized.

Grace Bodiford for  
Samuel Hogan  
Project Manager

# **Chain of Custody and Supporting Documentation**



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

557421

**REPORT TO**

CONTACT NAME Project Management Team

COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing

PHONE NO. 517-332-0167

E-MAIL ADDRESS results@meritlabs.com

STATE MI ZIP CODE 48823

P.O. NO.

QUOTE NO.

**CHAIN OF CUSTODY RECORD**

CONTACT NAME Julie Teague

COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing

PHONE NO. 517-332-0167

E-MAIL ADDRESS juliet@meritlabs.com

STATE MI ZIP CODE 48823

**INVOICE TO**

EPNAME

ANALYSIS(ATTACH LIST IF MORE SPACE IS REQUIRED)

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 SP=SOLID  
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPED A=AIR W=WASTE

MERIT LAB NO.	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATERIAL	# OF BOTTLES		# Containers & Preservatives								
						None	Other	HF	HNO3	H2O2	NaOH	MeOH	OTHER			
	9/28/21	1401		S28686.01	GW	2	2									
	9/28/21	1243		S28686.02	GW	2	2									
	9/28/21	1106		S28686.03	GW	2	2									
	9/28/21	0934		S28686.04	GW	2	2									
	9/28/21	1106		S28686.05	GW	2	2									
	9/28/21	0830		S28686.06 (Field Blank)	Wa	2	2									

RELINQUISHED BY: *Sammie J. Smith* DATE 9/29/21 TIME 1:00  
 SIGNATURE/Organization: *Sammie J. Smith*  
 RECEIVED BY: *Grace Bodford* DATE 9/29/21 TIME 1:00  
 SIGNATURE/Organization: *Grace Bodford*  
 RELINQUISHED BY: *UPS* DATE 9/29/21 TIME 1:00  
 SIGNATURE/Organization: *UPS*  
 RECEIVED BY: *UPS* DATE 9/29/21 TIME 1:00  
 SIGNATURE/Organization: *UPS*

RELINQUISHED BY: SIGNATURE/Organization: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_  
 RECEIVED BY: SIGNATURE/Organization: *Grace Bodford* DATE: 9-29-21 TIME: 1:00  
 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





Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

SA

Client: MERT SDG/AR/COC/Work Order: 557427

Received By: DC Date Received: 10-1-21

Carrier and Tracking Number: FedEx Express FedEx Ground (UPS) Field Services Courier Other 12466 477 0361274756

Table with 2 columns: Suspected Hazard Information (Yes/No) and details. Includes questions about DOT hazardous shipping, COC notation, net counts, and hazard identification.

Main table with 3 columns: Sample Receipt Criteria, Yes/No, and Comments/Qualifiers. Contains 13 rows of criteria such as 'Shipping containers received intact and sealed?' and 'Chain of custody documents included?'.

Comments (Use Continuation Form if needed):

# Laboratory Certifications

**List of current GEL Certifications as of 26 October 2021**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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: 

Name: Kenshalla Oston

Date: 28 OCT 2021

Title: Analyst I



# Sample Data Summary

# GEL LABORATORIES LLC

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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: S28686.01	Project: MERI00120
Sample ID: 557427001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 28-SEP-21 14:01	
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		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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: 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	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: 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	Project: MERI00120
Sample ID: 557427003	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	0.453	+/-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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: 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	Project: MERI00120
Sample ID: 557427004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 28-SEP-21 09:34	
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	-0.0760	+/-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	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: 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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: 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)	Project: MERI00120
Sample ID: 557427006	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 28-SEP-21 08:30	
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	-0.281	+/-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	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: October 28, 2021

Page 1 of 2

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
<b>Rad Gas Flow</b>											
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							
<b>Rad Ra-226</b>											
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

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 557427

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
J											
J											
K											
L											
M											
M											
N/A											
N1											
ND											
NJ											
Q											
R											
U											
UI											
UJ											
UL											
X											
Y											
^											
h											

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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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	Comments:
WORK 1951-B	Barium-133	.1 mL	Pipet Id: RAD-GFC-1795419
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL	Data Entry Date2: 08-OCT-2021 00:00
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	

### 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

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

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
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													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		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	Recovery %	Recovery Error %
			Alpha	Beta										
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	Critical	Required	Sample Act.		Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample	Sample	RPD	RER	Nominal	Recovery
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.						
1	0.9671	0.6828	3	1.5366	<b>2.4937</b>	22.63%	0.7287	0.1639	1.0992	1.2679		SAMPLE				
2	1.2393	0.8750	3	1.9643	<b>0.4689</b>	120.00%	0.1093	0.1312	1.1025	1.1089		SAMPLE				
3	0.7681	0.5423	3	1.2502	<b>0.4529</b>	80.77%	0.1367	0.1103	0.7166	0.7258		SAMPLE				
4	1.5282	1.0789	3	2.3417	<b>-0.0760</b>	858.30%	-0.0207	0.1774	1.2785	1.2786		SAMPLE				
5	1.1599	0.8189	3	1.8160	<b>0.8456</b>	64.62%	0.2373	0.1532	1.0700	1.0914		SAMPLE				
6	1.3370	0.9440	3	2.0566	<b>-0.2811</b>	199.18%	-0.0833	0.1660	1.0974	1.0975		SAMPLE				
7	0.8026	0.5666	3	1.3017	<b>4.2897</b>	14.22%	1.2733	0.1780	1.1752	1.6020		SAMPLE				
8	1.3782	0.9730	3	2.1286	<b>3.8726</b>	19.93%	1.0607	0.2096	1.4998	1.7931		SAMPLE				
9	0.9451	0.6673	3	1.5090	<b>1.9516</b>	27.14%	0.5593	0.1511	1.0335	1.1460		SAMPLE				
10	1.0153	0.7168	3	1.6052	<b>5.9566</b>	12.55%	1.7360	0.2123	1.4276	2.0832		SAMPLE				
11	0.7476	0.5278	3	1.2146	<b>0.3835</b>	91.58%	0.1207	0.1105	0.6882	0.6950		SAMPLE				
12	1.6393	1.1573	3	2.5226	<b>1.7296</b>	45.44%	0.4160	0.1886	1.5369	1.5994		SAMPLE				
13	0.7691	0.5430	3	1.2694	<b>0.5477</b>	68.96%	0.1493	0.1029	0.7397	0.7527		MB				
14	0.9545	0.6739	3	1.5190	<b>1.9436</b>	27.32%	0.5673	0.1541	1.0349	1.1472	557483002.1	DUP	66.3%			
15	0.9664	0.6823	3	1.5319	<b>48.4699</b>	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
<i>W. 10/15/21</i>	<del>557483004</del>	<del>1</del>	<del>14</del>	<del>1</del>	<del>180</del>	<del>737.5</del>	<del>245.8</del>	<del>3.68</del>	<del>84.91 08:16:21</del>
	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. Seil - Harmon*

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:**  
2181313

**Product:**  
LUC26RAL

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

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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
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**Comments:**  
 Data Entry Date2: 11-OCT-2021 00:00

### Radium-226 Liquid

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

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 : 2181313  
 Analyst : LIN01615  
 Prep Date : 10/11/2021  
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Counting		Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
					Cell Number	Time (min.)						
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			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
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

<b>Results</b>																
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	<b>0.8288</b>	23.72%	1.0000	0.2160	0.3509	0.4035		SAMPLE				
2	0.1865	0.1317	1	0.3392	<b>0.2278</b>	49.34%	0.3000	0.1453	0.2162	0.2227		SAMPLE				
3	0.0905	0.0639	1	0.2103	<b>0.7968</b>	19.37%	0.9667	0.1856	0.2998	0.3237		SAMPLE				
4	0.1845	0.1303	1	0.3356	<b>0.7011</b>	22.64%	0.9333	0.2055	0.3025	0.3272		SAMPLE				
5	0.2466	0.1741	1	0.4331	<b>0.3678</b>	40.08%	0.4333	0.1732	0.2881	0.2937		SAMPLE				
6	0.0978	0.0691	1	0.2272	<b>0.2969</b>	34.96%	0.3333	0.1155	0.2016	0.2079		SAMPLE				
7	0.1066	0.0753	1	0.2477	<b>1.0032</b>	19.00%	1.0333	0.1915	0.3644	0.4007		SAMPLE				
8	0.0923	0.0652	1	0.2143	<b>0.6722</b>	22.63%	0.8000	0.1700	0.2799	0.3136		SAMPLE				
9	0.1913	0.1351	1	0.3481	<b>0.8050</b>	20.76%	1.0333	0.2134	0.3259	0.3476		SAMPLE				
10	0.2356	0.1663	1	0.4085	<b>1.9715</b>	13.59%	2.6000	0.3232	0.4803	0.5974		SAMPLE				
11	0.1983	0.1400	1	0.3703	<b>0.4213</b>	34.56%	0.4667	0.1563	0.2766	0.2918		SAMPLE				
12	0.2728	0.1926	1	0.4730	<b>0.5562</b>	31.38%	0.6333	0.1972	0.3394	0.3514		SAMPLE				
13	0.2522	0.1780	1	0.4428	<b>0.2603</b>	53.33%	0.3000	0.1599	0.2719	0.2747		MB				
14	0.1825	0.1289	1	0.3537	<b>0.7037</b>	24.07%	0.7333	0.1764	0.3317	0.3472	557483001.1	DUP	35.1%			
15	0.8301	0.5860	1	1.6084	<b>152.7149</b>	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	<b>25.5737</b>	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  
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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. #:

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Maya Murshak  
Technical Director



## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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

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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





# Analytical Laboratory Report

Final Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # IR 2.8 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun                 |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped  |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box                        |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |

## Chain of Custody

- |     |  |  |
|-----|--|--|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out  |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab                                 |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC  |
| 09. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: GEL - UPS# 1Z4664770361236314 |

## Preservation

- |     |  |   |
|-----|--|---|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation        |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab?    |

## Bottle Conditions

- |     |  |   |
|-----|--|---|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact                            |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used       |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used                            |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received             |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration         |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time         |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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

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

Initial Preservation Check: 11/03/2021 09:25 JRM

Preservation Recheck (E200.8): N/A

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			



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

**REPORT TO**

**CHAIN OF CUSTODY RECORD**

**INVOICE 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.

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 GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID  
 CODE: SL=SLUDGE DW=DRINKINGWATER O=OIL WP=WIFE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Certifications
					<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water
					<input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES
					Project Locations
					<input type="checkbox"/> Detroit <input type="checkbox"/> New York
					<input type="checkbox"/> Other
					Special Instructions

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	MeOH	OTHER	Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS
	DATE	TIME															
29975.01	11/21	1429	MW-7 L111016 -01	GW	5	3	2						✓	✓	✓	✓	✓
.02		1309	MW-8 -02	GW	5	3	2						✓	✓	✓	✓	✓
.03		1134	MW-9 -03	GW	5	3	2						✓	✓	✓	✓	✓
.04		1001	MW-10 -04	GW	5	3	2						✓	✓	✓	✓	✓
.05		1134	Field Dupe MW-9 -05	GW	5	3	2						✓	✓	✓	✓	✓
.06		0900	Field Blank -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]* \* Sampler DATE **11-3-21** TIME **0903**  
 RECEIVED BY: *[Signature]* DATE **11/3/21** TIME **0903**  
 RELINQUISHED BY: DATE TIME  
 RECEIVED BY: DATE TIME

RELINQUISHED BY: DATE TIME  
 RECEIVED BY: 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

## 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	6 mos	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





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.

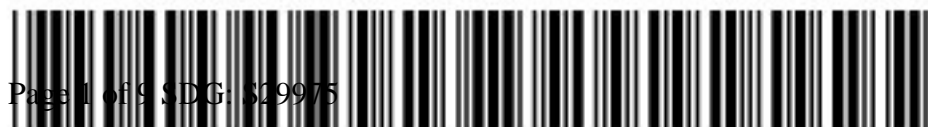
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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

Purchase Order: GELP20-0018  
Enclosures



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# 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.

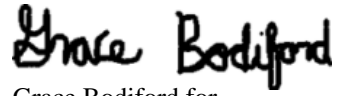
**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink that reads "Grace Bodiford". The script is cursive and somewhat stylized.

Grace Bodiford for  
Samuel Hogan  
Project Manager

# **Chain of Custody and Supporting Documentation**



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

**REPORT TO**

CONTACT NAME Project Management Team  
 COMPANY Merit Laboratories  
 ADDRESS 2680 East Lansing Drive  
 CITY East Lansing  
 PHONE NO. 517-332-0167 FAX NO. 48823  
 E-MAIL ADDRESS results@meritlabs.com

**CHAIN OF CUSTODY RECORD**

CONTACT NAME Julie Teague  
 COMPANY Merit Laboratories  
 ADDRESS 2680 East Lansing Drive  
 CITY East Lansing  
 PHONE NO. 517-332-0167 E-MAIL ADDRESS juliet@meritlabs.com  
 STATE MI ZIP CODE 48823

**INVOICE TO**

561280

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 GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID  
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPIPE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives														
							NONE	HCl	HNO <sub>3</sub>	H <sub>2</sub> O <sub>2</sub>	NaOH	MeOH	OTHER								
		11/2/21	1429	S29975.01	GW	2															
		11/2/21	1309	S29975.02	GW	2															
		11/2/21	1134	S29975.03	GW	2															
		11/2/21	1001	S29975.04	GW	2															
		11/2/21	1134	S29975.05	GW	2															
		11/2/21	0900	S29975.06 (Field Blank)	Wa	2															

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications	Project Locations	Special Instructions
<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	<input type="checkbox"/> Detroit <input type="checkbox"/> New York	* E903.1 Mod.
<input type="checkbox"/> DoD <input type="checkbox"/> NPDES	<input type="checkbox"/> Other	** 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: *Johnna Manning* DATE 11/3/21 TIME 1700  
 RECEIVED BY: *UPS* DATE 11/3/21 TIME 1700  
 RELINQUISHED BY: *GEL* DATE 11/5/21 TIME 105  
 RECEIVED BY: *[Signature]* DATE 11/5/21 TIME 105

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

**SAMPLE RECEIPT & REVIEW FORM**

Client: <b>MERI</b>		SDG/AR/COC/Work Order: <b>561-280</b>			
Received By: <b>DC</b>		Date Received: <b>11-5-21</b>			
Carrier and Tracking Number		Circle Applicable: FedEx Express    FedEx Ground <b>UPS</b> Field Services    Courier    Other <b>1E4664770361236314</b>			
Suspected Hazard Information		*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): <b>0</b> 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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable:    Seals broken    Damaged container    Leaking container    Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable:    Client contacted and provided COC    COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice    Ice Packs    Dry ice <b>None</b> Other: *all temperatures are recorded in Celsius <b>TEMP: 11°</b>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <b>IR6-21</b> Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable:    Seals broken    Damaged container    Leaking container    Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
					Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
					Do liquid VOA vials free of headspace? Yes ___ No ___ NA ___
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable:    No dates on containers    No times on containers    COC missing info    Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable:    No container count on COC    Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable:    Not relinquished    Other (describe)
Comments (Use Continuation Form if needed):					

PM (or PMA) review: Initials **GB** Date **11/8/21** Page **1** of **1**



# Laboratory Certifications

**List of current GEL Certifications as of 01 December 2021**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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: 

Name: Kenshalla Oston

Date: 03 DEC 2021

Title: Analyst I

# Sample Data Summary



# GEL LABORATORIES LLC

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

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: December 3, 2021

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 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

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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: S29975.03	Project: MERI00120
Sample ID: 561280003	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	-0.0915	+/-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	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: S29975.04	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

# GEL LABORATORIES LLC

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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 Lavery  
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

# GEL LABORATORIES LLC

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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
<b>Rad Gas Flow Proportional Counting</b>													
<b>GFPC Ra228, Liquid "As Received"</b>													
Radium-228	U	0.202	+/-1.22	2.20	3.00	pCi/L			LXB3	11/22/21	0959	2196215	1
<b>Radium-226+Radium-228 Calculation "See Parent Products"</b>													
Radium-226+228 Sum		0.321	+/-1.23			pCi/L		1	AEA	12/01/21	0441	2196232	2
<b>Rad Radium-226</b>													
<b>Lucas Cell, Ra226, Liquid "As Received"</b>													
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

Page 1 of 2

**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
<b>Rad Gas Flow</b>											
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							
<b>Rad Ra-226</b>											
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:



# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 561280

Page 2 of 2

Parname	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.									
NI		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:**  
2196215

**Product:**  
GFC28RAL

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

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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	Comments:
WORK 1951-C	Barium-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 18-NOV-2021 00:00
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 Substrate	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	

### 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

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

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
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													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		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	Recovery %	Recovery Error %
			Alpha	Beta										
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	Sample Act. 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	<b>3.3317</b>	26.78%	0.6333	0.1682	1.7342	1.9348		SAMPLE					
2	0.7687	0.5427	3	1.2630	<b>2.9771</b>	18.20%	0.8380	0.1503	1.0466	1.2945		SAMPLE					
3	1.1036	0.7792	3	1.7760	<b>2.8997</b>	22.98%	0.6660	0.1514	1.2924	1.4915		SAMPLE					
4	0.8642	0.6101	3	1.3947	<b>2.0134</b>	25.25%	0.5773	0.1447	0.9890	1.1149		SAMPLE					
5	0.9710	0.6855	3	1.5544	<b>2.2905</b>	24.71%	0.6247	0.1527	1.0977	1.2469		SAMPLE					
6	1.0023	0.7077	3	1.6022	<b>1.0837</b>	46.52%	0.2900	0.1345	0.9850	1.0241		SAMPLE					
7	1.3316	0.9401	3	2.0807	<b>0.1150</b>	502.96%	0.0287	0.1442	1.1332	1.1336		SAMPLE					
8	1.4288	1.0087	3	2.2024	<b>1.7066</b>	40.77%	0.4613	0.1875	1.3597	1.4281		SAMPLE					
9	0.6994	0.4938	3	1.1591	<b>-0.0915</b>	318.41%	-0.0267	0.0849	0.5710	0.5712		SAMPLE					
10	0.8459	0.5972	3	1.3519	<b>0.2246</b>	168.72%	0.0713	0.1203	0.7427	0.7449		SAMPLE					
11	0.9270	0.6545	3	1.4855	<b>0.4826</b>	89.61%	0.1367	0.1224	0.8469	0.8561		SAMPLE					
12	1.4287	1.0087	3	2.2040	<b>0.2015</b>	309.29%	0.0540	0.1670	1.2217	1.2228		SAMPLE					
13	1.2473	0.8806	3	1.9358	<b>0.8959</b>	65.05%	0.2567	0.1667	1.1407	1.1638		MB					
14	0.8664	0.6117	3	1.3951	<b>0.5907</b>	70.29%	0.1720	0.1208	0.8131	0.8270	561280005.1	DUP	* 0.0%				
15	1.3029	0.9198	3	2.0263	<b>44.3530</b>	5.06%	11.8813	0.4695	3.4354	11.8686		LCS			47.2376	93.9%	
16	0.6427	0.4537	3	1.0563	<b>40.0561</b>	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 *J. [Signature]*

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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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
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**Comments:**  
Data Entry Date2: 19-NOV-2021 00:00

### Radium-226 Liquid

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

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 : 2196214  
 Analyst : LIN01615  
 Prep Date : 11/19/2021  
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Counting		Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
					Cell Number	Time (min.)						
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			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
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

<b>Results</b>																
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	<b>2.0155</b>	12.43%	2.4000	0.2906	0.4783	0.5707		SAMPLE				
2	0.1654	0.1168	1	0.3010	<b>1.2574</b>	17.18%	1.8667	0.2708	0.3575	0.4606		SAMPLE				
3	0.2258	0.1594	1	0.3915	<b>2.0594</b>	12.28%	2.8333	0.3350	0.4772	0.5778		SAMPLE				
4	0.1904	0.1344	1	0.3396	<b>1.0850</b>	17.75%	1.5333	0.2539	0.3521	0.4087		SAMPLE				
5	0.1294	0.0914	1	0.2507	<b>1.1109</b>	15.73%	1.6333	0.2472	0.3296	0.3783		SAMPLE				
6	0.0751	0.0530	1	0.1745	<b>0.7069</b>	19.27%	1.0333	0.1915	0.2567	0.2859		SAMPLE				
7	0.1408	0.0994	1	0.2728	<b>0.6659</b>	21.49%	0.9000	0.1915	0.2777	0.2965		SAMPLE				
8	0.2361	0.1667	1	0.4093	<b>0.2280</b>	55.58%	0.3000	0.1667	0.2482	0.2505		SAMPLE				
9	0.0972	0.0686	1	0.2258	<b>0.1770</b>	47.33%	0.2000	0.0943	0.1635	0.1662		SAMPLE				
10	0.1870	0.1320	1	0.3401	<b>0.3806</b>	33.58%	0.5000	0.1667	0.2487	0.2565		SAMPLE				
11	0.2154	0.1521	1	0.3842	<b>0.5337</b>	29.87%	0.6667	0.1886	0.2959	0.3218		SAMPLE				
12	0.1569	0.1108	1	0.2929	<b>0.1190</b>	72.40%	0.1667	0.1202	0.1682	0.1698		SAMPLE				
13	0.1186	0.0837	1	0.2438	<b>0.2545</b>	38.63%	0.3333	0.1247	0.1866	0.1962		MB				
14	0.2338	0.1651	1	0.4106	<b>2.1454</b>	12.73%	2.6667	0.3232	0.5096	0.6185	560777003.1	DUP	4.1%			
15	1.1953	0.8439	1	2.0725	<b>112.7325</b>	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	<b>23.4259</b>	3.69%	26.9000	0.9563	1.6322	3.7828		LCS			26.6343	88.0%
17	0.1724	0.1217	1	0.3340	<b>21.2617</b>	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



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**  
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**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. #:

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Maya Murshak  
Technical Director



## General Report Notes

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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.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

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

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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



# Analytical Laboratory Report

Final Report

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	



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory 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



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory Report

Final 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.



# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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.





# Analytical Laboratory 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	



# Analytical Laboratory Report

Final Report

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

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

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI New Wells 7-10

Submitted: 12/08/2021 09:38 Login User: JRM

Phone: 517-702-6372 FAX:  
Email: Environmental\_Laboratory@LBWL.com

Selection	Description	Note
-----------	-------------	------

## Sample Receiving

- |     |  |  |
|-----|--|--|
| 01. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # IR 4.8 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun                 |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped  |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box                        |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |

## Chain of Custody

- |     |  |  |
|-----|--|--|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out                    |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab       |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC              |
| 09. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: GEL |

## Preservation

- |     |  |   |
|-----|--|---|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation        |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab?    |

## Bottle Conditions

- |     |  |   |
|-----|--|---|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact                            |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used       |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used                            |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received             |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration         |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time         |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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

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

Initial Preservation Check: 12/08/2021 10:08 JRM

Preservation Recheck (E200.8): N/A

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			



2680 East Lansing Dr., East Lansing, MI 48823  
 Phone (517) 332-0167 Fax (517) 332-4034  
 www.meritlabs.com

**REPORT TO** **CHAIN OF CUSTODY RECORD** **INVOICE 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. \_\_\_\_\_

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

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION		# Containers & Preservatives							Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Certifications	
	DATE	TIME	MATRIX	# OF BOTTLES	NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER							OHIO VAP
<u>31034.01</u>	<u>12/07/21</u>	<u>1425</u>	<u>MW-7</u>	<u>L112020-01</u>	<u>GW</u>	<u>5</u>	<u>3</u>	<u>2</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Metals to analyse:
<u>.02</u>	<u>12/07/21</u>	<u>1304</u>	<u>MW-8</u>	<u>L112020-02</u>	<u>GW</u>	<u>5</u>	<u>3</u>	<u>2</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	B, Ca, Sb, As, Ba, Be, Cd, Cr,
<u>.03</u>	<u>12/07/21</u>	<u>1122</u>	<u>MW-9</u>	<u>L112020-03</u>	<u>GW</u>	<u>5</u>	<u>3</u>	<u>2</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Co, Li, Hg, Mo, Pb, Se, Tl,
<u>.04</u>	<u>12/07/21</u>	<u>0951</u>	<u>MW-10</u>	<u>L112020-04</u>	<u>GW</u>	<u>5</u>	<u>3</u>	<u>2</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Fe, Cu, Ni, Ag, V, Zn
<u>.05</u>	<u>12/07/21</u>	<u>1122</u>	<u>Field Dupe MW-9</u>	<u>L112020-05</u>	<u>GW</u>	<u>5</u>	<u>3</u>	<u>2</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Please send a preliminary report
<u>.06</u>	<u>12/07/21</u>	<u>0850</u>	<u>Field Blank</u>	<u>L112020-06</u>	<u>DI</u>	<u>5</u>	<u>3</u>	<u>2</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

RELINQUISHED BY: \_\_\_\_\_ DATE 12-8-21 TIME 0938  
 SIGNATURE/ORGANIZATION: \_\_\_\_\_  
 RECEIVED BY: Jehanna Murray DATE 12/8/21 TIME 0938  
 SIGNATURE/ORGANIZATION: \_\_\_\_\_  
 RELINQUISHED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 SIGNATURE/ORGANIZATION: \_\_\_\_\_  
 RECEIVED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 SIGNATURE/ORGANIZATION: \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 SIGNATURE/ORGANIZATION: \_\_\_\_\_  
 RECEIVED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 SIGNATURE/ORGANIZATION: \_\_\_\_\_  
 SEAL NO. SEAL INTACT INITIALS  
 YES  NO   
 SEAL NO. SEAL INTACT INITIALS  
 YES  NO   
 NOTES: TEMP. ON ARRIVAL 4.8

## 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	6 mos	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



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.

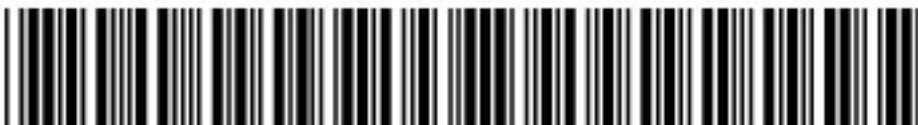
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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

Purchase Order: GELP20-0018  
Enclosures



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# 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.

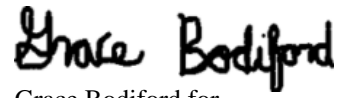
**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink that reads "Grace Bodiford". The script is cursive and somewhat stylized.

Grace Bodiford for  
Samuel Hogan  
Project Manager

# **Chain of Custody and Supporting Documentation**



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

<b>REPORT TO</b>		<b>CHAIN OF CUSTODY RECORD</b>		<b>INVOICE TO</b>	
CONTACT NAME Project Management Team		CONTACT NAME Julie Teague		COMPANY Merit Laboratories	
COMPANY Merit Laboratories		ADDRESS 2680 East Lansing Drive		CITY East Lansing	
ADDRESS 2680 East Lansing Drive		PHONE NO. 517-332-0167		STATE MI	
CITY East Lansing		ZIP CODE 48823		E-MAIL ADDRESS juliet@meritlabs.com	
PHONE NO. 517-332-0167		QUOTE NO.		PROJECT NO./NAME S31034	
E-MAIL ADDRESS results@meritlabs.com		SAMPLER(S) - PLEASE PRINT/SIGN NAME		ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)	
TURNAROUND TIME REQUIRED <input type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> OTHER		DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL II <input type="checkbox"/> LEVEL III <input checked="" type="checkbox"/> LEVEL IV <input type="checkbox"/> EDD <input type="checkbox"/> OTHER		CERTIFICATIONS <input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water <input type="checkbox"/> DoD <input type="checkbox"/> NPDES	
MATRIX GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE		# Containers & Preservatives		Project Locations <input type="checkbox"/> Detroit <input type="checkbox"/> New York <input type="checkbox"/> Other	
MATRIX		METHANOL		Special Instructions * E903.1 Mod. ** E904.0/SW 9320 Mod.	
YEAR		HNO <sub>3</sub>		Please use calculation product & provide Radium 226/228 combined results on the report	
DATE		H <sub>2</sub> O <sub>2</sub>		(Ice for IC)	
TIME		HCl		** Subcontracted to	
12/7/21 1425		NONE		GEL Laboratories, Inc.	
12/7/21 1304		# OR BOTTLES		2040 Savage Road	
12/7/21 1122		METHANOL		Charleston, SC 29407	
12/7/21 0951		HNO <sub>3</sub>			
12/7/21 1122		H <sub>2</sub> O <sub>2</sub>			
12/7/21 0850		HCl			
		OTHER			
		OTHER			

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

SAMPLE RECEIPT & REVIEW FORM

Client: <b>MERT</b>	SDG/AR/COC/Work Order: <b>Stat-468 / 5101472</b>
Received By: <b>DC</b>	Date Received: <b>12-9-21</b>
Carrier and Tracking Number	FedEx Express    FedEx Ground <u>UPS</u> Field Services    Courier    Other <b>1Z4624770163258621</b>

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?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples are to be received as radioactive?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/Hr Classified as: Rad 1    Rad 2    Rad 3
D) Did the client designate samples are hazardous?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's    Flammable    Foreign Soil    RCRA    Asbestos    Beryllium    Other: _____

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken    Damaged container    Leaking container    Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Client contacted and provided COC    COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Preservation Method: Wet Ice    Ice Packs    Dry ice <u>Went</u> Other: _____ *all temperatures are recorded in Celsius    TEMP: <u>6°</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature Device Serial #: <u>IR6-21</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken    Damaged container    Leaking container    Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
				Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
				Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: No dates on containers <u>No times on containers</u> COC missing info    Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: No container count on COC    Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Not relinquished    Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials GTB Date 12/13/21 Page 1 of 1

# Laboratory Certifications

**List of current GEL Certifications as of 10 December 2021**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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	<b>564472</b>
	<b>001</b>
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

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## Certificate of Analysis

Report Date: December 13, 2021

Company : Merit Laboratories Inc.  
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery  
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 Lavery  
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

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## Certificate of Analysis

Report Date: December 13, 2021

Company : Merit Laboratories Inc.  
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery  
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



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## Certificate of Analysis

Report Date: December 13, 2021

Company : Merit Laboratories Inc.  
Address : 2680 East Lansing Drive  
  
East Lansing, Michigan 48823  
Contact: John Lavery  
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

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## Certificate of Analysis

Report Date: December 13, 2021

Company : Merit Laboratories Inc.  
Address : 2680 East Lansing Drive  
  
East Lansing, Michigan 48823  
Contact: John Lavery  
Project: Routine Analysis

Client Sample ID: S31034.05      Project: MERI00120  
Sample ID: 564472005      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		1.07	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      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 Lavery  
Project: Routine Analysis

Client Sample ID: S31034.06 (Field Blank)      Project: MERI00120  
Sample ID: 564472006      Client ID: MERI001  
Matrix: Ground Water  
Collect Date: 07-DEC-21 08:50  
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	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      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 13, 2021

Page 1 of 2

**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
<b>Ion Chromatography</b>											
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:

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 564472

Page 2 of 2

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
<b>ICV</b>	<b>09-DEC-2021 10:53:00</b>	<b>211209</b>	<b>4.6042</b>	<b>5</b>	<b>92.1</b>	<b>(90%-110%)</b>	<b>Yes</b>
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
<b>ICB</b>	<b>09-DEC-2021 11:24:00</b>	<b>211209</b>	<b>0</b>	<b>0.2</b>	<b>Yes</b>
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
<b>ICV</b>	<b>09-DEC-2021 10:53:00</b>	<b>211209</b>	<b>2.331</b>	<b>2.5</b>	<b>93.2</b>	<b>(90%-110%)</b>	<b>Yes</b>
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
<b>ICB</b>	<b>09-DEC-2021 11:24:00</b>	<b>211209</b>	<b>0</b>	<b>0.1</b>	<b>Yes</b>
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
<b>ICV</b>	<b>09-DEC-2021 10:53:00</b>	<b>211209</b>	<b>9.4625</b>	<b>10</b>	<b>94.6</b>	<b>(90%-110%)</b>	<b>Yes</b>
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

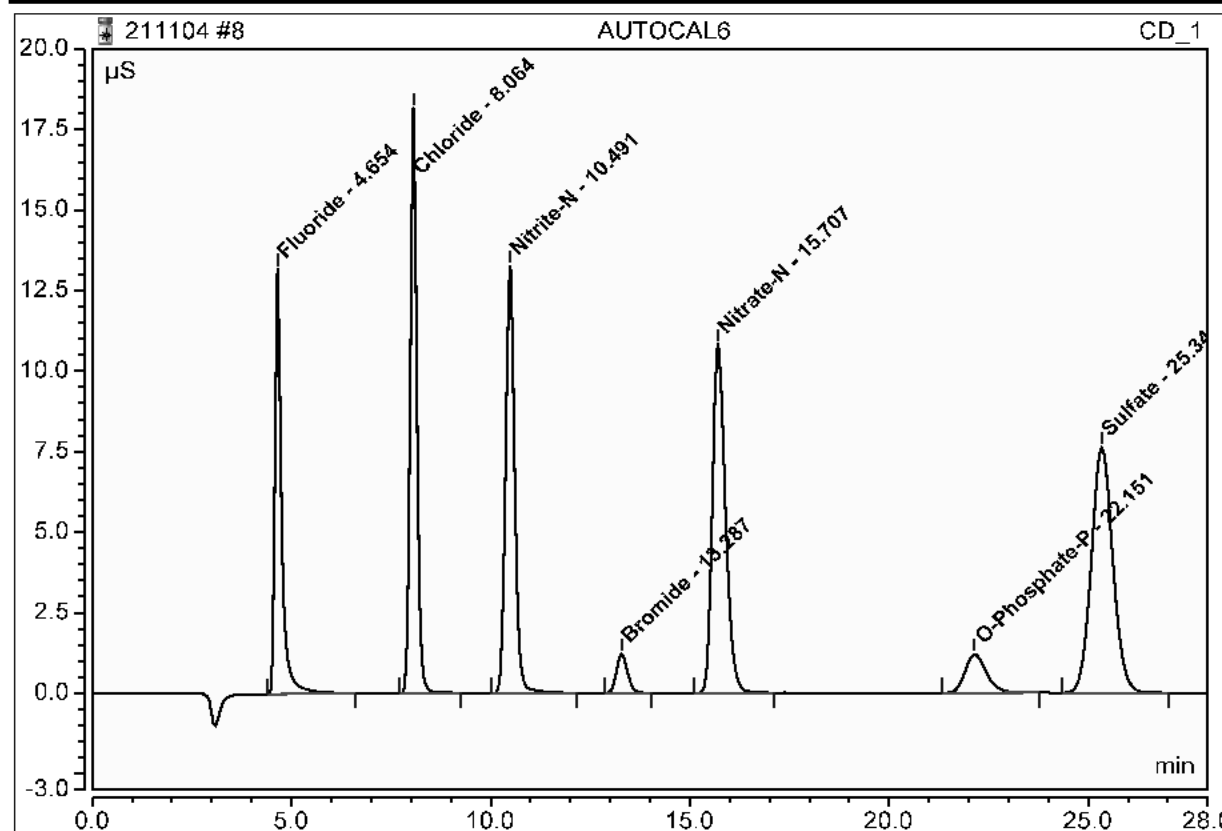
Sample Type	Run Date	Data File	Result	Limits	Within Limits
<b>ICB</b>	<b>09-DEC-2021 11:24:00</b>	<b>211209</b>	<b>0</b>	<b>0.4</b>	<b>Yes</b>
CCB	09-DEC-2021 14:29:00	211209	0	0.4	Yes
CCB	09-DEC-2021 20:39:00	211209	0	0.4	Yes
CCB	10-DEC-2021 02:49:00	211209	0	0.4	Yes
CCB	10-DEC-2021 08:59:00	211209	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

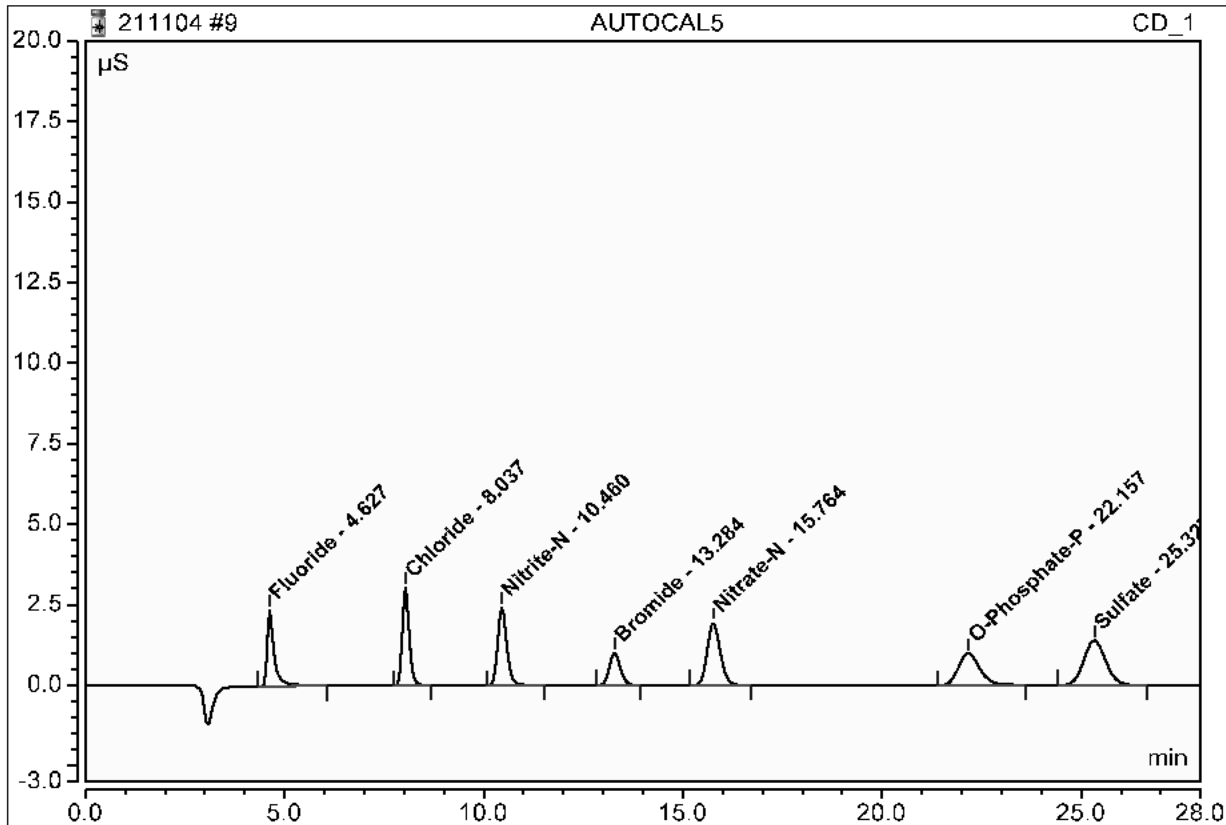
Sample ID	Run Time	Batch	Dilution	Dataset	Analyst
ICAL-06	11/04/21 15:28		1	211104	LXA2
ICAL-05	11/04/21 15:58		1	211104	LXA2
ICAL-04	11/04/21 16:29		1	211104	LXA2
ICAL-03	11/04/21 17:00		1	211104	LXA2
ICAL-02	11/04/21 17:30		1	211104	LXA2
ICAL-01	11/04/21 18:01		1	211104	LXA2
ICAL-06	11/04/21 15:28		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



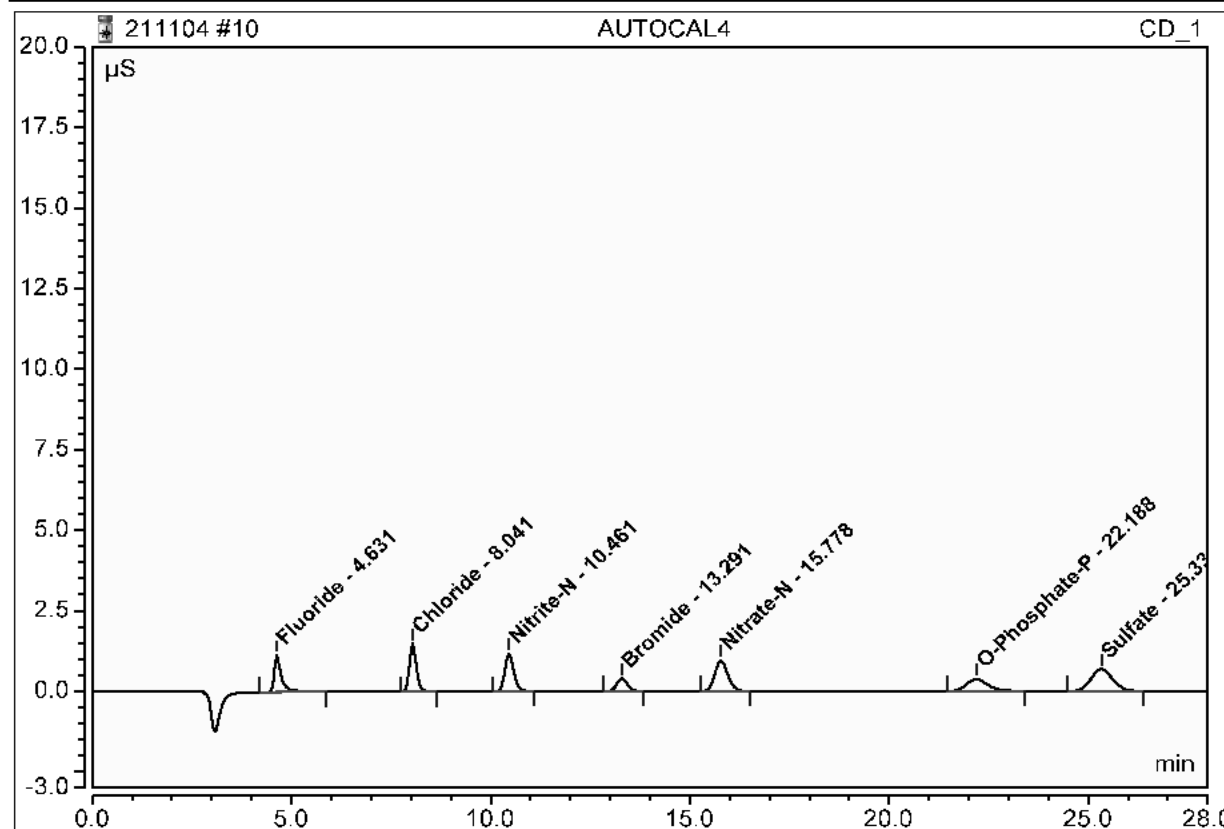
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.65	Fluoride	5.0000	5.0100		2.55433	13.08
2	8.06	Chloride	10.0000	10.0355		3.46803	17.76
3	10.49	Nitrite-N	5.0000	5.0111		3.49816	17.91
4	13.29	Bromide	3.0000	3.0113		0.39064	2.00
5	15.71	Nitrate-N	5.0000	5.0138		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
<b>Total:</b>				51.1279	0.000	19.532	100.00

<b>9 AUTOCAL5</b>			
Sample Name:	<b>AUTOCAL5</b>	Injection Volume:	<b>50.0</b>
Vial Number:	<b>2</b>	Channel:	<b>CD_1</b>
Sample Type:	<b>Calibration Standard</b>	Dilution Factor:	<b>1.0000</b>
Control Program:	<b>AS23</b>	Sample Weight:	<b>1.0000</b>
Quantif. Method:	<b>211104an</b>	Sample Amount:	<b>1.0000</b>
Recording Time:	<b>11/4/2021 15:58</b>	Analyst:	<b>LXA2</b>
Run Time (min):	<b>28.00</b>	Column:	<b>AS23-002407;GLGCE086;300;9056</b>



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
<b>Total:</b>				13.4205	0.000	4.298	100.00

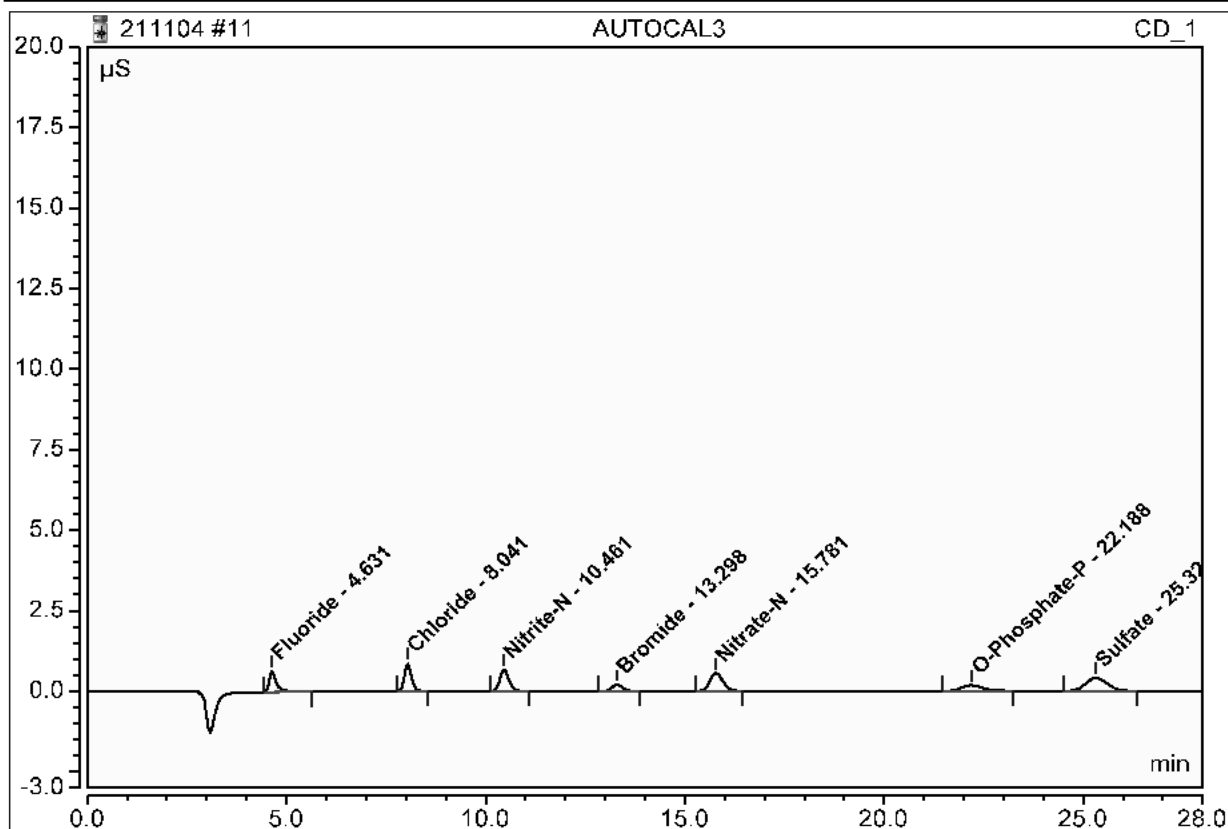
<b>10 AUTOCL4</b>			
Sample Name:	<b>AUTOCL4</b>	Injection Volume:	<b>50.0</b>
Vial Number:	<b>3</b>	Channel:	<b>CD_1</b>
Sample Type:	<b>Calibration Standard</b>	Dilution Factor:	<b>1.0000</b>
Control Program:	<b>AS23</b>	Sample Weight:	<b>1.0000</b>
Quantif. Method:	<b>211104an</b>	Sample Amount:	<b>1.0000</b>
Recording Time:	<b>11/4/2021 16:29</b>	Analyst:	<b>LXA2</b>
Run Time (min):	<b>28.00</b>	Column:	<b>AS23-002407;GLGCE086;300;9056</b>



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
<b>Total:</b>				<b>6.2274</b>	<b>0.000</b>	<b>2.002</b>	<b>100.00</b>

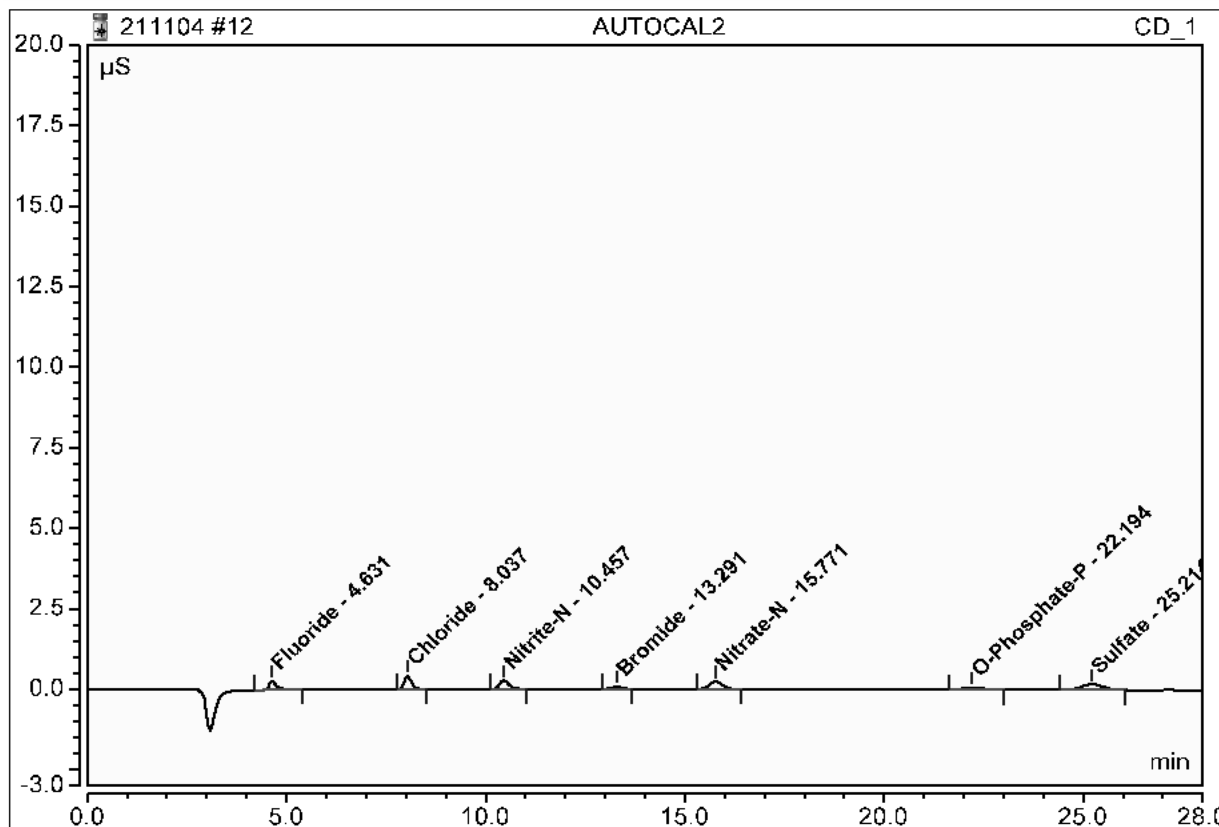
**11 AUTOCAL3**

Sample Name:	<b>AUTOCAL3</b>	Injection Volume:	<b>50.0</b>
Vial Number:	<b>4</b>	Channel:	<b>CD_1</b>
Sample Type:	<b>Calibration Standard</b>	Dilution Factor:	<b>1.0000</b>
Control Program:	<b>AS23</b>	Sample Weight:	<b>1.0000</b>
Quantif. Method:	<b>211104an</b>	Sample Amount:	<b>1.0000</b>
Recording Time:	<b>11/4/2021 17:00</b>	Analyst:	<b>LXA2</b>
Run Time (min):	<b>28.00</b>	Column:	<b>AS23-002407;GLGCE086;300;9056</b>



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
<b>Total:</b>				3.6175	0.000	1.140	100.00

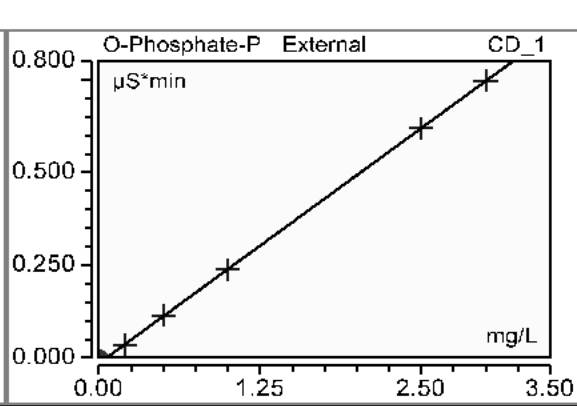
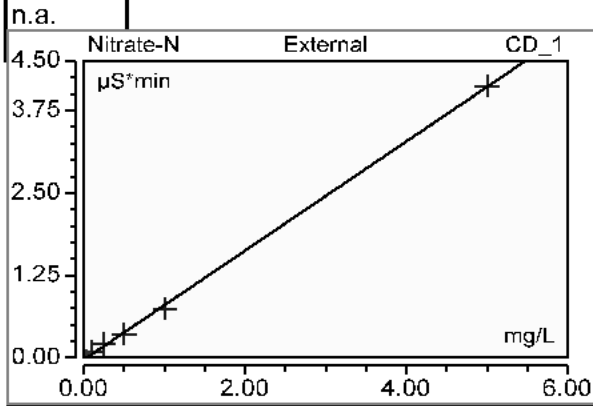
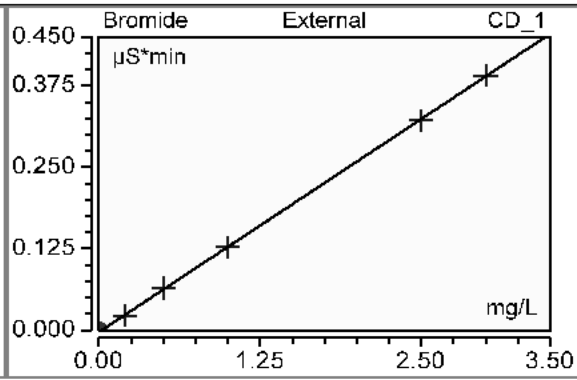
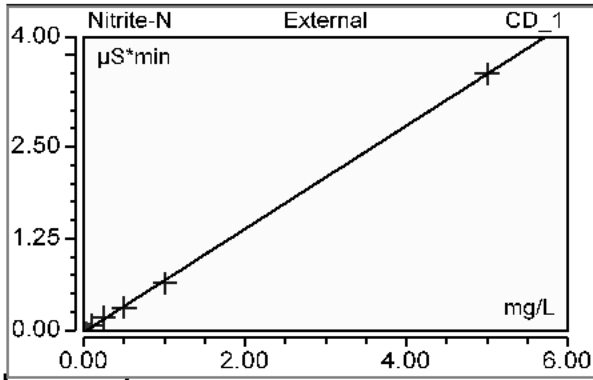
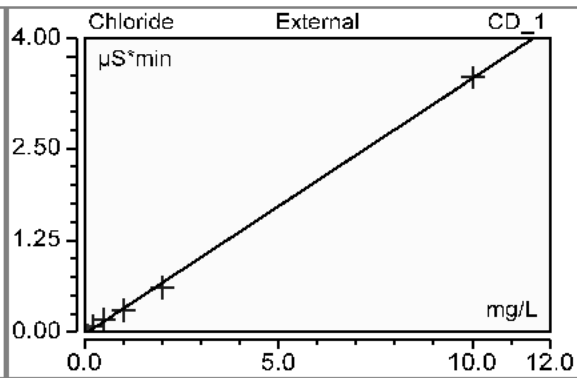
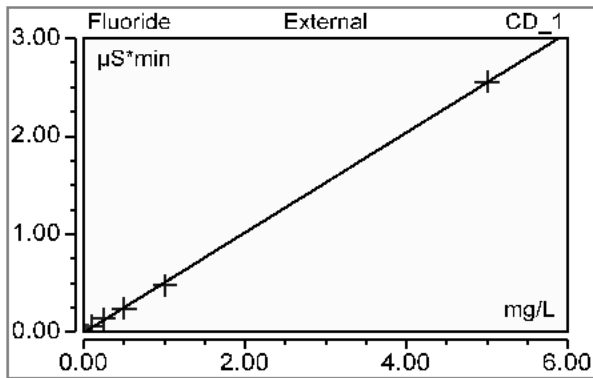
12 AUTOCAL2			
Sample Name:	AUTOCAL2	Injection Volume:	50.0
Vial Number:	5	Channel:	CD_1
Sample Type:	Calibration Standard	Dilution Factor:	1.0000
Control Program:	AS23	Sample Weight:	1.0000
Quantif. Method:	211104an	Sample Amount:	1.0000
Recording Time:	11/4/2021 17:30	Analyst:	LXA2
Run Time (min):	28.00	Column:	AS23-002407;GLGCE086;300;9056

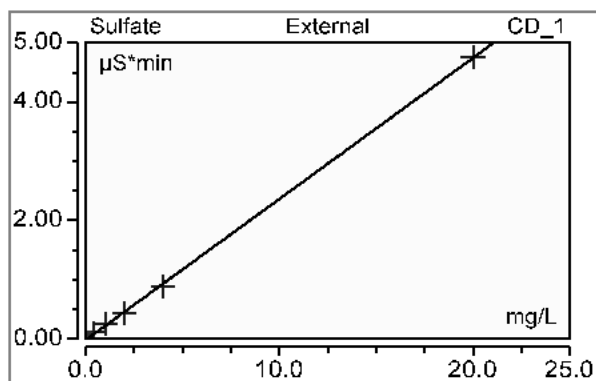


No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.63	Fluoride	0.1000	0.1323		0.06182	12.85
2	8.04	Chloride	0.2000	0.3212		0.08270	17.19
3	10.46	Nitrite-N	0.1000	0.1374		0.07280	15.13
4	13.29	Bromide	0.2000	0.1899		0.02219	4.61
5	15.77	Nitrate-N	0.1000	0.1450		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
<b>Total:</b>				1.6568	0.000	0.481	100.00



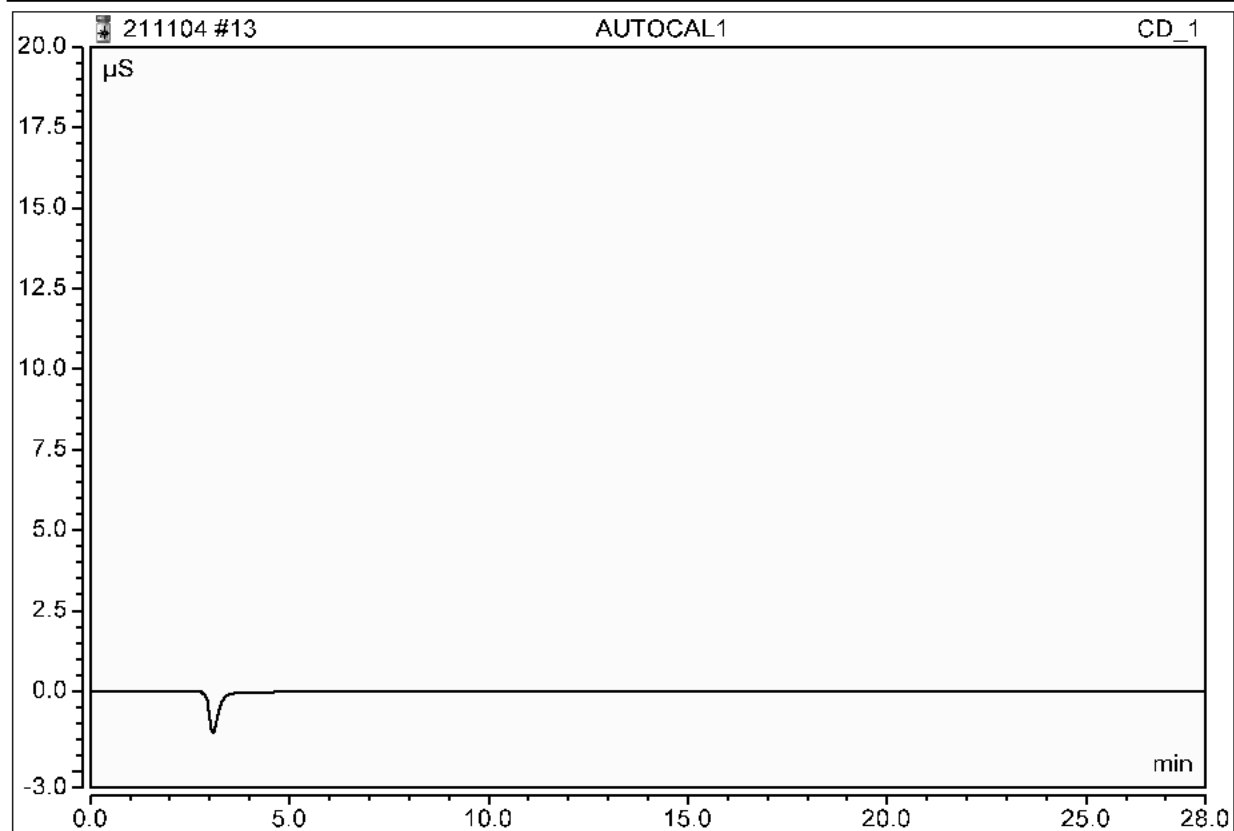
<b>13 AUTOCAL1</b>		
Sample Name:	<b>AUTOCAL1</b>	Injection Volume: <b>50.0</b>
Vial Number:	<b>6</b>	Channel: <b>CD_1</b>
Sample Type:	<b>Calibration Standard</b>	Dilution Factor: <b>1.0000</b>
Control Program:	<b>AS23</b>	Sample Weight: <b>1.0000</b>
Quantif. Method:	<b>211104an</b>	Sample Amount: <b>1.0000</b>
Recording Time:	<b>11/4/2021 18:01</b>	Analyst: <b>LXA2</b>
Run Time (min):	<b>28.00</b>	Column: <b>AS23-211005140;GLGCE086;300;9056</b>





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
<b>Average:</b>				99.9626	-0.0167	0.4302	0.0000

<b>13 AUTOCAL1</b>			
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



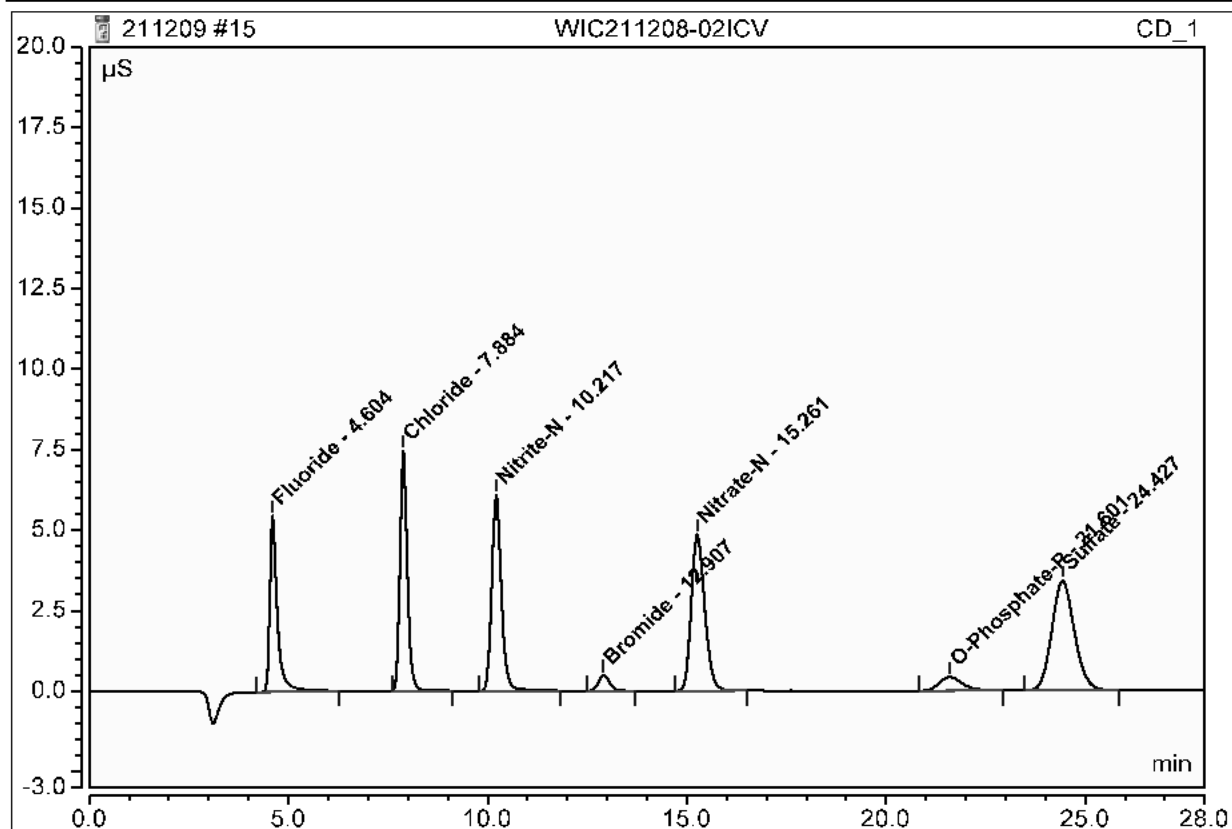
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	0.0000	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	0.0000	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.
<b>Total:</b>				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

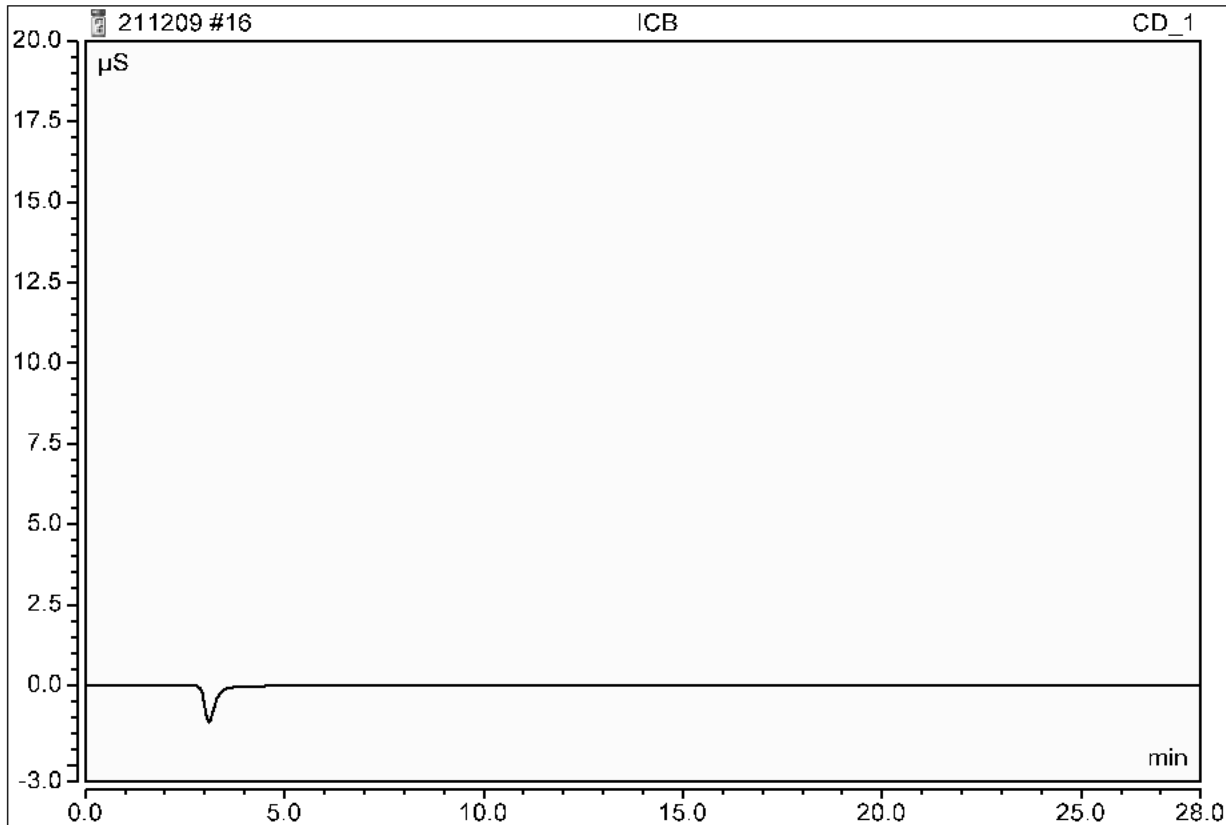
**15 WIC211208-02ICV**

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



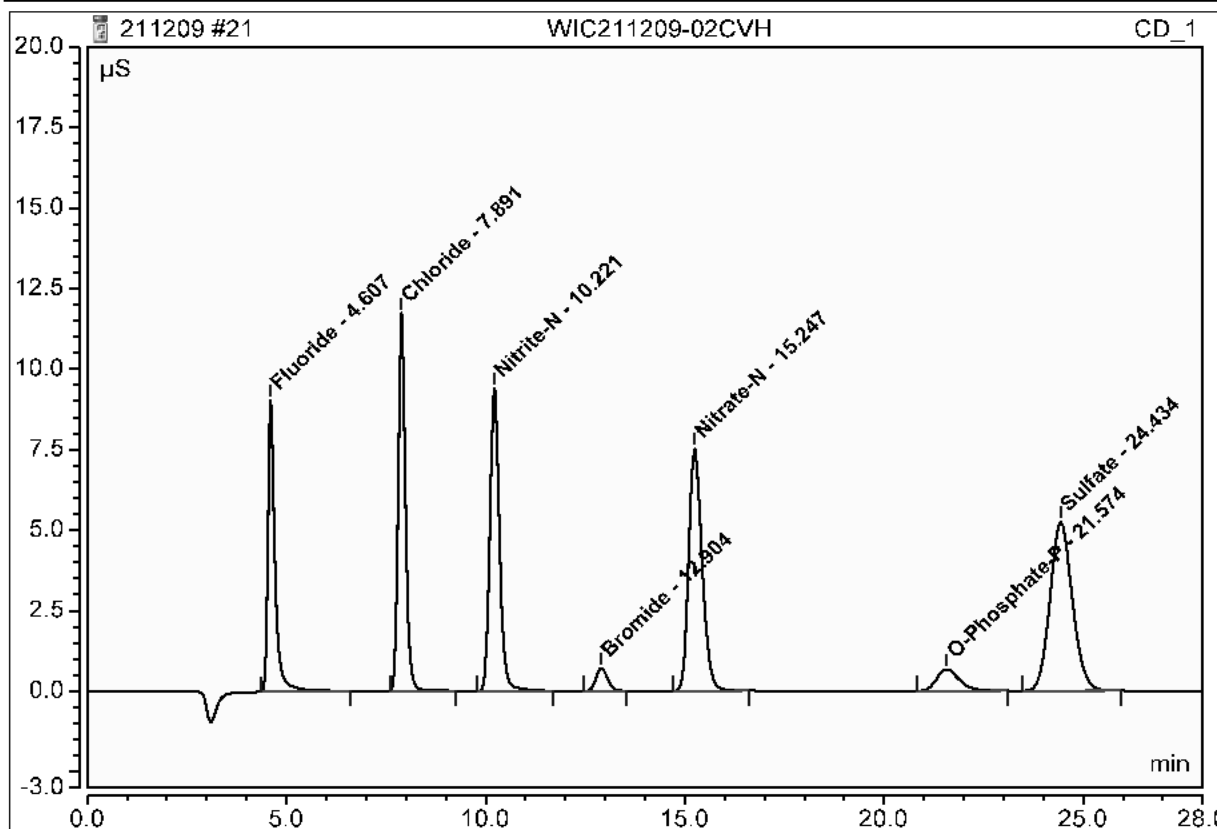
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
1	4.60	Fluoride	n.a.	2.3310		1.18538	13.09
2	7.88	Chloride	n.a.	4.6042		1.57530	17.39
3	10.22	Nitrite-N	n.a.	2.4654		1.70902	18.87
4	12.91	Bromide	n.a.	1.2518		0.16087	1.78
5	15.26	Nitrate-N	n.a.	2.3339		1.90364	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
<b>Total:</b>				23.6370	0.000	9.058	100.00

<b>16 ICB</b>			
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



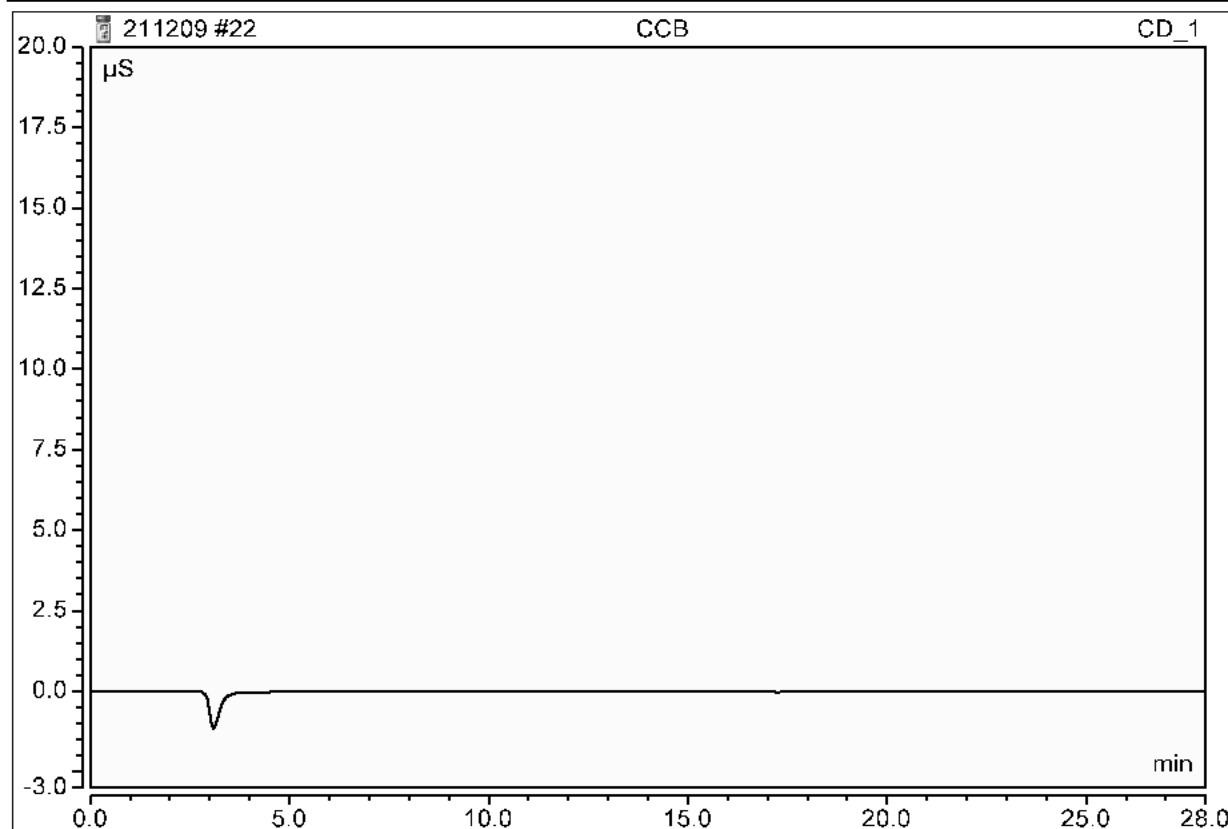
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

<b>21 WIC211209-02CVH</b>			
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
<b>Total:</b>				36.2453	0.000	13.978	100.00

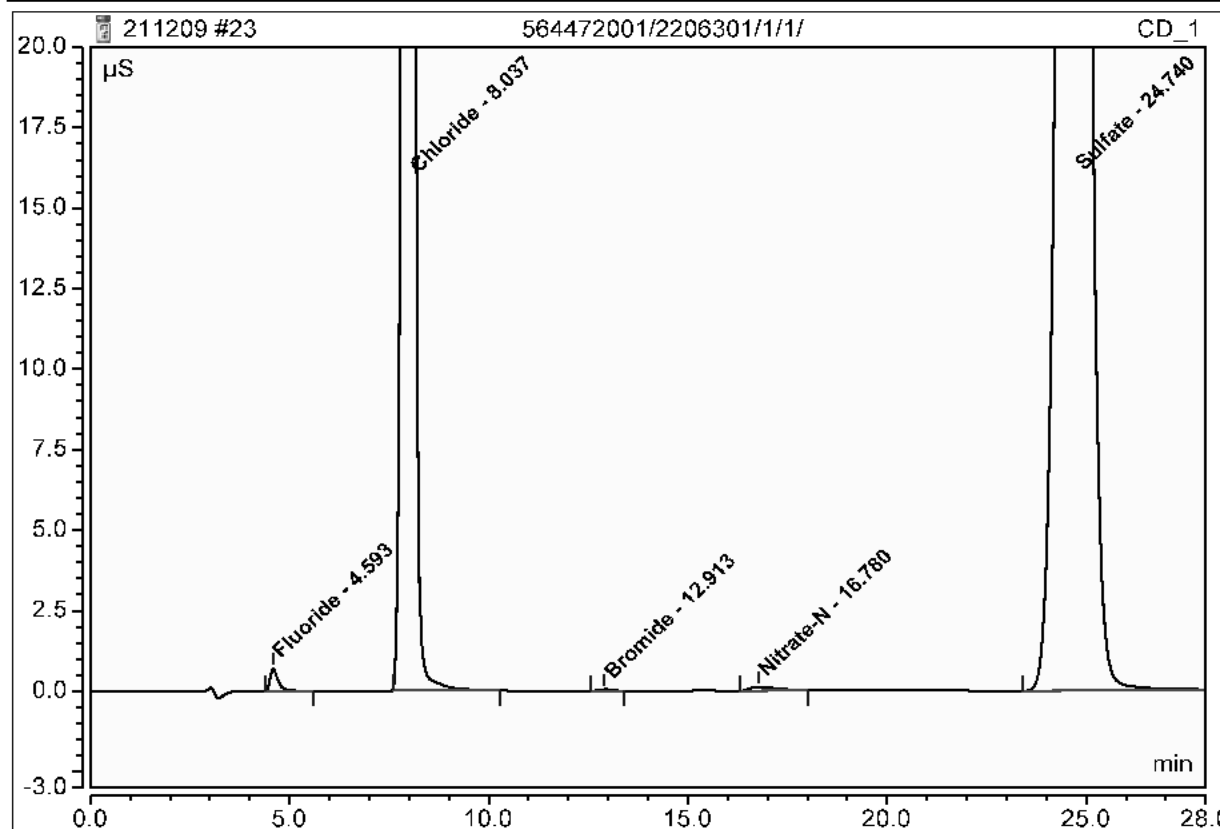
22 CCB			
Sample Name:	CCB	Injection Volume:	50.0
Vial Number:	9	Channel:	CD_1
Sample Type:	Unknown	Dilution Factor:	1.0000
Control Program:	AS23	Sample Weight:	1.0000
Quantif. Method:	211104an	Sample Amount:	1.0000
Recording Time:	12/9/2021 14:29	Analyst:	HXC1
Run Time (min):	28.00	Column:	AS23-002407;GLGCE086;300;9056



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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

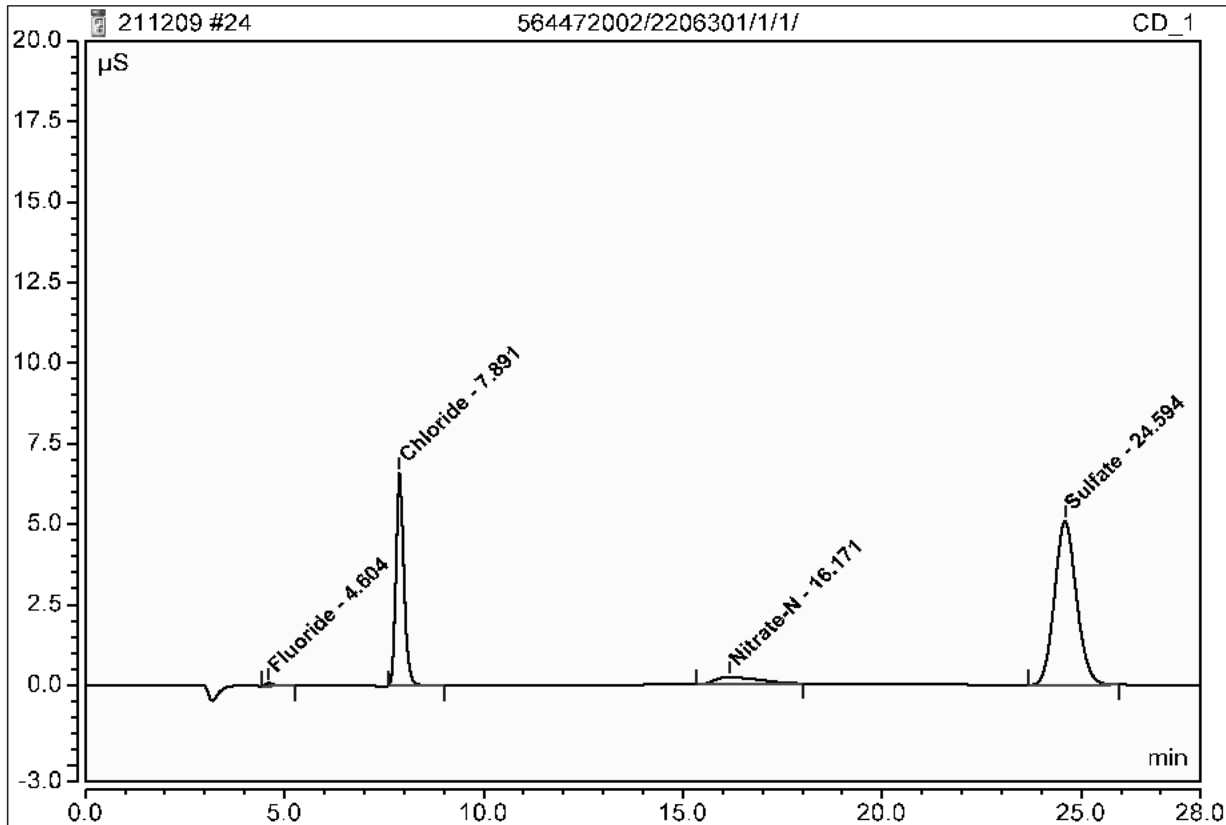


<b>23 564472001/2206301/1/1/</b>			
Sample Name:	564472001/2206301/1/1/	Injection Volume:	50.0
Vial Number:	10	Channel:	CD_1
Sample Type:	Unknown	Dilution Factor:	1.0000
Control Program:	AS23	Sample Weight:	1.0000
Quantif. Method:	211104an	Sample Amount:	1.0000
Recording Time:	12/9/2021 15:00	Analyst:	HXC1
Run Time (min):	28.00	Column:	AS23-002407;GLGCE086;300;9056



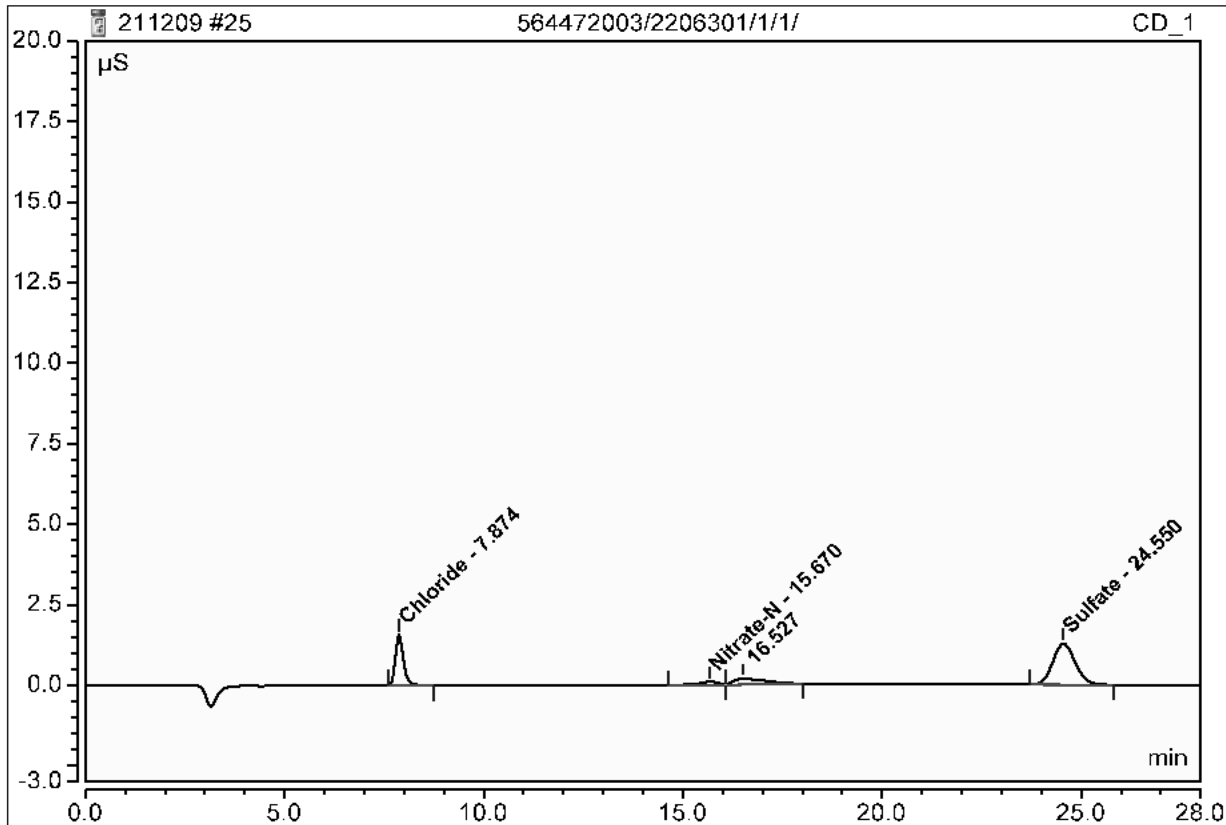
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.59	Fluoride	n.a.	0.3381		0.16699	0.16
2	8.04	Chloride	n.a.	96.2701		33.51996	32.68
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
3	12.91	Bromide	n.a.	0.1501		0.01700	0.02
4	16.78	Nitrate-N	n.a.	0.1512		0.09816	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
<b>Total:</b>				386.0648	0.000	102.579	100.00

<b>24 564472002/2206301/1/1/</b>			
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



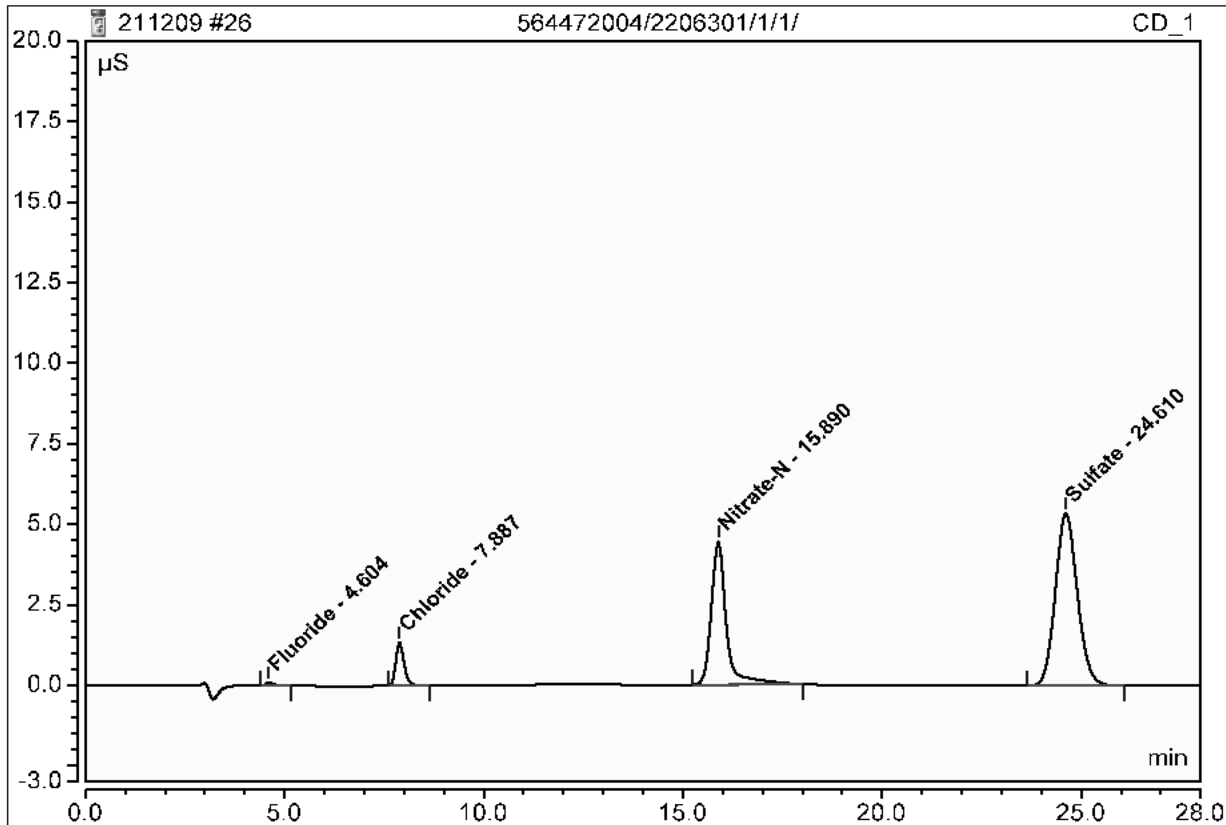
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.60	Fluoride	n.a.	0.0587		0.02423	0.48
2	7.89	Chloride	n.a.	4.4480		1.52084	29.86
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
3	16.17	Nitrate-N	n.a.	0.3820		0.28905	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
<b>Total:</b>				18.6480	0.000	5.093	100.00

<b>25 564472003/2206301/1/1/</b>			
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



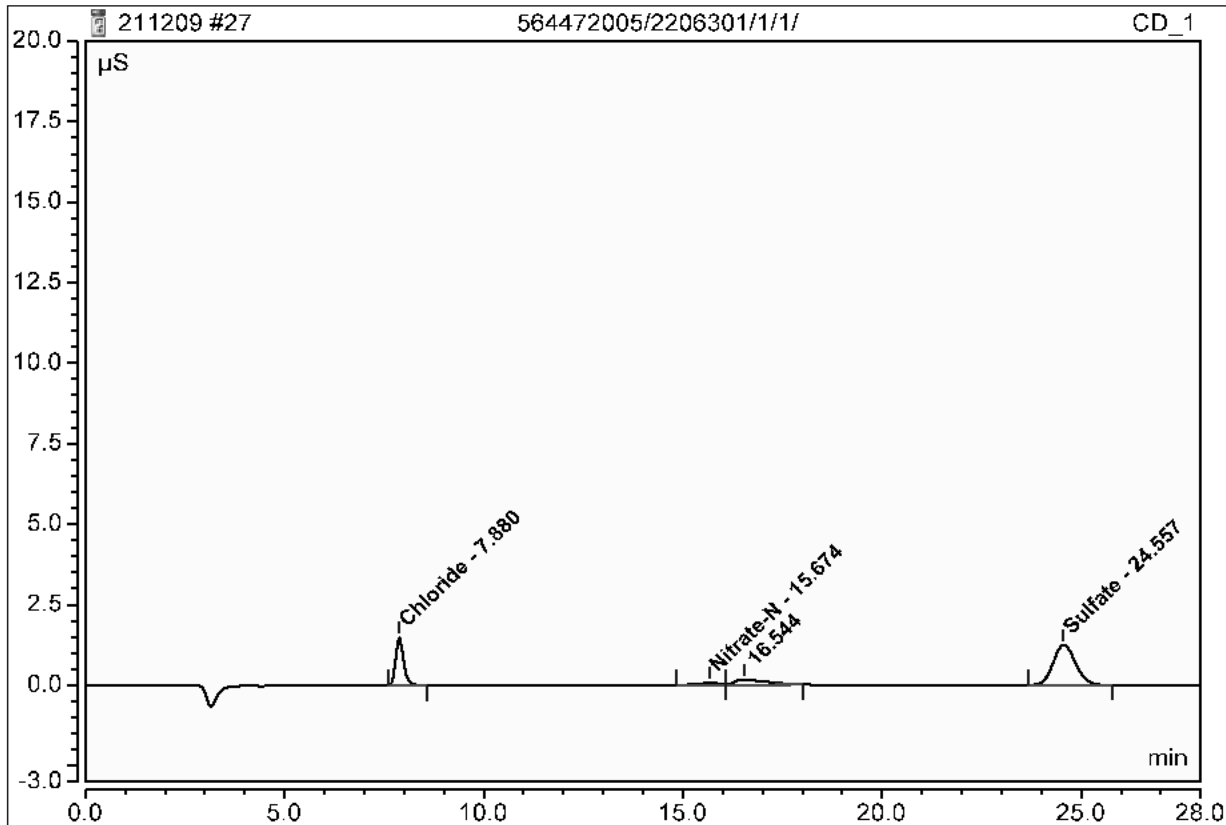
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	7.87	Chloride	n.a.	1.1116		0.35815	24.99
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
2	15.67	Nitrate-N	n.a.	0.1060		0.06079	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
<b>Total:</b>				4.8000	0.000	1.257	87.72

<b>26 564472004/2206301/1/1/</b>			
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



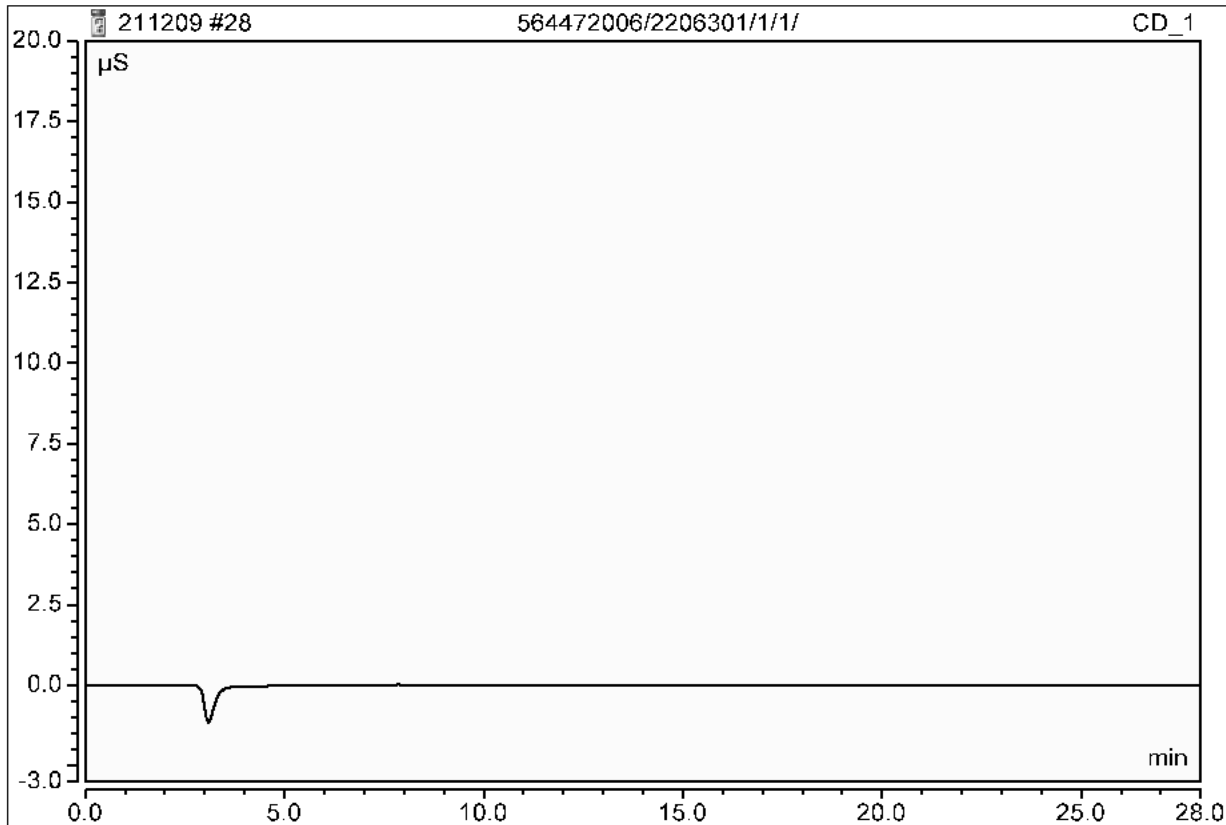
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.60	Fluoride	n.a.	0.0660		0.02792	0.49
2	7.89	Chloride	n.a.	1.0315		0.33024	5.75
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
3	15.89	Nitrate-N	n.a.	2.3913		1.95119	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
<b>Total:</b>				17.9795	0.000	5.743	100.00

<b>27 564472005/2206301/1/1/</b>			
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



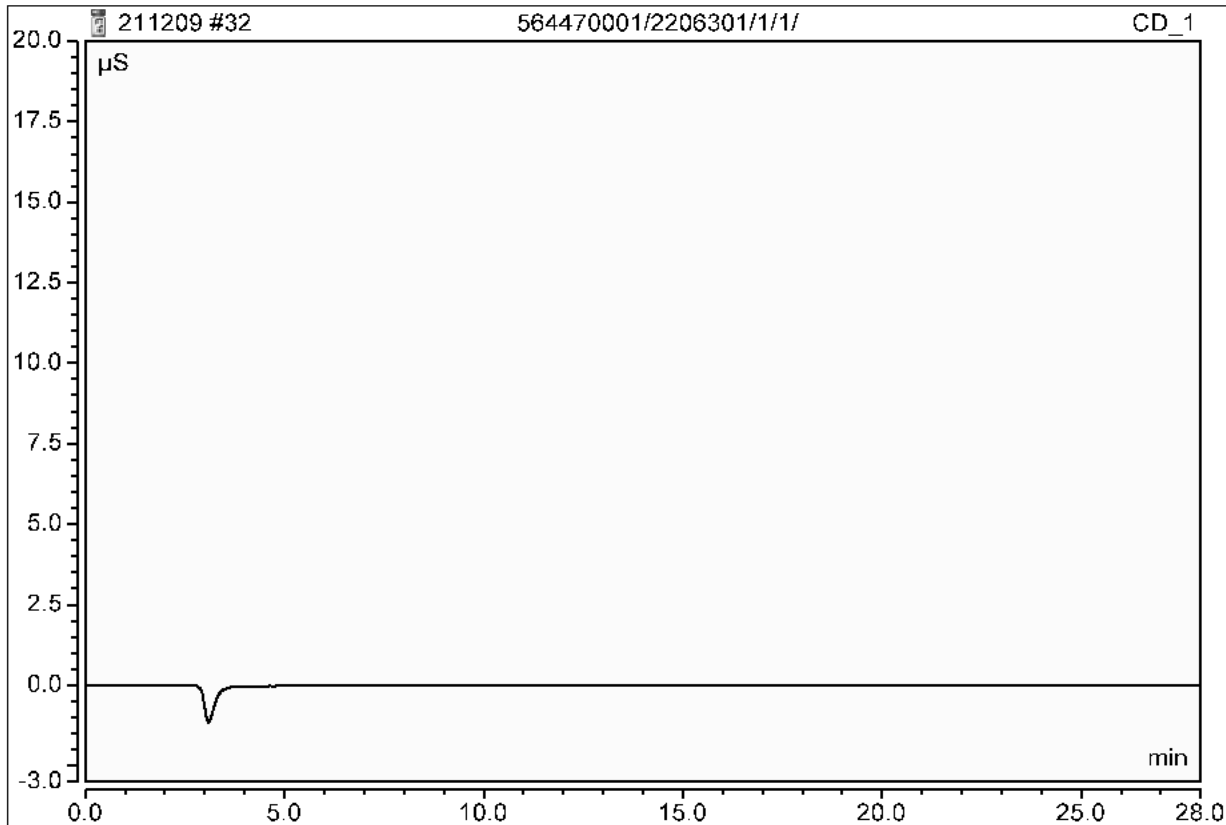
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	7.88	Chloride	n.a.	1.0677		0.34287	25.11
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
2	15.67	Nitrate-N	n.a.	0.0851		0.04345	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
<b>Total:</b>				4.6710	0.000	1.209	88.56

<b>28 564472006/2206301/1/1/</b>			
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



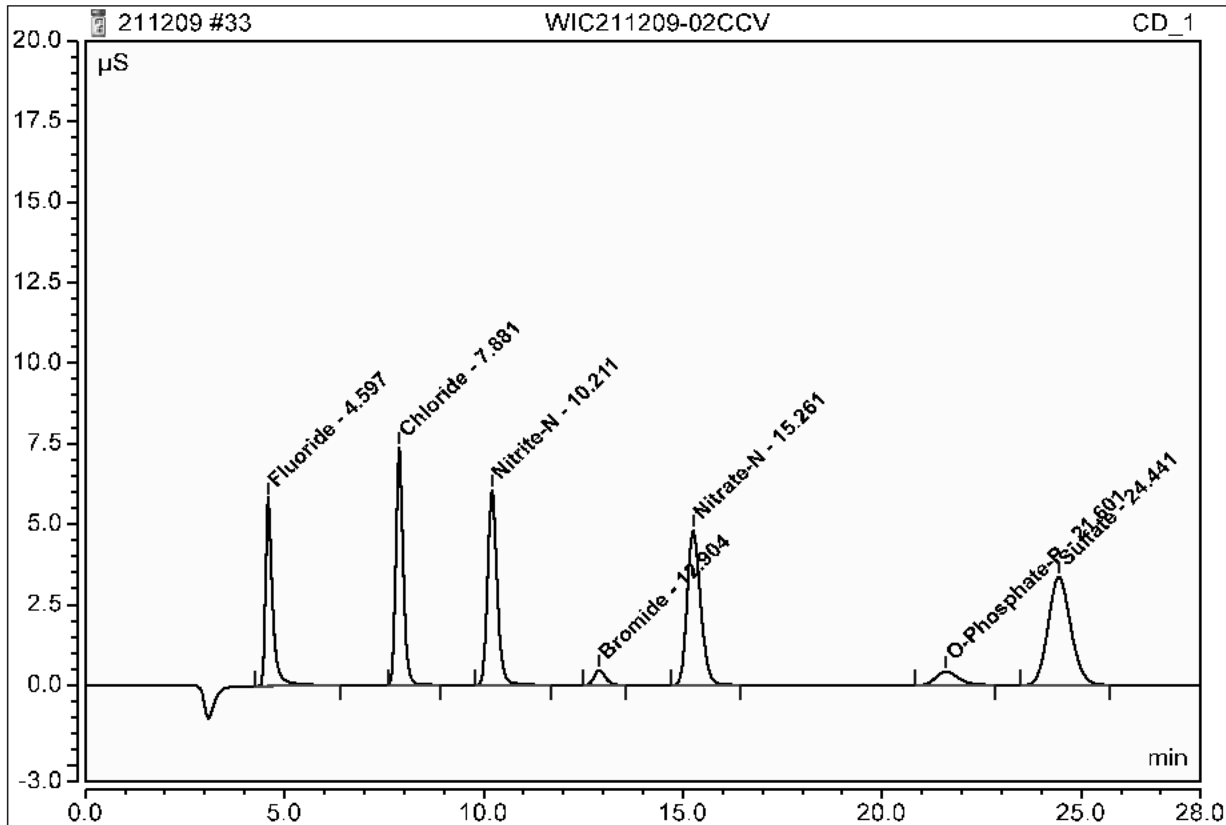
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

<b>32 564470001/2206301/1/1/</b>			
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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

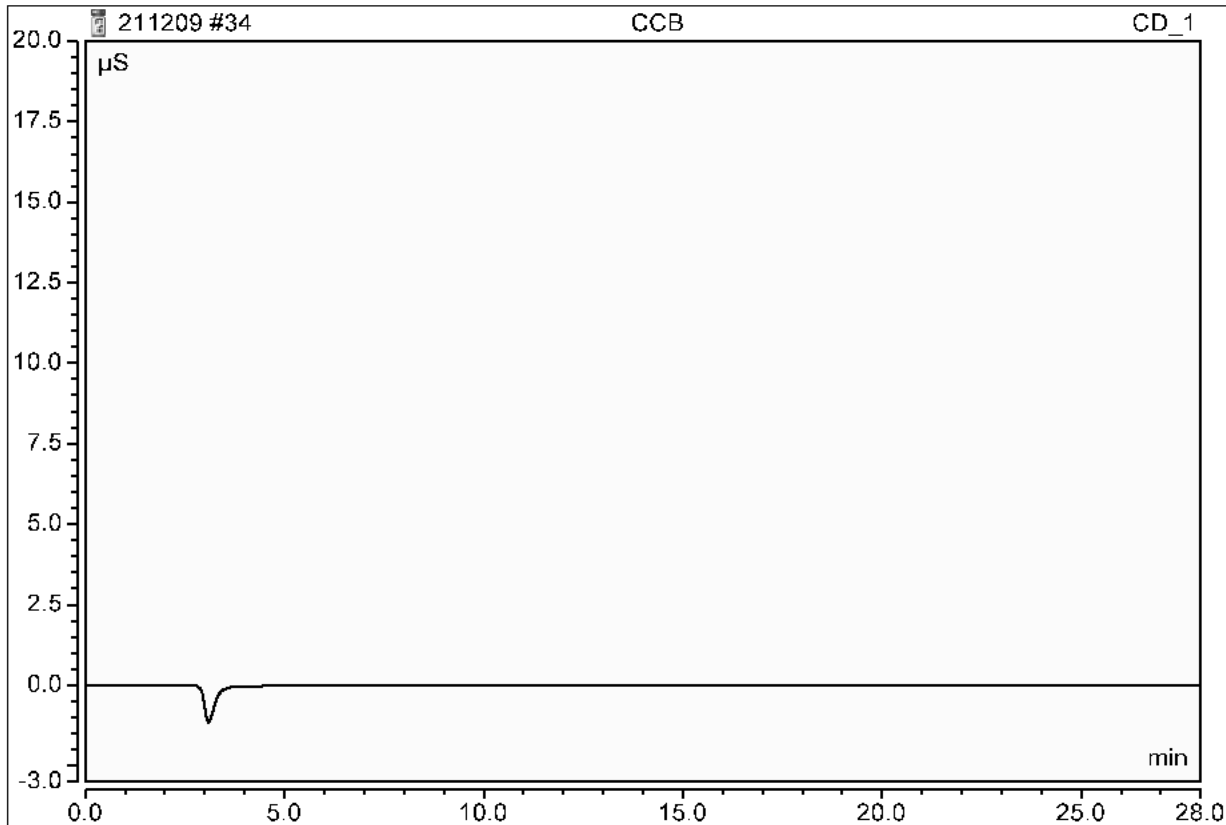
<b>33 WIC211209-02CCV</b>			
Sample Name:	WIC211209-02CCV	Injection Volume:	50.0
Vial Number:	20	Channel:	CD_1
Sample Type:	Unknown	Dilution Factor:	1.0000
Control Program:	AS23	Sample Weight:	1.0000
Quantif. Method:	211104an	Sample Amount:	1.0000
Recording Time:	12/9/2021 20:08	Analyst:	HXC1
Run Time (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
<b>Total:</b>				23.4452	0.000	8.998	100.00

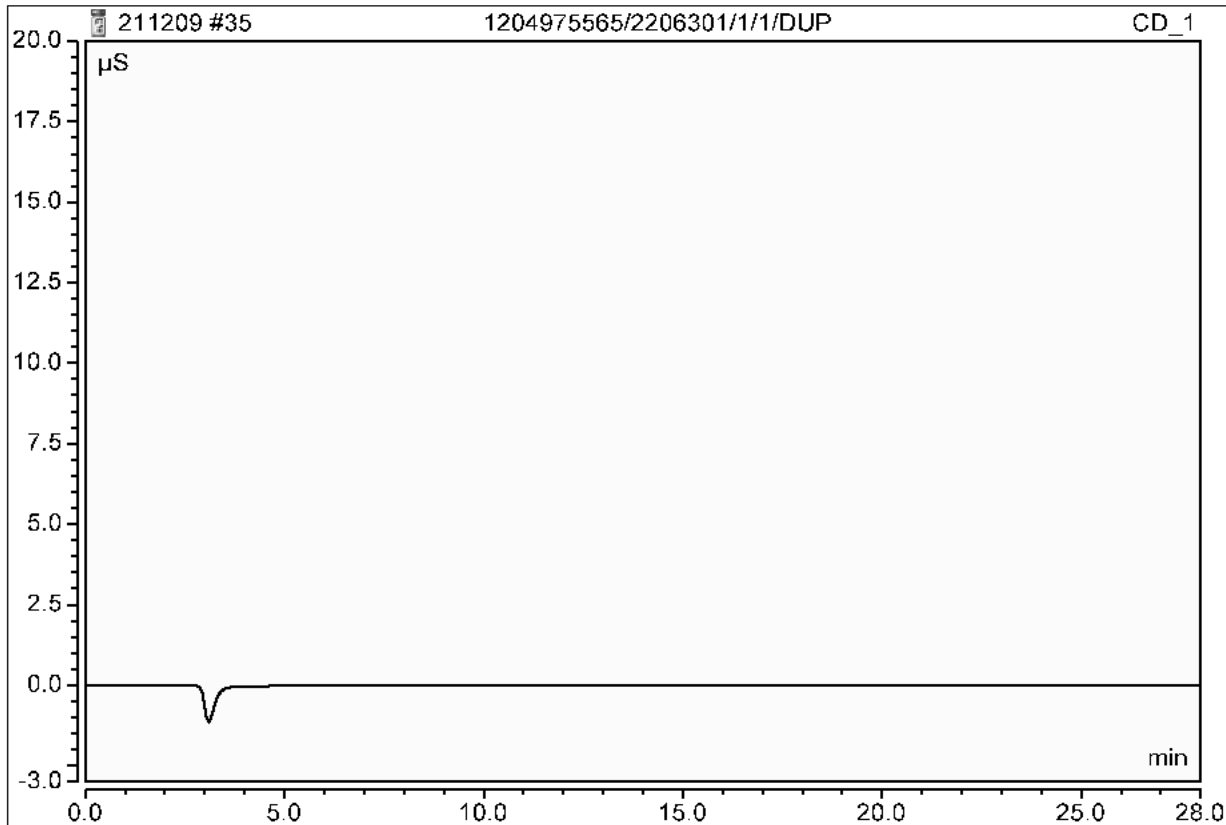


34 CCB			
Sample Name:	CCB	Injection Volume:	50.0
Vial Number:	21	Channel:	CD_1
Sample Type:	Unknown	Dilution Factor:	1.0000
Control Program:	AS23	Sample Weight:	1.0000
Quantif. Method:	211104an	Sample Amount:	1.0000
Recording Time:	12/9/2021 20:39	Analyst:	HXC1
Run Time (min):	28.00	Column:	AS23-002407;GLGCE086;300;9056



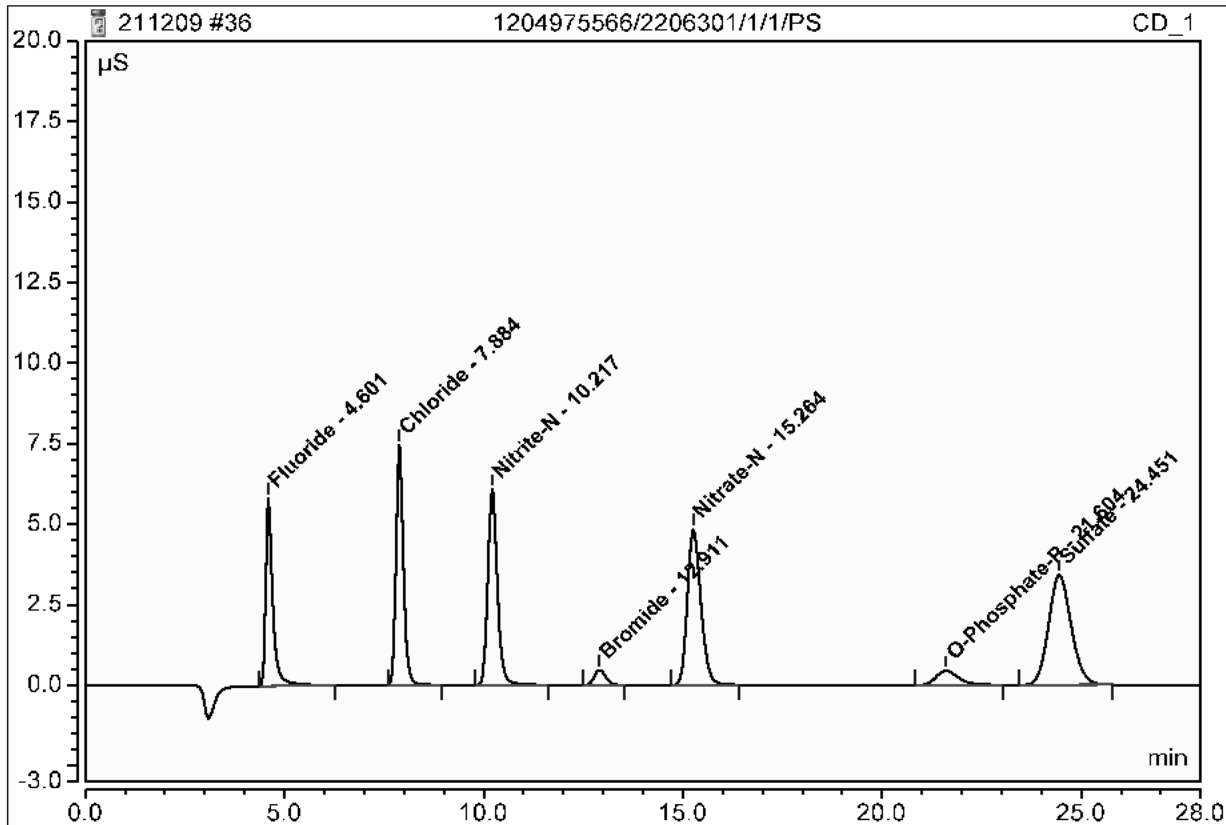
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

<b>35 1204975565/2206301/1/1/DUP</b>			
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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

<b>36 1204975566/2206301/1/1/PS</b>			
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

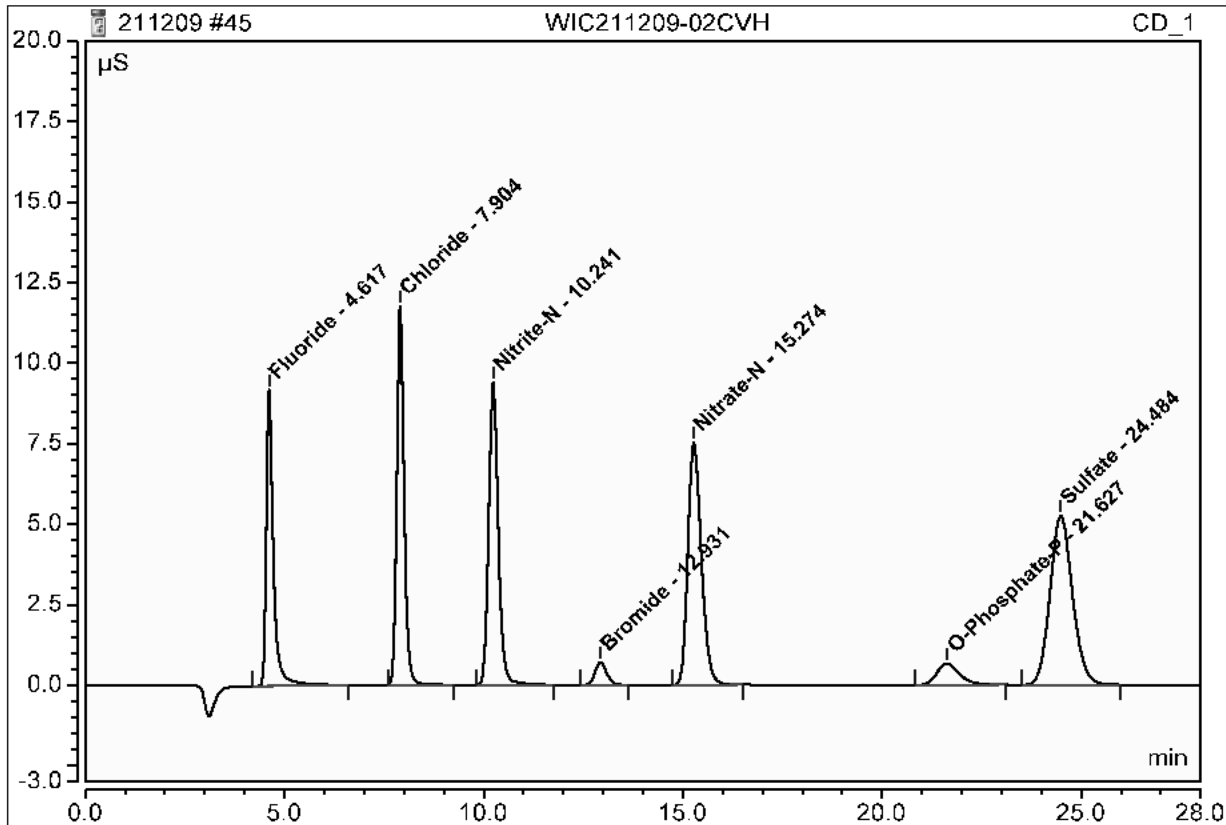


No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.60	Fluoride	n.a.	2.3314		1.18558	13.06
2	7.88	Chloride	n.a.	4.6089		1.57693	17.37
3	10.22	Nitrite-N	n.a.	2.4579		1.70370	18.77
4	12.91	Bromide	n.a.	1.2216		0.15692	1.73
5	15.26	Nitrate-N	n.a.	2.3374		1.90655	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
<b>Total:</b>				23.7053	0.000	9.077	100.00

This is runlog for Sequence 211209.seq for IC7

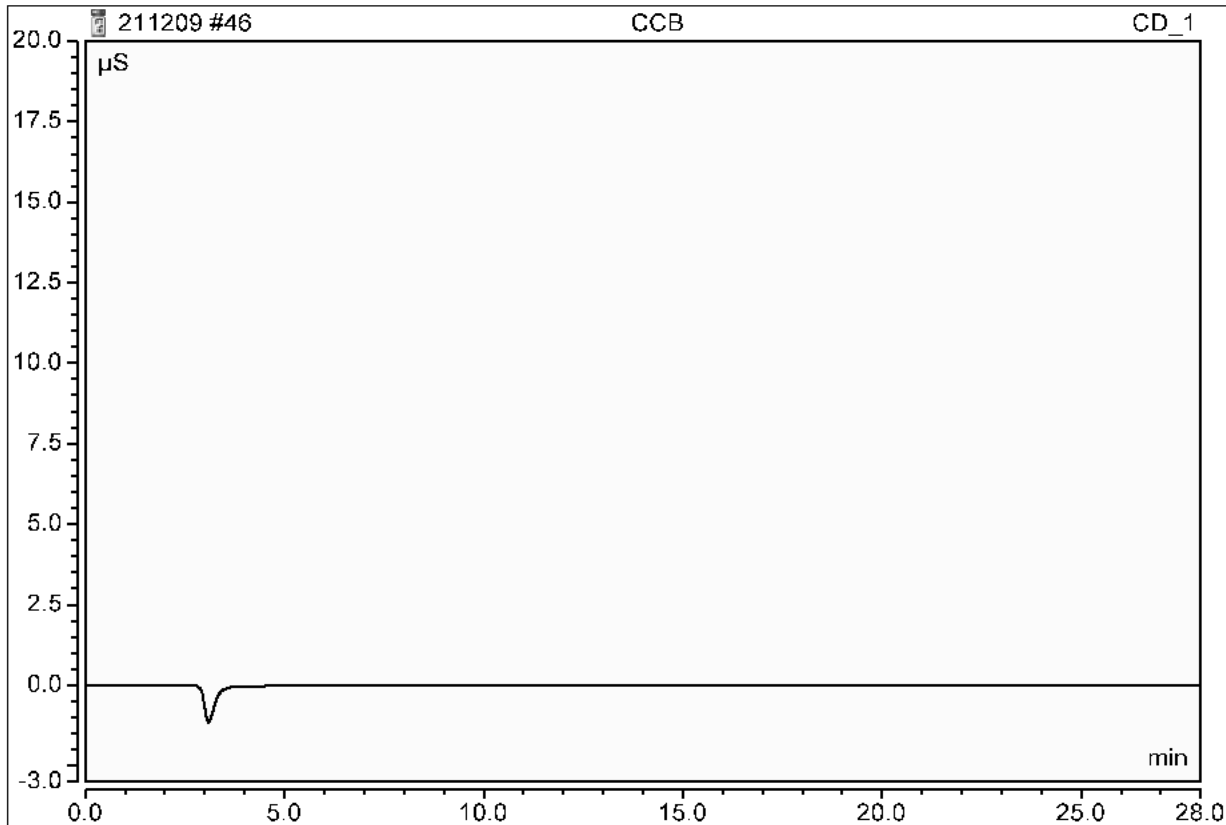
Sample ID	Run Time	Batch	Dilution	Dataset	Analyst
564470006	12/10/21 00:14	2206301	1	211209	HXC1
564470007	12/10/21 00:45	2206301	1	211209	HXC1
564470008	12/10/21 01:16	2206301	1	211209	HXC1
564470009	12/10/21 01:47	2206301	1	211209	HXC1
CVH	12/10/21 02:18		1	211209	HXC1
CCB	12/10/21 02:49		1	211209	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

<b>45 WIC211209-02CVH</b>			
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



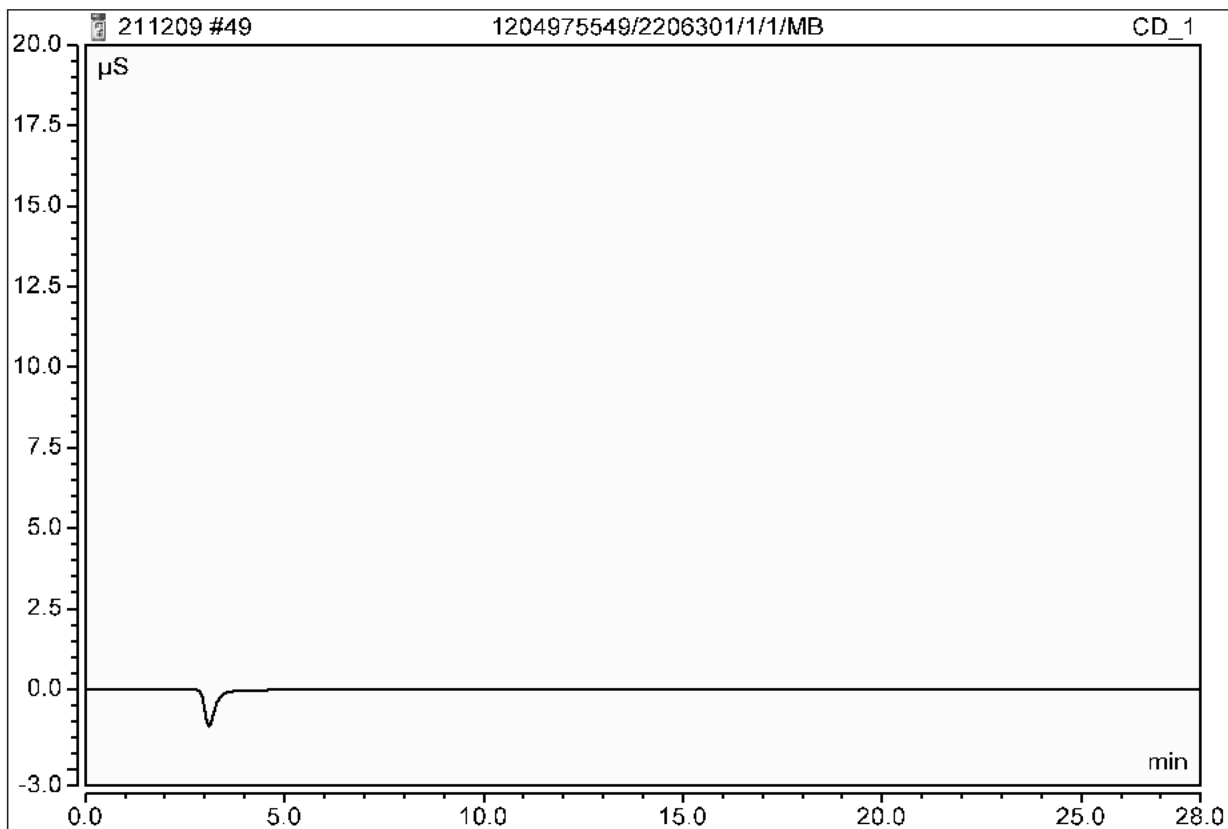
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.62	Fluoride	n.a.	3.6934		1.88156	13.38
2	7.90	Chloride	n.a.	7.1623		2.46675	17.55
3	10.24	Nitrite-N	n.a.	3.7803		2.63311	18.73
4	12.93	Bromide	n.a.	1.8675		0.24127	1.72
5	15.27	Nitrate-N	n.a.	3.6027		2.95325	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
<b>Total:</b>				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



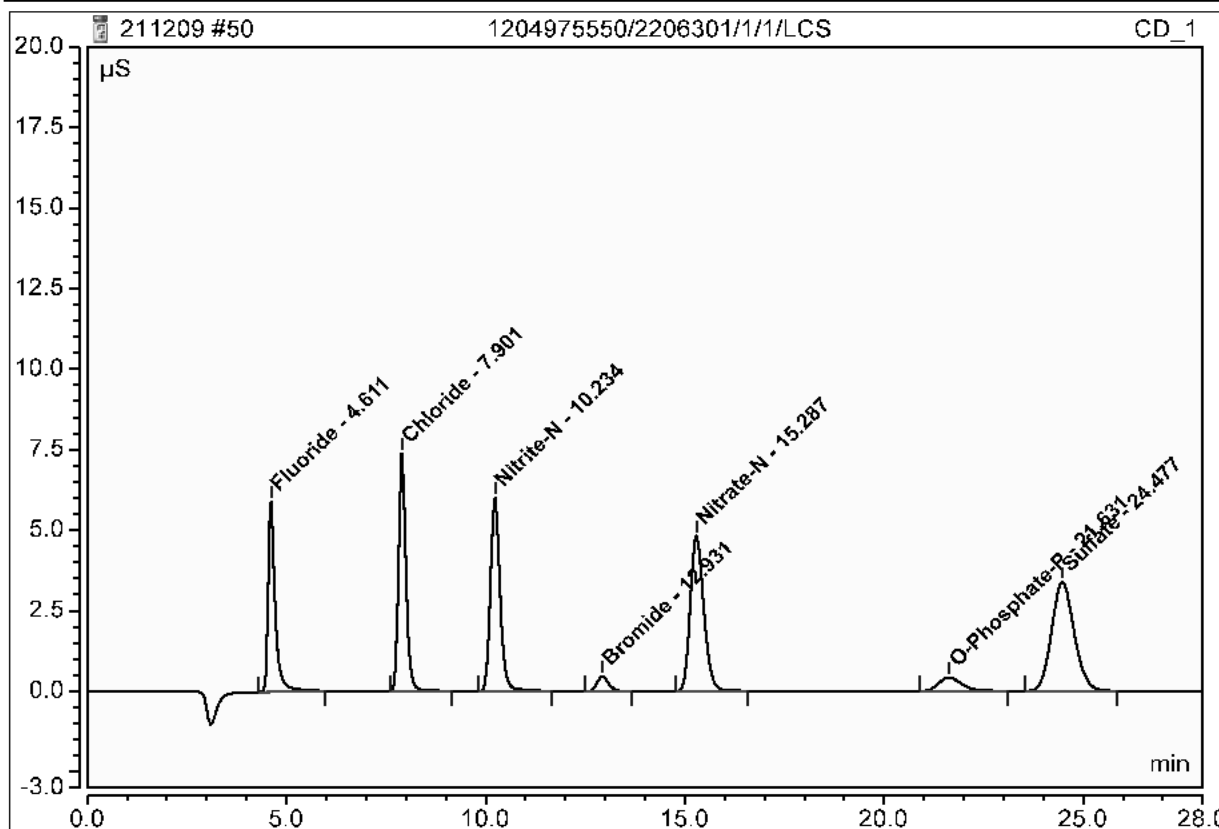
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

<b>49 1204975549/2206301/1/1/MB</b>			
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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

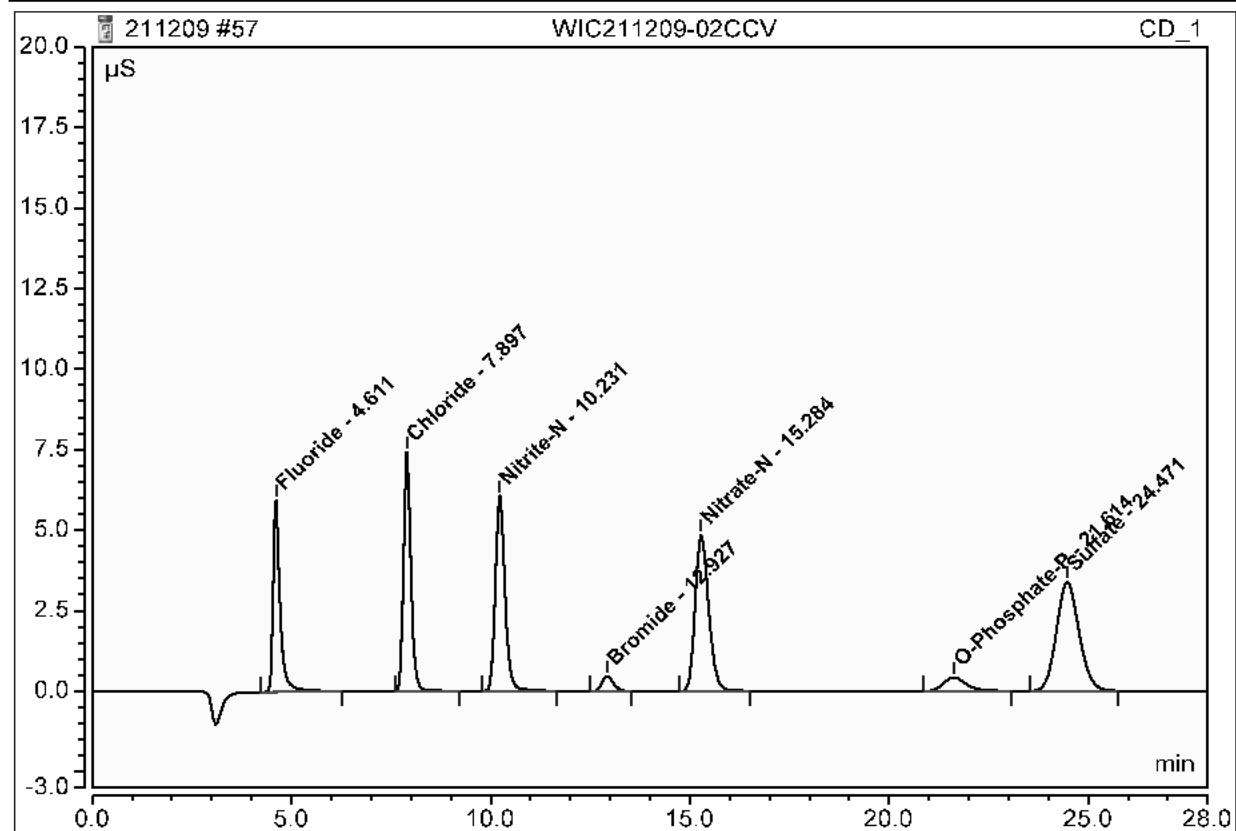
<b>50 1204975550/2206301/1/1/LCS</b>			
Sample Name:	1204975550/2206301/1/1/LCS	Injection Volume:	50.0
Vial Number:	37	Channel:	CD_1
Sample Type:	Unknown	Dilution Factor:	1.0000
Control Program:	AS23	Sample Weight:	1.0000
Quantif. Method:	211104an	Sample Amount:	1.0000
Recording Time:	12/10/2021 4:52	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
<b>Total:</b>				23.5610	0.000	9.035	100.00

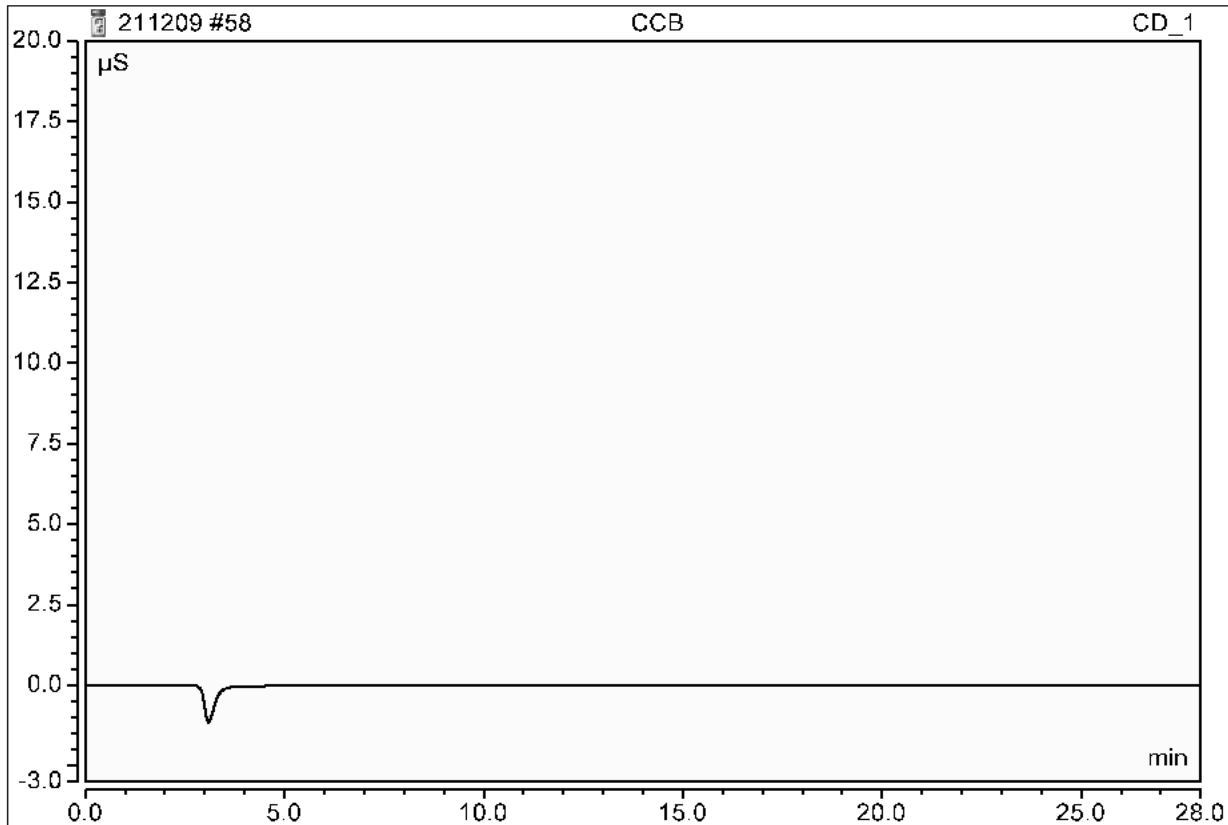


<b>57 WIC211209-02CCV</b>			
Sample Name:	WIC211209-02CCV	Injection Volume:	50.0
Vial Number:	44	Channel:	CD_1
Sample Type:	Unknown	Dilution Factor:	1.0000
Control Program:	AS23	Sample Weight:	1.0000
Quantif. Method:	211104an	Sample Amount:	1.0000
Recording Time:	12/10/2021 8:28	Analyst:	HXC1
Run Time (min):	28.00	Column:	AS23-002407;GLGCE086;300;9056



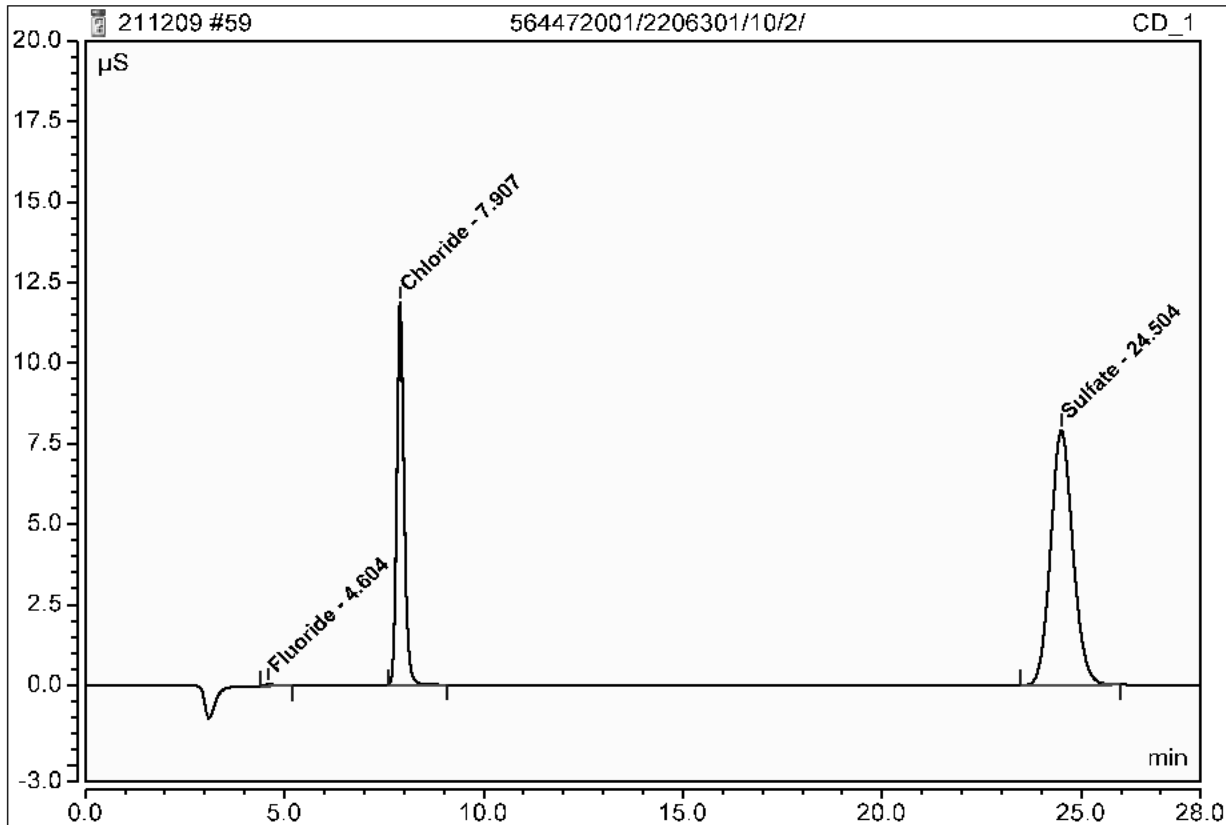
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.61	Fluoride	n.a.	2.3611		1.20077	13.26
2	7.90	Chloride	n.a.	4.6117		1.57792	17.42
3	10.23	Nitrite-N	n.a.	2.4531		1.70034	18.77
4	12.93	Bromide	n.a.	1.2195		0.15665	1.73
5	15.28	Nitrate-N	n.a.	2.3349		1.90450	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
<b>Total:</b>				23.6052	0.000	9.058	100.00

<b>58 CCB</b>			
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



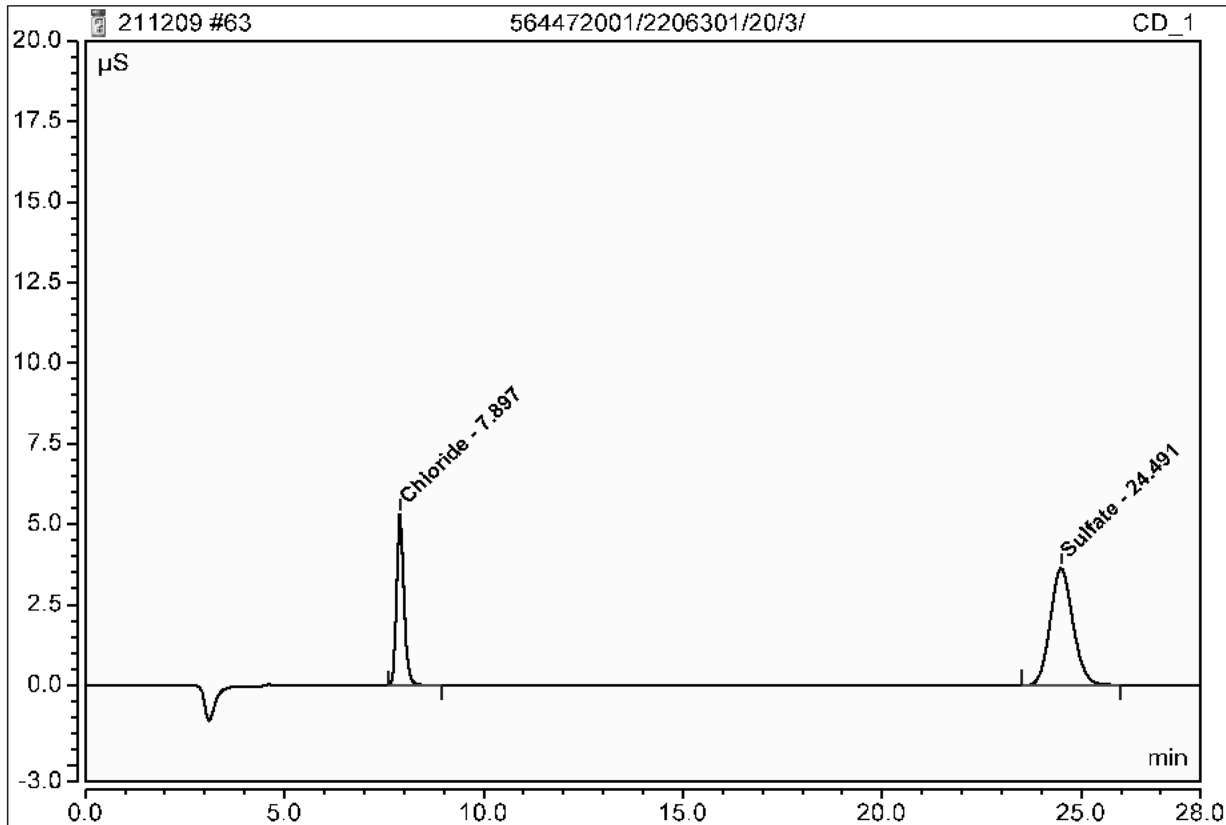
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area µS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Chloride	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	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.
<b>Total:</b>				0.0000	0.000	0.000	0.00

<b>59 564472001/2206301/10/2/</b>			
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



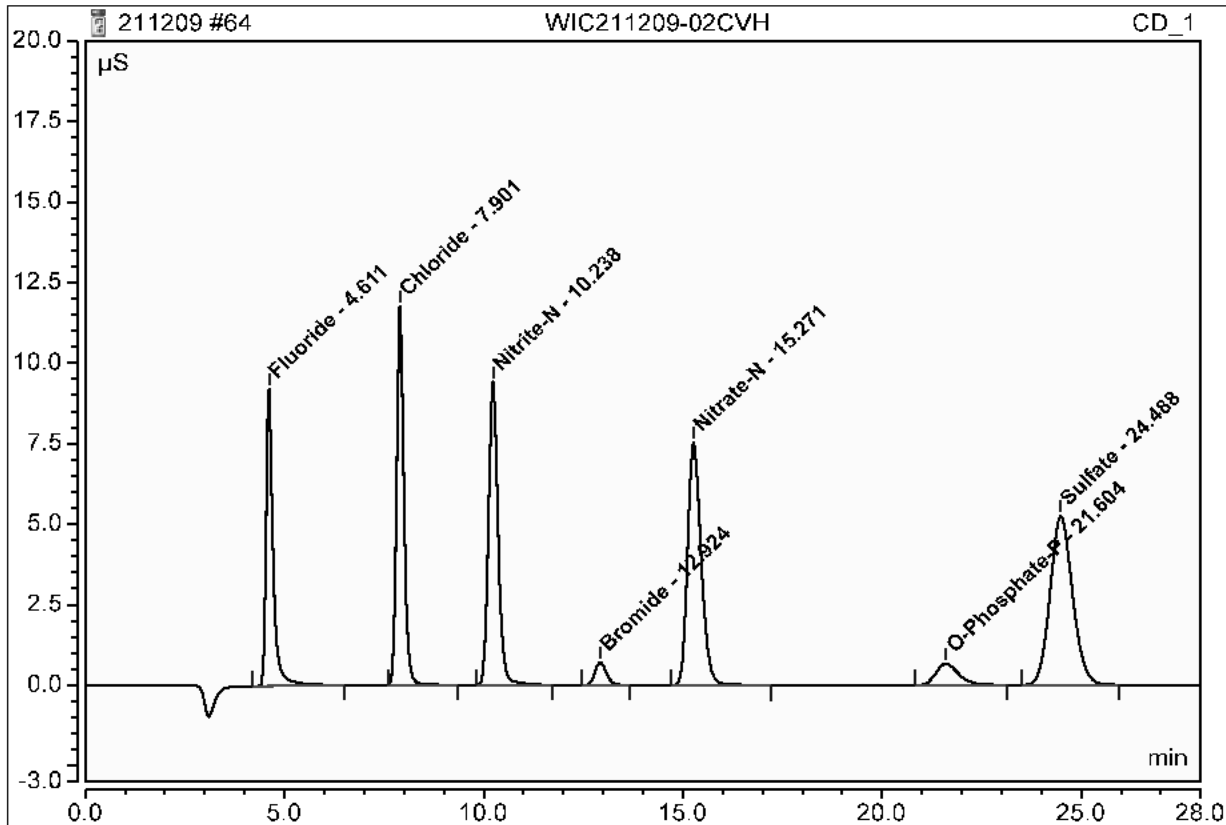
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
1	4.60	Fluoride	n.a.	0.0467		0.01806	0.24
2	7.91	Chloride	n.a.	7.2182		2.48625	32.55
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	n.a.	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
<b>Total:</b>				28.9037	0.000	7.638	100.00

<b>63 564472001/2206301/20/3/</b>			
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



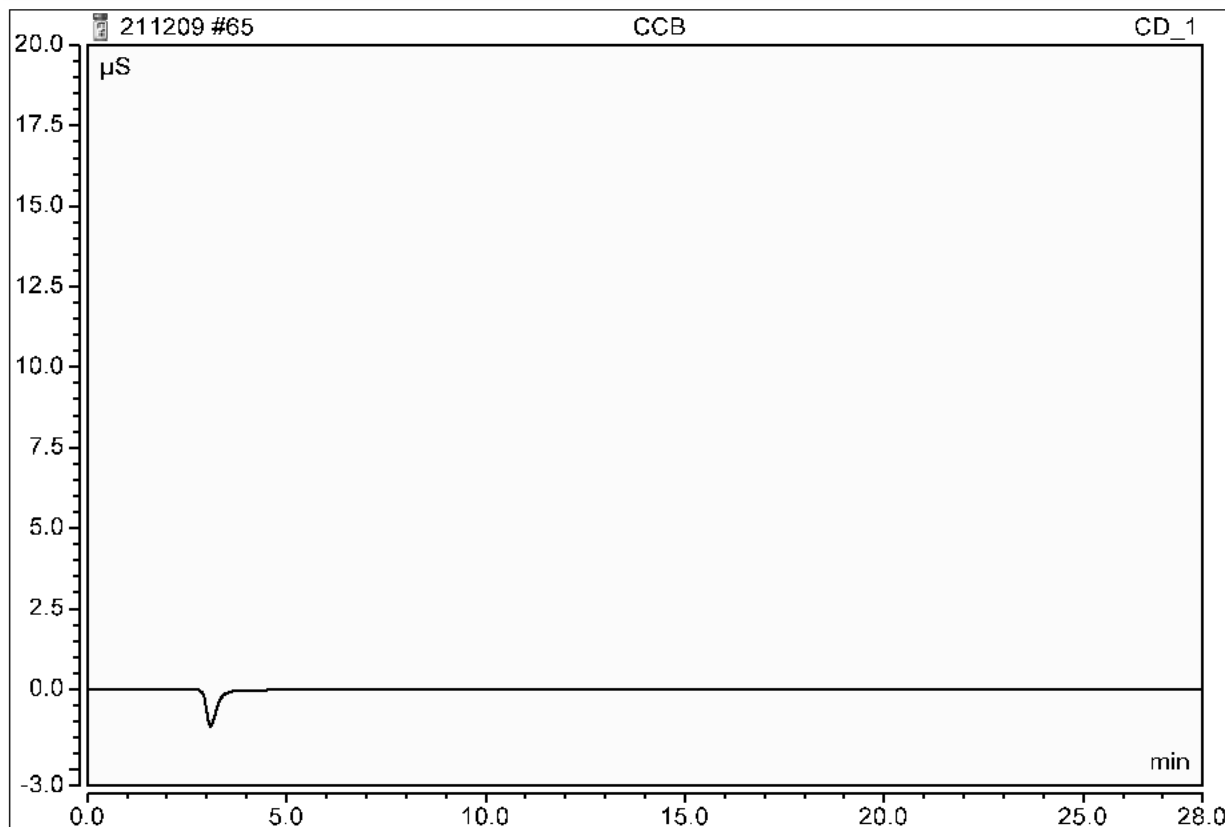
No.	Ret.Time min	Peak Name	Concentration mg/L	Amount mg/L	Modified?	Area μS*min	Rel.Area %
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	7.90	Chloride	n.a.	3.3590		1.14134	32.26
n.a.	n.a.	Nitrite-N	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.
n.a.	n.a.	Nitrate-N	n.a.	n.a.	n.a.	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
<b>Total:</b>				13.4928	0.000	3.538	100.00

<b>64 WIC211209-02CVH</b>			
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
<b>Total:</b>				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.
<b>Total:</b>				0.0000	0.000	0.000	0.00



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.

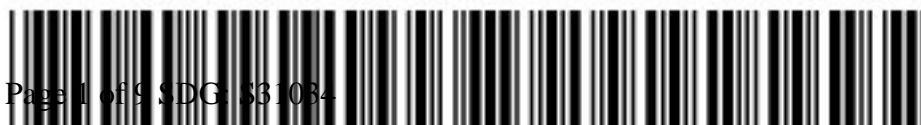
Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without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

Purchase Order: GELP20-0018  
Enclosures



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# 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.

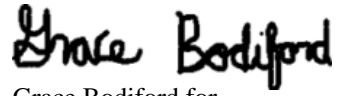
**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
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.

A handwritten signature in black ink that reads "Grace Bodiford". The script is cursive and somewhat stylized.

Grace Bodiford for  
Samuel Hogan  
Project Manager

# **Chain of Custody and Supporting Documentation**



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

564468

**REPORT TO**

CONTACT NAME: Project Management Team  
 COMPANY: Merit Laboratories  
 ADDRESS: 2680 East Lansing Drive  
 CITY: East Lansing  
 PHONE NO.: 517-332-0167  
 E-MAIL ADDRESS: results@meritlabs.com

**CHAIN OF CUSTODY RECORD**

CONTACT NAME: Julie Teague  
 COMPANY: Merit Laboratories  
 ADDRESS: 2680 East Lansing Drive  
 CITY: East Lansing  
 PHONE NO.: 517-332-0167  
 E-MAIL ADDRESS: juliet@meritlabs.com

**INVOICE TO**

CONTACT NAME: [Blank]  
 COMPANY: [Blank]  
 ADDRESS: [Blank]  
 CITY: [Blank]  
 PHONE NO.: [Blank]  
 E-MAIL ADDRESS: [Blank]  
 STATE: MI  
 ZIP CODE: 48823

PROJECT NO./NAME: S31034		SAMPLE(S) - PLEASE PRINT/SIGN NAME																					
TURNAROUND TIME REQUIRED: <input type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> OTHER		DELIVERABLES REQUIRED: <input type="checkbox"/> STD <input type="checkbox"/> LEVEL II <input type="checkbox"/> LEVEL III <input checked="" type="checkbox"/> LEVEL IV <input type="checkbox"/> EDD <input type="checkbox"/> OTHER		MATRIX		# Containers & Preservatives		Radium 226*		Radium 228**		Certifications											
MATRIX CODE:	GW=GROUNDWATER SL=SLUDGE	WW=WASTEWATER DW=DRINKING WATER	S=SOIL O=OIL	L=LIVID WP=WPE	A=AIR	SD=SOLID W=WASTE	OTHER	H <sub>2</sub> O	H <sub>2</sub> SO <sub>4</sub>	NaOH	MeOH	OTHER	OHIO VAP	Drinking Water	DoD	NPDES	Project Locations	Detroit	New York	Other	Special Instructions		
YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	BOTTLES	OTHER	NO	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	12/7/21	1425	S31034.01	GW	2			✓					✓										* E903.1 Mod.
	12/7/21	1304	S31034.02	GW	2			✓					✓										** E904.0/SW 9320 Mod.
	12/7/21	1122	S31034.03	GW	2			✓					✓										Please use calculation product & provide Radium 226/228 combined results on the report
	12/7/21	0951	S31034.04	GW	2			✓					✓										(No Ice needed)
	12/7/21	1122	S31034.05	GW	2			✓					✓										** Subcontracted to
	12/7/21	0850	S31034.06 (Field Blank)	Wa	2			✓					✓										GEL Laboratories, Inc.
																							2040 Savage Road
																							Charleston, SC 29407

RELINQUISHED BY: [Signature] DATE: 12/18/21 TIME: 1700

RECEIVED BY: [Signature] DATE: 12/18/21 TIME: 1700

RELINQUISHED BY: [Signature] DATE: 12/18/21 TIME: 1700

RECEIVED BY: [Signature] DATE: 12/18/21 TIME: 1700

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

SH

SAMPLE RECEIPT & REVIEW FORM

Client: <b>MERI</b>	SDG/AR/COC/Work Order: <b>SL4-468 / 3104472</b>
Received By: <b>DC</b>	Date Received: <b>12-9-11</b>
Carrier and Tracking Number	FedEx Express    FedEx Ground <u>UPS</u> Field Services    Courier    Other <b>1Z4604770163258621</b>

Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
A) Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples are to be received as radioactive?	<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?	<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?	<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice <u>None</u> Other: _____ *all temperatures <u>are</u> recorded in Celsius      TEMP: <u>6°</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature Device Serial #: <u>IR6-21</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: No dates on containers <u>No times on containers</u> COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials GIB Date 12/13/21 Page 1 of 1

# Laboratory Certifications

**List of current GEL Certifications as of 05 January 2022**

<b>State</b>	<b>Certification</b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
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: 

Name: Kenshalla Oston

Date: 06 JAN 2022

Title: Analyst I

# Sample Data Summary

# GEL LABORATORIES LLC

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## 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	Project: MERI00120
Sample ID: 564468001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-DEC-21 14:25	
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	0.179	+/-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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: January 6, 2022

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 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

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## 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	Project: MERI00120
Sample ID: 564468003	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-DEC-21 11:22	
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	0.666	+/-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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: 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	Project: MERI00120
Sample ID: 564468004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-DEC-21 09:51	
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	0.929	+/-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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: 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	Project: MERI00120
Sample ID: 564468005	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-DEC-21 11:22	
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	0.826	+/-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	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: January 6, 2022

Company : Merit Laboratories Inc.  
 Address : 2680 East Lansing Drive  
  
 East Lansing, Michigan 48823  
 Contact: John Lavery  
 Project: Routine Analysis

Client Sample ID: S31034.06 (Field Blank)	Project: MERI00120
Sample ID: 564468006	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-DEC-21 08:50	
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	0.549	+/-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	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: January 6, 2022

Page 1 of 2

**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
<b>Rad Gas Flow</b>											
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							
<b>Rad Ra-226</b>											
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

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 564468

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
BD											
BD											
FA											
H											
J											
J											
K											
L											
M											
M											
N/A											
NI											
ND											
NJ											
Q											
R											
U											
UI											
UJ											
UL											
X											
Y											
^											
h											

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:**  
2207640

**Product:**  
GFC28RAL

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

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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	Comments:
WORK 1951-C	Barium-133	.1 mL	Pipet Id: RAD-GFC-1795419
REGNT 3290227	500 mg/mL Neodymium Carrier	.2 mL	Data Entry Date2: 21-DEC-2021 00:00
REGNT 3301783	Barium Carrier Ra228 REG	1 mL	
REGNT 3353921	RGF-1M Citric Acid	5 mL	
REGNT 3354444	RGF-Neodymium Substrate	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	

### 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

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

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
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													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		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	Recovery %	Sample Recovery Error %
			Alpha	Beta										
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%

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	0.6380	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	Critical	Required	Sample Act.		Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
	Level pCi/L	Level pCi/L	MDA pCi/L	MDA pCi/L	Conc. pCi/L	Error %	Rate CPM	Rate Error CPM	Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L						
1	1.1441	0.8077	3	1.8099	<b>0.1789</b>	281.01%	0.0460	0.1293	0.9853	0.9863		SAMPLE				
2	0.9291	0.6560	3	1.5262	<b>0.5827</b>	76.90%	0.1360	0.1045	0.8779	0.8902		SAMPLE				
3	0.9593	0.6773	3	1.5311	<b>0.6663</b>	68.59%	0.1887	0.1294	0.8955	0.9110		SAMPLE				
4	0.8976	0.6337	3	1.4523	<b>0.9290</b>	48.89%	0.2513	0.1227	0.8888	0.9197		SAMPLE				
5	1.3376	0.9444	3	2.0653	<b>0.8263</b>	74.45%	0.2340	0.1742	1.2054	1.2231		SAMPLE				
6	1.1293	0.7973	3	1.7738	<b>0.5495</b>	94.18%	0.1533	0.1444	1.0142	1.0235		SAMPLE				
7	1.0464	0.7387	3	1.6535	<b>2.8558</b>	21.34%	0.8113	0.1726	1.1910	1.3897		SAMPLE				
8	1.1302	0.7980	3	1.7752	<b>3.0007</b>	21.54%	0.8367	0.1795	1.2621	1.4699		SAMPLE				
9	1.6082	1.1354	3	2.4585	<b>2.4569</b>	32.42%	0.6547	0.2115	1.5558	1.6765		SAMPLE				
10	1.0773	0.7606	3	1.6978	<b>2.8798</b>	21.64%	0.8153	0.1753	1.2135	1.4159		SAMPLE				
11	0.7479	0.5281	3	1.2286	<b>0.7565</b>	50.63%	0.2193	0.1110	0.7503	0.7739		SAMPLE				
12	0.9020	0.6369	3	1.4433	<b>0.2329</b>	173.39%	0.0687	0.1191	0.7914	0.7936		SAMPLE				
13	0.7998	0.5646	3	1.3002	<b>0.6610</b>	59.68%	0.1933	0.1153	0.7728	0.7904		MB				
14	0.8165	0.5765	3	1.3253	<b>2.8580</b>	18.84%	0.8293	0.1554	1.0499	1.2721	564713004.1	DUP	0.8%			
15	1.6172	1.1418	3	2.4820	<b>50.2601</b>	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. Beil - Harman*

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
<b>Preparation Information</b>				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
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		
<b>Technical Information</b>				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
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		
<b>Miscellaneous Information</b>				
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
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**Comments:**

Data Entry Date2: 21-DEC-2021 00:00

### Radium-226 Liquid

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

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 : 2207637  
 Analyst : LIN01615  
 Prep Date : 12/21/2021  
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
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)
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			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
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

<b>Results</b>																
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	<b>2.6397</b>	13.45%	3.1333	0.3266	0.5393	0.7934		SAMPLE				
2	0.1275	0.0900	1	0.2622	<b>1.6967</b>	13.73%	2.0667	0.2708	0.4358	0.5181		SAMPLE				
3	0.1697	0.1198	1	0.3168	<b>1.6735</b>	13.86%	2.1667	0.2848	0.4312	0.5147		SAMPLE				
4	0.1176	0.0830	1	0.2417	<b>1.4634</b>	15.76%	1.9333	0.2625	0.3894	0.4989		SAMPLE				
5	0.0910	0.0643	1	0.2114	<b>1.6851</b>	16.17%	2.0333	0.2646	0.4298	0.5869		SAMPLE				
6	0.0910	0.0643	1	0.2114	<b>1.7130</b>	14.40%	2.0667	0.2667	0.4332	0.5431		SAMPLE				
7	0.0969	0.0684	1	0.2251	<b>1.4117</b>	14.89%	1.6000	0.2357	0.4076	0.4598		SAMPLE				
8	0.1795	0.1267	1	0.3352	<b>2.1790</b>	11.82%	2.6667	0.3127	0.5008	0.5948		SAMPLE				
9	0.0997	0.0704	1	0.2316	<b>0.3027</b>	34.75%	0.3333	0.1155	0.2055	0.2108		SAMPLE				
10	0.2565	0.1811	1	0.4448	<b>0.4680</b>	33.89%	0.5667	0.1915	0.3099	0.3181		SAMPLE				
11	0.1594	0.1125	1	0.3088	<b>2.7365</b>	10.88%	3.2667	0.3399	0.5581	0.7045		SAMPLE				
12	0.0819	0.0578	1	0.1901	<b>0.4224</b>	27.31%	0.5667	0.1453	0.2123	0.2341		SAMPLE				
13	0.1123	0.0793	1	0.2309	<b>0.4097</b>	27.38%	0.5667	0.1528	0.2165	0.2277		SAMPLE				
14	0.2363	0.1668	1	0.4150	<b>0.0271</b>	387.33%	0.0333	0.1291	0.2058	0.2058		MB				
15	0.2202	0.1555	1	0.3928	<b>0.2729</b>	47.27%	0.3333	0.1563	0.2509	0.2559	564713006.1	DUP	40.1%			
16	1.4608	1.0313	1	2.5329	<b>108.3054</b>	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	<b>21.9332</b>	4.56%	22.5333	0.8731	1.6656	3.7233		LCS			26.5001	82.8%
18	0.1558	0.1100	1	0.3019	<b>25.3583</b>	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