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Environmental Services and Contaminated Sites
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Date
October 28, 2021

Project #
60608868

Dear Rebecca,

**Subject: Kwetīḡāà (Rayrock) Remediation Project
2021 Field Investigation Summary – Mill Lake Surface Water Sampling**

AECOM Canada Ltd. (AECOM) is pleased to provide Public Services and Procurement Canada (PSPC) this report summarizing the results of Mill Lake surface water sampling completed at the former Rayrock mine (the Site) in July and October 2021. A figure indicating the Mill Lake surface water sampling locations is provided as **Appendix A** with photographs provided in **Appendix B**. Summary tables with the test result data are provided in **Appendix C**. Laboratory analytical reports are provided in **Appendix D**.

1. Objectives

Remediation activities are proposed to be undertaken at Rayrock commencing in 2022. Components of the remediation include the treatment of Mill Lake surface water as part of Mill Lake remediation activities. Mill Lake water is expected to be treated in both a relatively undisturbed state (depending on the remediation approach chosen by the contractor) and subsequent mixing of the water with the lake bottom sediments through geotextile tubes. Three types of surface water samples were collected and analyzed as part of the 2021 sampling:

1. Standard surface water samples collected from mid-depth in the lake water column.
2. Water samples collected by passing the lake water through geotextile tubes filled with lake bottom sediments collected from the approximate full depth sediment profile.
3. Water samples collected by mixing lake water, coagulant polymer and lake bottom sediments collected from the approximate full depth sediment profile through geotextile tubes.

The objectives of this sampling were to:

- Provide current (2021) surface water quality information,
- To identify changes to the water quality subsequent to passage through the lake bottom sediments, and
- To identify changes to the water quality subsequent to passage through the mixing coagulant polymer and lake bottom sediments.

2. Methodology

Bulk surface water samples were collected from five locations in Mill Lake (Sample locations shown on Figure 1, Appendix B). Samples were collected from mid-depth in the water column at each location sampled. The distance from the water surface to the top of sediment was measured and the samples collected from mid-depth using a vertical water column sampler. Surface water samples were collected on July 15, 2021.

Filtrate water samples were collected as follows:

- Organic sediment was collected from the approximate interval from top of sediment surface to the bottom of the sediment in rigid aluminum tubing driven into the lake bottom using a vibe-core sampling head.
- Organic sediments were removed and mixed with approximately five equivalent volumes of lake water in pails prior to placement into geosynthetic pillows. Water leaving the pillows (filtrate water) was then collected in laboratory-supplied sampling containers. Pillow filtration-test samples were conducted on July 25 and 27, 2021.
- Organic sediments were removed, combined in a pail and mixed with approximately five equivalent volumes of lake water (5:1 ratio water to sediment) then mixed with a 15 ml mixture of Aquatrol 5320 coagulant polymer followed by a 15 ml mixture of 1440 flocculant polymer prior to placement into geosynthetic pillows. Pillow-test with polymer were conducted on October 1 and 2, 2021. Water leaving the pillows (filtrate water) was then collected in laboratory-supplied sampling containers on October 2, 2021.
- Sampling was conducted using single-use nitrile gloves (changed prior to the collection of each sample) with samples placed in laboratory-supplied containers. Samples were kept on ice in coolers prior to daily air transport to the receiving laboratory (Bureau Veritas) in Yellowknife.

All water samples were analyzed for:

- Routine Water Chemistry, including:
 - Nitrate
 - Nitrite
 - Ammonia
 - Sulphate
 - Alkalinity
- Total Metals
- Dissolved Metals (field filtered)
- Colour
- Dissolved Organic Carbon
- Total Organic Carbon
- Fluoride
- Total Suspended Solids
- Total Dissolved Solids
- Radionuclides

3. Results

Three sets of laboratory analytical data are summarized in Tables 1 through 6 (Appendix C) including:

- Surface Water Analytical Results: The 2021 surface water sample analytical results are summarized along with historical Mill Lake water quality data (as available).
- February 2021 Pillow Filtrate Results: In February 2021 tap water was processed through synthetic pillows filled with organic sediment collected in fall 2020. The organic sediment had been stored at room temperature and had undergone some decay over several months. These results are included for reference only. They are not expected to reflect actual site conditions (i.e., fresh lake water and fresh sediment).
- July 2021 Pillow Filtrate Results: The July 2021 pillow filtrate water sample analytical results included.
 - Sample MLVC-04 + MLVC-05 FILTRATE comprises the water filtered directly through the pillows, from the organic sediment collected from vibecore sampling locations MLVC-04 and MLVC-05. This water sample was collected immediately as it drained from the pillow.

- Sample ML24H FILT comprises the water filtered over 24 hours from the organic sediment collected from the same vibecore sampling location listed above.
- October 2021 Pillow Filtrate Results: The October 2021 pillow filtrate water sample analytical results included.
 - Sample MLVC-0309-P comprises the water filtered over 24 hours from the organic sediment/polymer mix collected from vibecore sampling location MLVC-0309.
 - Sample MLVC-0509-P comprises the water filtered over 24 hours from the organic sediment/polymer mix collected from vibecore sampling location MLVC-0509.
 - Filtrate was slow to leave the pillows during the October 2021 sampling and thus short-term (immediate) samples were not collected.

4. Observations

4.1 July 2021 Filtrate Results (No Polymer Added)

A review of the July 2021 filtrate results identifies various parameters being notably different than the historical Mill Lake surface water analyses. Notable observations are as follows:

- Total Ammonia (Table 1): Total Ammonia concentrations increase significantly from the surface water (all five July 2021 samples below 0.015 mg/L) to 1.7 and 1.9 mg/L in the filtrate.
- Total Dissolved Solids (Table 2): TDS increases from an average of 81 mg/L in the surface water samples to an average of 195 mg/L in the filtrate samples.
- Total Suspended Solids (Table 2): TSS increases from an average of 3.4 mg/L in the surface water samples to an average of 335 mg/L in the filtrate samples.
- Dissolved and Total Metals: (Tables 3 to 5): Several metals show concentrations increases, occasionally by 1-2 orders of magnitude as filtrate compared to surface water.
 - Notable increases in dissolved metals concentrations include: aluminum, antimony, arsenic, boron, lead, manganese, molybdenum, silicon, and vanadium.
 - Notable increases in total metals concentrations include: aluminum, antimony, cadmium, copper, lead, manganese, molybdenum, phosphorus, selenium, silicon, titanium, uranium, vanadium and zinc.
- Radionuclides:
 - Radionuclide results indicate Lead-210, Radium-226, Thorium-230, Thorium-234 and Uranium-238 at concentrations notably higher than in surface water.
 - Pillow filtrate results for radionuclides from the October 2021 sampling had not yet been received in time for this report's preparation. This data will be provided at a later date.

4.2 October 2021 Filtrate Results (Polymer Added)

Field sampling in fall 2020 (AECOM, 2020 Field Investigation Summary, Kwetjijaa (Rayrock) Remediation Project, August 2021) identified that a solutions with a 5 parts water to 1 part slurry (5:1) mixture using a co-polymer treatment with both Aquatrol 5320/A1440 conditioning product achieved the most efficient settlement and water clarity of the field mixtures tested at that time. The sediment used during that testing was obtained using an Eckman dredge and was largely comprised of sediment from the upper 0.3 m of the sediment profile.

Sampling in October 2021 used the same 5:1 lake water to slurry mixture and Aquatrol 5320/A1440 conditioning product as used in fall 2020 testing. However, the slurry used to make the mixture was obtained from the full depth of sediment as could be obtained from the sediment cores at the locations identified. Field observations were that the same level of clarity in the water was not achieved, likely due to the organic sample including the denser sediments as found throughout the sediment profile. This may indicate that adjustments to the polymer mixture would be required to achieve the desired level of clarity prior to water treatment.

Analytical observations include:

- Low levels of dissolved nitrate and nitrite were identified in the slurry, of a similar order of magnitude to surface water samples collected at 3.0 m depth in 2019. Concentrations of these parameters were mostly below the laboratory's minimum detection limits in the surface water samples.
- Turbidity and TSS results were elevated as compared to the non-polymer treated pillow test results.
- Several total metals concentrations were further higher than results from both surface water and non-polymer treated pillow test results.

4.3 February 2021 Filtrate Results

The February 2021 laboratory testing of organic sediments similarly shows increases in several parameters; however, as indicated, this testing was performed on samples not stored in a controlled environment and should not be considered representative of field conditions.

4.4 February 2021 Filtrate Results

At the date of this report's preparation, the Wek'èezhii Land and Water Board (WLWB) had issued a Recommendation for Approval of Water Licence – CIRNAC-CARD – Rayrock Remediation Project – former Rayrock Mine Site, NT (September 30, 2021). Discharge from the Mill Lake Water Treatment Facility will be required to meet the Water Licence Effluent Quality Criteria as follows:


Parameter	Maximum Grab Concentration
pH	6 to 9
Ammonia (total)	499 µg/l
Flouride	120 µg/l
Nitrate	13,000 µg/l
Nitrite (as NO ₂)	197 µg/l
Copper (total)	2.8 µg/l
Iron (total)	300 µg/l
Nickel (total)	25 µg/l
Zinc (total)	23 µg/l
Total Suspended Solids	15 mg/L
Total Petroleum Hydrocarbons	5 mg/L

A review of the appended data Tables 1-7 indicates key parameters exceeding these Effluent Quality Criteria, in particular the water samples mixed with sediment and less so the surface water samples from Mill Lake.

5. Closing

We trust this submission meets your requirements. Please contact the undersigned should you have any questions regarding this submission.

Sincerely,
AECOM Canada Ltd.



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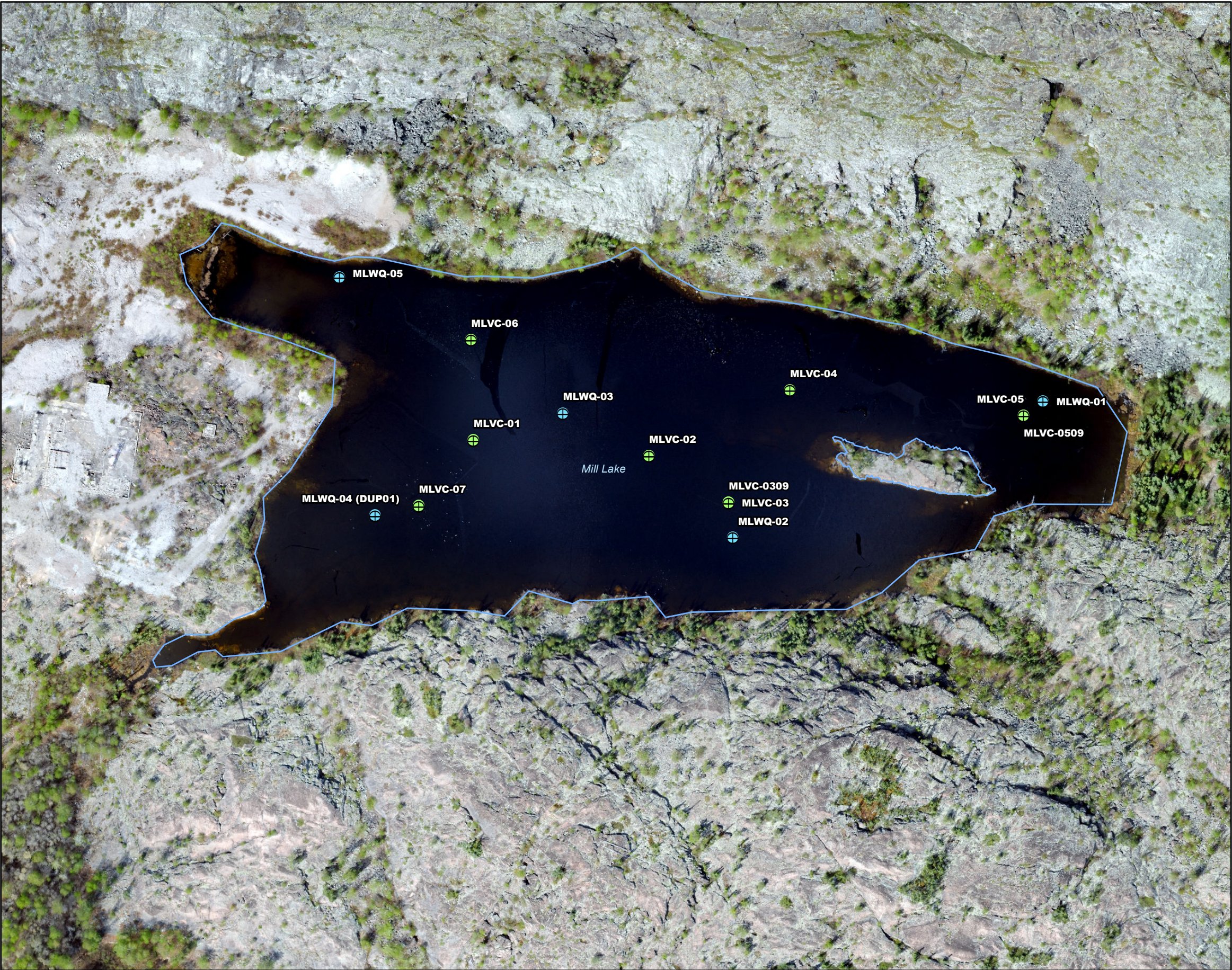
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Appendix A

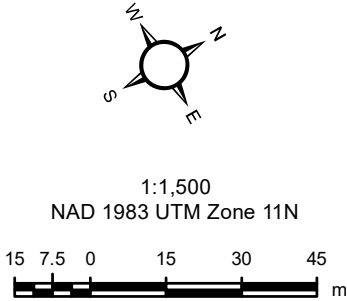
Mill Lake Sampling Locations



Legend

- 2021 Surface Water Sample Location
- 2021 Vibecore Sample Location

NOTE:
MLVC = Mill Lake Vibecore



Ortho-Imagery: Arcadis Canada Inc. (Photo Date: May 26, 2017)

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Appendix B
Photographs

Client Name:	Site Location	Project No.
Public Services and Procurement Canada	Mill Lake, Former Rayrock Mine Site, NWT	60608868

Photo No. 1	Date 7/15/2021	
Direction Photo Taken Northeast		
Description Zodiac boat and barge on Mill Lake.		

Photo No. 2	Date 7/15/2021	
Direction Photo Taken North		
Description Using a vertical sampling device to collect surface water samples from Mill Lake.		

Client Name: Public Services and Procurement Canada	Site Location Mill Lake, Former Rayrock Mine Site, NWT	Project No. 60608868
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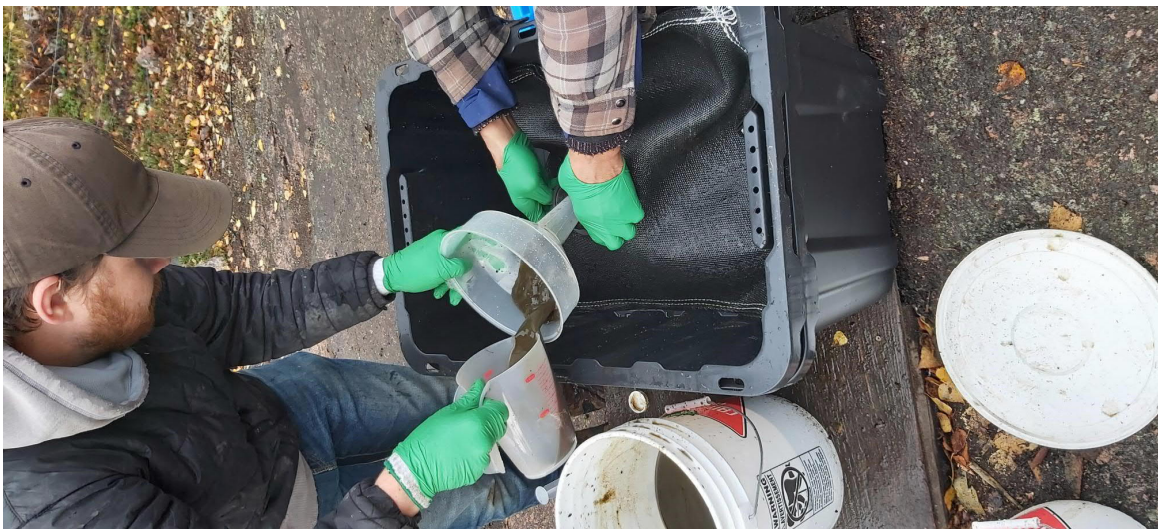
Photo No.	Date	
3	10/1/2021	
Direction Photo Taken		
N/A		
Mixing of sediment, surface water and polymer prior to placement in geotextile pillow		

Photo No. 4	Date 10/1/2021	
Direction Photo Taken N/A		
Description Placement of sediment, surface water and polymer in geotextile pillow		

Appendix C

Tables with Test Result Data

<div>Table 1</div> <div>Surface Water Analytical Results - Routine Water Chemistry (1 of 2)</div> <div>2021 Field Program - Rayrock Mine Remediation Project</div> <div>Public Services and Procurement Canada</div>																	
Sample Information					Calculated Parameters								Nutrients				
Parameter					Anion Sum	Cation Sum	Hardness (as CaCO3)	Ion Balance (% Difference)	Dissolved Nitrate (NO3)	Nitrate plus Nitrite (N)	Dissolved Nitrite (NO2)	Calculated Total Dissolved Solids	Turbidity	Dissolved Nitrite (N)	Dissolved Nitrate (N)	Total Ammonia (N) Guideline	Total Ammonia (N)
Unit					meq/L	meq/L	mg/L	%	mg/l	mg/l	mg/l	mg/l	NTU	mg/l	mg/l		mg/l
CCME Freshwater ¹					NG	NG	NG	NG	NG	NG	NG	NG	NG	0.197	3		VARIES
WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)									13		0.197			0.197	13		0.499
Reportable Detection Limit					N/A	N/A	0.50	N/A	0.044	0.010	0.033	10	0.10	0.010	0.010		0.015
Lake Group	Sample Location	Sample Date (mm/dd/yyyy)	Sample ID	Sample Depth (mbws)													
Mill Lake Surface Water																	
Mill Lake	Mill 9W1	7/13/1983	RR-0001-053	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill W5	7/20/1995	RR-0001-057	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	SW3 Mill	11/20/1996	RR-0001-062	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	SW3 Mill	8/21/1997	RR-0001-098	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill Lake	8/28/2007	RR-0002-068	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill Lake	8/27/2008	RR-0002-073	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill Lake	8/30/2009	RR-0002-082	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill Lake	8/31/2011	RR-0002-096	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill Lake	8/6/2014	RR-0003-004	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill Lake	5/26/2017	RR-0003-032	-	-	-	-	-	-	-	-	-	-	-	-		-
Mill Lake	Mill Lake	9/17/2018	SW007_20180917	0.5 m	1.7	1.7	81	0.29	<0.010	<0.014	<0.033	-	0.51	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW008_20180917	2.0 m	1.7	1.7	78	0.58	<0.010	<0.014	<0.033	-	0.45	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW009_20180917	3.0 m	1.7	1.7	79	0.26	<0.010	<0.014	<0.033	-	0.54	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW010_20180917	0.5 m	1.7	1.7	80	1.1	<0.010	<0.014	<0.033	-	0.61	<0.010	<0.044		-
Mill Lake	Mill Lake (Duplicate)	9/17/2018	Duplicate of SW010_20180917	-	1.7	1.7	81	0.31	<0.010	<0.014	<0.033	-	0.62	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW011_20180917	1.5 m	1.7	1.7	81	0.25	<0.010	<0.014	<0.033	-	0.53	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW012_20180917	3.0 m	1.7	1.7	81	1.8	<0.010	<0.014	<0.033	-	0.53	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW013_20180917	0.5 m	1.7	1.7	81	0.42	<0.010	<0.014	<0.033	-	0.63	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW014_20180917	1.5 m	1.7	1.7	81	1.5	<0.010	<0.014	<0.033	-	0.73	<0.010	<0.044		-
Mill Lake	Mill Lake	9/17/2018	SW015_20180917	2.5 m	1.7	1.7	81	0.17	<0.010	<0.014	<0.033	-	0.52	<0.010	<0.044		-
Mill Lake	Mill Lake - 1.5 m depth	8/3/2019	ML_SW009_1.5_20190803	1.5 m	1.8	1.7	78	2.1	<0.044	<0.014	<0.033	98	1.1	<0.010	<0.010		-
Mill Lake	Mill Lake - 3.0 m depth	8/3/2019	ML_SW010_3.0_20190803	3.0 m	1.7	1.7	78	0.033	0.067	0.015	<0.033	96	1	<0.010	0.015		-
Mill Lake	0522774, 7036330	7/15/2021	MLWQ-01	1.0 m	1.6	1.4	64	NC	<0.044	<0.010	<0.033	86	-	<0.010	<0.010	0.410 (at 20°C/pH=8)	<0.015
Mill Lake	0522760, 7036204	7/15/2021	MLWQ-02	1.65 m	1.9	1.3	62	NC	<0.044	<0.010	<0.033	92	-	<0.010	<0.010	0.410 (at 20°C/pH=8)	<0.015
Mill Lake	0522688,7036172	7/15/2021	MLWQ-03	1.61 m	1.7	1.4	67	NC	<0.044	<0.010	<0.033	91	-	<0.010	<0.010	0.410 (at 20°C/pH=8)	<0.015
Mill Lake	0522686, 7036092	7/15/2021	MLWQ-04	1.2 m	1.8	1.4	64	NC	0.055	0.012	<0.033	90	-	<0.010	0.012	0.410 (at 20°C/pH=8)	<0.015
Mill Lake	DUP01	7/15/2021	Duplicate of MLWQ-04	1.2 m	1.7	1.5	69	NC	<0.044	<0.010	<0.033	90	-	<0.010	<0.010	0.410 (at 20°C/pH=8)	<0.015
Mill Lake	0522602, 7036125	7/15/2021	MLWQ-05	1.2 m	2.2	1.5	72	NC	<0.044	<0.010	<0.033	110	-	<0.010	<0.010	0.410 (at 20°C/pH=8)	<0.015
				Maximum	2.2	1.7	81	2.1	0.067	0.015	<0.033	110	1.1	<0.010	0.015	0.410 (at 20°C/pH=8)	<0.015
				Average	1.7	1.6	75	0.7	-	-	-	94	0.6	-	-	-	<0.015
				Minimum	1.6	1.3	62	0.0	<0.010	<0.010	<0.033	86	0.5	<0.010	<0.010	0.410 (at 20°C/pH=8)	<0.015
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (July 2021) - NO POLYMER ADDED																	
Mill Lake	Field Pillow Testing	7/25/2021	MLVC-04 + MLVC-05 FILTRATE		2.2	1.6	65	NC	<0.044	<0.010	<0.033	110	-	<0.010	<0.010	0.410 (at 20°C/pH=8)	1.7
		7/27/2021	ML24H FILT		2.1	1.6	67	NC	<0.044	<0.010	<0.033	110	-	<0.010	<0.010	0.410 (at 20°C/pH=8)	1.9
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (October 2021) - POLYMER ADDED																	
Mill Lake	Field Pillow Testing	10/2/2021	MLVC-0309-P		1.3	1.2	46	NC	0.11	0.025	<0.033	73	1500	<0.010	0.025	0.410 (at 20°C/pH=8)	1.8
		10/2/2021	MLVC-0509-P		1.5	1.4	58	NC	0.062	0.014	<0.033	84	510	<0.010	0.014	0.410 (at 20°C/pH=8)	1.8

Table 1

Surface Water Analytical Results - Routine Water Chemistry (1 of 2)
2021 Field Program - Rayrock Mine Remediation Project
Public Services and Procurement Canada

Sample Information Parameter					Calculated Parameters							Nutrients						
					Anion Sum	Cation Sum	Hardness (as CaCO3)	Ion Balance (% Difference)	Dissolved Nitrate (NO3)	Nitrate plus Nitrite (N)	Dissolved Nitrite (NO2)	Calculated Total Dissolved Solids	Turbidity	Dissolved Nitrite (N)	Dissolved Nitrate (N)	Total Ammonia (N) Guideline	Total Ammonia (N)	
Unit					meq/L	meq/L	mg/L	%	mg/l	mg/l	mg/l	mg/l	NTU	mg/l	mg/l		mg/l	
CCME Freshwater ¹					NG	NG	NG	NG	NG	NG	NG	NG	NG	0.197	3			VARIES
WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)									13		0.197		0.197	13			0.499	
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (Unpreserved and Unchilled Samples - For Reference, Samples Not Preserved Using Standard Processes) ²																		
Mill Lake	Field Pillow Testing	2/25/2021	JM-001 2021008009	-	-	-	-	-	0.36	-	<0.03	-	-	-	-	0.410 (at 20°C/pH=8)	1.0	
Mill Lake	Field Pillow Testing	2/25/2021	JM-002 2021008010	-	-	-	-	-	<0.4	-	<0.03	-	-	-	-	0.410 (at 20°C/pH=8)	0.84	
Mill Lake	Field Pillow Testing	2/25/2021	JM-003 2021008011	-	-	-	-	-	<0.04	-	<0.03	-	-	-	-	0.410 (at 20°C/pH=8)	1.6	
Mill Lake	Field Pillow Testing	2/25/2021	JM-004 2021008012	-	-	-	-	-	0.05	-	<0.03	-	-	-	-	0.410 (at 20°C/pH=8)	1.7	
Mill Lake	Field Pillow Testing	2/25/2021	JM-005 2021008013	-	-	-	-	-	2.1	-	0.08	-	-	-	-	0.410 (at 20°C/pH=8)	0.55	
Mill Lake	Field Pillow Testing	2/25/2021	JM-006 2021008014	-	-	-	-	-	<0.04	-	<0.03	-	-	-	-	0.410 (at 20°C/pH=8)	1.7	
Mill Lake	Field Pillow Testing	2/25/2021	JM-007 2021008015	-	-	-	-	-	0.63	-	<0.03	-	-	-	-	0.410 (at 20°C/pH=8)	1.5	
Mill Lake	Field Pillow Testing	2/25/2021	JM-008 2021008016	-	-	-	-	-	0.27	-	<0.03	-	-	-	-	0.410 (at 20°C/pH=8)	1.6	
Notes:																		
NG = No Guideline																		
¹ Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, Freshwater Aquatic Life On-Line, Accessed 08.10.21. CCME guidelines for metals are only compared to total metal analysis																		
² Analytical results obtained by flowing tap water through sediment. Sediments had been collected in September 2020 and maintained at room temperature until test occurred in February 2021																		
For the pH or hardness dependent guidelines, the referenced guideline is based on the measured parameter																		
mbws Meters below water surface																		
RDL Reportable Detection Limit																		
1001 Bold/Red font indicates reported concentration greater than CCME Freshwater Guideline																		
Yellow background indicates concentration exceeding WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)																		
"-" not analyzed / not applicable																		

Table 2																		
Surface Water Analytical Results - Routine Water Chemistry (2 of 2) 2021 Field Program - Rayrock Mine Remediation Project Public Services and Procurement Canada																		
Sample Information Parameter					Misc. Inorganics						Anions							
					Conductivity	pH	Total Organic Carbon	Dissolved Organic Carbon	Total Dissolved Solids	Total Suspended Solids	Alkalinity (PP as CaCO3)	Alkalinity (Total as CaCO3)	Bicarbonate (HCO3)	Carbonate (CO3)	Hydroxide (OH)	Dissolved Chloride (Cl)	Dissolved Fluoride (F)	Dissolved Sulphate (SO4)
Unit					µS/cm	pH	mg/L	mg/L	mg/l	mg/l	mg/l	mg/l	mg/L	mg/l	mg/l	mg/l	mg/l	
CCME Freshwater ¹					NG	6.5 - 9.0	NG	NG	NG	5	NG	NG	NG	NG	NG	120	0.12	NG
WLBW Rayrock Remediation Effluent Quality Criteria (September 30, 2021)						6-9				15						0.120		
Reportable Detection Limit					2.0	N/A	0.50	0.50	10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.050	0.50
Lake Group	Sample Location	Sample Date (mm/dd/yyyy)	Sample ID	Sample Depth (mbws)														
Mill Lake Surface Water																		
Mill Lake	Mill 9W1	7/13/1983	RR-0001-053	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill W5	7/20/1995	RR-0001-057	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	SW3 Mill	11/20/1996	RR-0001-062	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	SW3 Mill	8/21/1997	RR-0001-098	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill Lake	8/28/2007	RR-0002-068	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill Lake	8/27/2008	RR-0002-073	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill Lake	8/30/2009	RR-0002-082	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill Lake	8/31/2011	RR-0002-096	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill Lake	8/6/2014	RR-0003-004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill Lake	5/26/2017	RR-0003-032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Lake	Mill Lake	9/17/2018	SW007_20180917	0.5 m	170	7.78	-	-	99	2.7	<1.0	49	60	<1.0	<1.0	<1.0	-	37
Mill Lake	Mill Lake	9/17/2018	SW008_20180917	2.0 m	170	7.47	-	-	95	2.7	<1.0	45	55	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake	9/17/2018	SW009_20180917	3.0 m	170	7.73	-	-	96	15	<1.0	47	57	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake	9/17/2018	SW010_20180917	0.5 m	170	7.72	-	-	98	1.3	<1.0	49	60	<1.0	<1.0	<1.0	-	37
Mill Lake	Mill Lake (Duplicate)	9/17/2018	Duplicate of SW010_20180917	-	170	7.77	-	-	98	1.3	<1.0	48	59	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake	9/17/2018	SW011_20180917	1.5 m	170	7.75	-	-	98	1.3	<1.0	50	61	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake	9/17/2018	SW012_20180917	3.0 m	170	7.77	-	-	96	2.7	<1.0	46	56	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake	9/17/2018	SW013_20180917	0.5 m	170	7.77	-	-	98	2	<1.0	49	60	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake	9/17/2018	SW014_20180917	1.5 m	170	7.76	-	-	97	2	<1.0	47	57	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake	9/17/2018	SW015_20180917	2.5 m	170	7.78	-	-	98	1.3	<1.0	49	60	<1.0	<1.0	<1.0	-	36
Mill Lake	Mill Lake - 1.5 m depth	8/3/2019	ML_SW009_1.5_20190803	1.5 m	170	7.89	7.7 ⁽⁷⁾	7.5 ⁽⁷⁾	110	6	<1.0	48	58	<1.0	<1.0	<1.0	-	38
Mill Lake	Mill Lake - 3.0 m depth	8/3/2019	ML_SW010_3.0_20190803	3.0 m	170	7.89	7.0 ⁽⁷⁾	7.1 ⁽⁷⁾	110	2	<1.0	46	56	<1.0	<1.0	<1.0	-	37
Mill Lake	0522774, 7036330	7/15/2021	MLWQ-01	1.0 m	150	6.96	7.8	12	44	<1.0	<1.0	48	58	<1.0	<1.0	<1.0	0.082	32
Mill Lake	0522760, 7036204	7/15/2021	MLWQ-02	1.65 m	150	6.97	7.5	10	<10	<1.0	<1.0	59	72	<1.0	<1.0	<1.0	0.080	32
Mill Lake	0522688,7036172	7/15/2021	MLWQ-03	1.61 m	150	6.99	7.8	11	32	<1.0	<1.0	52	64	<1.0	<1.0	1.1	0.082	32
Mill Lake	0522686, 7036092	7/15/2021	MLWQ-04	1.2 m	150	6.94	7.5	11	16	<1.0	<1.0	56	68	<1.0	<1.0	<1.0	0.080	31
Mill Lake	DUP01	7/15/2021	Duplicate of MLWQ-04	1.2 m	150	6.96	7.8	9.5	48	<1.0	<1.0	50	61	<1.0	<1.0	1.1	0.080	32
Mill Lake	0522602, 7036125	7/15/2021	MLWQ-05	1.2 m	150	7.02	7.9	10	40	<1.0	<1.0	61	74	<1.0	<1.0	1.7	0.14	42
				Maximum	170	7.89	7.9	12	110	15	<1.0	61	74	<1.0	<1.0	<1.0	0.14	42
				Average	163	7.50	7.7	11	81	3.4	<1.0	50	61	<1.0	<1.0	-	0.09	35
				Minimum	150	6.94	7.5	9.5	16	1.3	<1.0	45	55	<1.0	<1.0	<1.0	0.08	31
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (July 2021) - NO POLYMER ADDED																		
Mill Lake	Field Pillow Testing	7/25/2021	MLVC-04 + MLVC-05 FILTRATE		170	6.92	13	16	220	330	<1.0	77	94	<1.0	<1.0	1.0	0.074	28
Mill Lake	Field Pillow Testing	7/27/2021	ML24H FILT		160	7.17	13	15	170	340	<1.0	76	93	<1.0	<1.0	1.6	0.079	27
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (October 2021) - POLYMER ADDED																		
Mill Lake	Field Pillow Testing	10/2/2021	MLVC-0309-P		130	6.83	20	14	83	3000	<1.0	31	37	<1.0	<1.0	1.7	<0.050	30
Mill Lake	Field Pillow Testing	10/2/2021	MLVC-0509-P		140	7.03	11	13	57	950	<1.0	43	52	<1.0	<1.0	1.6	0.074	29
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (Unpreserved and Unchilled Samples - For Reference, Samples Not Preserved Using Standard Processes) ²																		
Mill Lake	Field Pillow Testing	2/25/2021	JM-001 2021008009	-	-	6.42	-	-	-	6	-	-	-	-	-	-	0.06	-
Mill Lake	Field Pillow Testing	2/25/2021	JM-002 2021008010	-	-	5.59	-	-	-	19100	-	-	-	-	-	-	0.03	-
Mill Lake	Field Pillow Testing	2/25/2021	JM-003 2021008011	-	-	6.71	-	-	-	188	-	-	-	-	-	-	0.07	-
Mill Lake	Field Pillow Testing	2/25/2021	JM-004 2021008012	-	-	6.7	-	-	-	26	-	-	-	-	-	-	0.08	-
Mill Lake	Field Pillow Testing	2/25/2021	JM-005 2021008013	-	-	7.25	-	-	-	58	-	-	-	-	-	-	0.13	-
Mill Lake	Field Pillow Testing	2/25/2021	JM-006 2021008014	-	-	6.39	-	-	-	17100	-	-	-	-	-	-	0.08	-
Mill Lake	Field Pillow Testing	2/25/2021	JM-007 2021008015	-	-	7.31	-	-	-	342	-	-	-	-	-	-	0.13	-
Mill Lake	Field Pillow Testing	2/25/2021	JM-008 2021008016	-	-	7.29	-	-	-	16	-	-	-	-	-	-	0.11	-
Notes:																		
NG = No Guideline																		
¹ Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, Freshwater Aquatic Life On-Line, Accessed 08.10.21. CCME guidelines for metals are only compared to total metal analysis																		
² Analytical results obtained by flowing tap water through sediment. Sediments had been collected in September 2020 and maintained at room temperature until test occurred in February 2021																		
For the pH or hardness dependent guidelines, the referenced guideline is based on the measured parameter																		
mbws Meters below water surface																		
RDL Reportable Detection Limit																		
1001 Bold/Red font indicates reported concentration greater than CCME Freshwater Guideline																		
<0.01 Grey background indicates circumstance where the laboratory's minimum detection limit is greater than the referenced CCME guideline																		
Yellow background indicates concentration exceeding WLBW Rayrock Remediation Effluent Quality Criteria (September 30, 2021)																		
"-" not analyzed / not applicable																		

Table 3																																
Surface Water Analytical Results - General Metals (1 of 3) 2021 Field Program - Rayrock Mine Remediation Project Public Services and Procurement Canada																																
Sample Information Parameter Fraction Unit					Hardness (as CaCO3)	Aluminum		Antimony		Arsenic		Barium		Beryllium		Bismuth		Metals Boron		Cadmium		Calcium		Chromium		Cobalt		Copper				
						Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total Guideline	Total
						mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
CCME Freshwater ¹					NG	NG	0.100	NG	NG	NG	0.005	NG	NG	NG	NG	NG	NG	NG	1.5	NG	0.00009	NG	NG	NG	NG	NG	NG	NG	NG	Guideline varies with Hardness	0.0028	
WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)																																
Reportable Detection Limit							0.0030	0.0030	0.00060	0.00060	0.00020	0.00020	0.010	0.010	0.0010	0.0010			0.020	0.020	0.020	0.020	0.30	0.30	0.0010	0.0010	0.00030	0.00030	0.00020			
Lake Group	Sample Location	Sample Date (mm/dd/yyyy)	Sample ID	Sample Depth (mbws)																												
Mill Lake Surface Water																																
Mill Lake	Mill 9W1	7/13/1983	RR-0001-053		-	-	-	-	-	0.002	0.002	-	-	-	-	-	-	-	-	< 0.00005	0.0001	-	-	-	-	0.0025	0.0025	-	-	-		
Mill Lake	Mill W5	7/20/1995	RR-0001-057		-	-	-	-	-	-	-		0.014	-	-	-	-	-	< 0.05	-	< 0.001	-	-	-	0.005	-	< 0.001	-	-	-		
Mill Lake	SW3 Mill	11/20/1996	RR-0001-062		-	0.044	-	-	-	-	-	0.013	-	< 0.001	-	-	-	< 0.001	-	< 0.001	-	23.0	-	0.001	-	< 0.001	-	-	-	-		
Mill Lake	SW3 Mill	8/21/1997	RR-0001-098		-	0.040	-	-	-	-	-	0.013	-	< 0.001	-	-	-	0.004	-	< 0.001	-	22.0	-	0.002	-	< 0.001	-	-	-	-		
Mill Lake	Mill Lake	8/28/2007	RR-0002-068		85	0.016	0.019	< 0.0001	< 0.0001	0.000325	0.000328	0.0126	0.0128	< 0.001	< 0.001	-	-	0.0125	0.0128	< 0.00002	< 0.00002	25.4	25.5	0.00017	0.00013	< 0.0001	< 0.0001	-	-	-		
Mill Lake	Mill Lake	8/27/2008	RR-0002-073		84	0.015	0.019	< 0.0001	< 0.0001	0.00038	0.000303	0.0128	0.0125	< 0.001	< 0.001	< 0.001	< 0.001	0.0139	0.0121	< 0.00002	< 0.00002	25.7	24.7	0.00017	< 0.001	< 0.0001	< 0.0001	-	-	-		
Mill Lake	Mill Lake	8/30/2009	RR-0002-082		80	0.020	0.022	0.00022	0.00051	0.00035	0.00041	0.0124	0.0124	< 0.001	< 0.001	< 0.001	< 0.001	0.014	0.014	< 0.00002	< 0.00002	24.0	23.4	< 0.001	< 0.001	< 0.0001	< 0.0001	-	-	-		
Mill Lake	Mill Lake	8/31/2011	RR-0002-096		81	0.013	0.021	0.00006	0.000057	0.000315	0.0003	0.0138	0.0135	< 0.001	< 0.001	< 0.001	< 0.001	0.0148	0.0154	< 0.00002	< 0.00002	24.2	24.0	< 0.001	< 0.001	< 0.0001	< 0.0001	-	-	-		
Mill Lake	Mill Lake	8/6/2014	RR-0003-004		94	0.031	0.032	< 0.001	< 0.001	0.00041	0.00038	0.02	0.02	< 0.001	< 0.001	-	-	0.021	< 0.02	< 0.00002	< 0.00002	28.0	28.0	< 0.001	< 0.001	< 0	< 0	-	-	-		
Mill Lake	Mill Lake	5/26/2017	RR-0003-032		-	-	0.055	-	< 0.001	-	0.00035	-	0.014	-	< 0.001	-	-	-	< 0.02	-	< 0.00002	-	24.0	-	< 0.001	-	< 0	< 0	-	-	-	
Mill Lake	Mill Lake	9/17/2018	SW007_20180917	0.5 m	81	0.021	0.025	< 0.00060	< 0.00060	0.0003	0.00035	0.012	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0032	0.0020	0.0037		
Mill Lake	Mill Lake	9/17/2018	SW008_20180917	2.0 m	78	0.021	0.026	< 0.00060	< 0.00060	0.00029	0.00033	0.011	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0030	0.0020	0.0034		
Mill Lake	Mill Lake	9/17/2018	SW009_20180917	3.0 m	79	0.022	0.068	< 0.00060	< 0.00060	0.00028	0.00042	0.012	0.014	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0031	0.0020	0.0076		
Mill Lake	Mill Lake	9/17/2018	SW010_20180917	0.5 m	80	0.022	0.024	< 0.00060	< 0.00060	0.0003	0.00036	0.012	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0031	0.0020	0.0036		
Mill Lake	Mill Lake (Duplicate)	9/17/2018	Duplicate of SW010_20180917	-	81	0.023	0.025	< 0.00060	< 0.00060	0.0003	0.00029	0.012	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0030	0.0020	0.0034		
Mill Lake	Mill Lake	9/17/2018	SW011_20180917	1.5 m	81	0.021	0.025	< 0.00060	< 0.00060	0.00028	0.0003	0.012	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0031	0.0020	0.0038		
Mill Lake	Mill Lake	9/17/2018	SW012_20180917	3.0 m	81	0.024	0.025	< 0.00060	< 0.00060	0.00037	0.00033	0.012	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0031	0.0020	0.0041		
Mill Lake	Mill Lake	9/17/2018	SW013_20180917	0.5 m	81	0.027	0.026	< 0.00060	< 0.00060	0.00036	0.00039	0.011	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0031	0.0020	0.0038		
Mill Lake	Mill Lake	9/17/2018	SW014_20180917	1.5 m	81	0.021	0.025	< 0.00060	< 0.00060	0.00031	0.00034	0.012	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0032	0.0020	0.0038		
Mill Lake	Mill Lake	9/17/2018	SW015_20180917	2.5 m	81	0.022	0.026	< 0.00060	< 0.00060	0.0003	0.00031	0.011	0.012	< 0.0010	< 0.0010	-	-	< 0.020	< 0.020	< 0.000020	< 0.000020	24.0	24.0	< 0.0010	< 0.0010	< 0.00030	< 0.00030	0.0031	0.0020	0.0037		
Mill Lake	Mill Lake - 1.5 m depth	8/3/2019	ML_SW009_1.5_20190803	1.5 m	78	0.035	0.043	<0.00060	< 0.00060	0.00026	0.00036	0.01	0.01	<0.0010	< 0.0010	-	-	<0.020	< 0.020	<0.000020	< 0.000020	23.0	23.0	<0.0010	< 0.0010	<0.00030	< 0.00030	0.0036	0.0020	0.0041		
Mill Lake	Mill Lake - 3.0 m depth	8/3/2019	ML_SW010_3.0_20190803	3.0 m	78	0.034	0.042	<0.00060	< 0.00060	0.00033	0.00040	0.01	0.01	<0.0010	< 0.0010	-	-	<0.020	< 0.020	<0.000020	<0.000020	23.0	23.0	<0.0010	< 0.0010	<0.00030	< 0.00030	0.0036	0.0020	0.0041		
Mill Lake	0522774, 70																															

Table 4																												
Surface Water Analytical Results - General Metals (2 of 3) 2021 Field Program - Rayrock Mine Remediation Project Public Services and Procurement Canada																												
Sample Information					Hardness (as CaCO3)	Metals																						
Parameter	Fraction	Unit				Iron		Lead			Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel			Phosphorus		Potassium		
					mg/l	Dissolved mg/l	Total mg/l	Dissolved mg/l	Total mg/l	Total mg/l	Dissolved mg/l	Total mg/l	Dissolved mg/l	Total mg/l	Dissolved mg/l	Total mg/l	Dissolved mg/l	Total mg/l	Dissolved mg/l	Total mg/l	Dissolved mg/l	Total mg/L	Total mg/l	Dissolved mg/l	Total mg/l	Dissolved mg/l	Total mg/l	
CCME Freshwater ¹					NG	NG	0.3	NG	CCME	Varies	NG	NG	NG	NG	NG	NG	NG	NG	0.000026	NG	0.073	NG	CCME	Varies ^{3,4}	NG	NG	NG	NG
WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)							0.300		Guideline varies with Hardness		0.020	0.020	0.20	0.20	0.0040	0.0040	0.0020	0.0020	0.00020	0.00020	0.00050	Guideline varies with Hardness	0.00050	0.10	0.10	0.30	0.30	
Reportable Detection Limit						0.060	0.060	0.00020		0.00020																		
Lake Group	Sample Location	Sample Date (mm/dd/yyyy)	Sample ID	Sample Depth (mbws)																								
Mill Lake Surface Water																												
Mill Lake	Mill 9W1	7/13/1983	RR-0001-053			0.083	0.1														0.0043	0.025	0.0043					
Mill Lake	Mill W5	7/20/1995	RR-0001-057														< 0.00001		< 0.00005		0.025	< 0.001						
Mill Lake	SW3 Mill	11/20/1996	RR-0001-062			0.041							5.2		0.009		< 0.00005		< 0.001		< 0.001	0.025		< 0.05		1.4		
Mill Lake	SW3 Mill	8/21/1997	RR-0001-098			0.008							4.7		< 0.001		< 0.00005		< 0.001		< 0.001	0.025		< 0.05		1.0		
Mill Lake	Mill Lake	8/28/2007	RR-0002-068		85.1	< 0.03	0.018						5.28	5.28	0.00008	0.0133	< 0.00001	< 0.00001	0.000258	0.000266	< 0.001	0.085	< 0.001			1.03	1.03	
Mill Lake	Mill Lake	8/27/2008	RR-0002-073		84.2	< 0.03	0.027				< 0.005	< 0.005	4.84	3.86	0.00015	0.0189	< 0.00001	< 0.00001	0.000232	0.000211	0.00015	0.084	< 0.001	< 0.3	< 0.3	1.03	1.0	
Mill Lake	Mill Lake	8/30/2009	RR-0002-082		80.1	0.034	< 0.03				< 0.005	< 0.005	4.90	4.82	0.00037	0.0123	< 0.00001	< 0.00001	0.000247	0.000258	< 0.001	0.081	0.00054	< 0.3	< 0.3	1.0	0.985	
Mill Lake	Mill Lake	8/31/2011	RR-0002-096		80.5	< 0.03	0.028				< 0.005	< 0.005	4.84	4.81	0.000307	0.0178	< 0.00001	< 0.00001	0.000252	0.000253	< 0.001	0.081	< 0.001	< 0.3	< 0.3	0.985	0.987	
Mill Lake	Mill Lake	8/6/2014	RR-0003-004		94	< 0.06	< 0.06				< 0.02	< 0.02	5.6	5.6	0.016	0.033	< 0.005	< 0.005	0.00034	0.00047	< 0.001	0.092	< 0.001	< 0.1	< 0.1	1.1	1.1	
Mill Lake	Mill Lake	5/26/2017	RR-0003-032				0.091					< 0.02		4.5		0.11				0.00023		0.025	< 0.001		< 0.1	-	1.0	
Mill Lake	Mill Lake	9/17/2018	SW007_20180917	0.5 m	81	< 0.060	< 0.060	< 0.00020	0.0024	0.00021	< 0.020	< 0.020	4.9	4.8	< 0.0040	0.0091	-	0.0000098	0.00023	0.00024	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.0	
Mill Lake	Mill Lake	9/17/2018	SW008_20180917	2.0 m	78	< 0.060	< 0.060	< 0.00020	0.0023	< 0.00020	< 0.020	< 0.020	4.7	4.8	< 0.0040	0.0093	-	0.0000022	0.00022	0.00022	< 0.00050	0.079	< 0.00050	< 0.10	< 0.10	0.99	1.0	
Mill Lake	Mill Lake	9/17/2018	SW009_20180917	3.0 m	79	< 0.060	0.19	< 0.00020	0.0024	0.00046	< 0.020	< 0.020	4.7	4.8	< 0.0040	0.052	-	0.000011	0.00025	0.00025	< 0.00050	0.08	0.00072	< 0.10	< 0.10	1.0	1.1	
Mill Lake	Mill Lake	9/17/2018	SW010_20180917	0.5 m	80	< 0.060	< 0.060	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.8	4.7	< 0.0040	0.0091	-	0.0000052	0.00026	0.0002	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.1	
Mill Lake	Mill Lake (Duplicate)	9/17/2018	Duplicate of SW010_20180917	-	81	< 0.060	< 0.060	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.8	< 0.0040	0.009	-	0.000005	< 0.00020	0.00021	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.0	
Mill Lake	Mill Lake	9/17/2018	SW011_20180917	1.5 m	81	< 0.060	< 0.060	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.8	< 0.0040	0.009	-	0.0000063	0.00025	0.00023	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.0	
Mill Lake	Mill Lake	9/17/2018	SW012_20180917	3.0 m	81	< 0.060	< 0.060	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.9	< 0.0040	0.0091	-	< 0.000002	0.00024	0.00023	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.0	
Mill Lake	Mill Lake	9/17/2018	SW013_20180917	0.5 m	81	< 0.060	< 0.060	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.8	< 0.0040	0.0089	-	0.0000046	0.00021	0.00021	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.0	
Mill Lake	Mill Lake	9/17/2018	SW014_20180917	1.5 m	81	< 0.060	< 0.060	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.8	< 0.0040	0.0087	-	0.00001	0.00023	0.00021	< 0.00050	0.081	0.00078	< 0.10	< 0.10	1.0	1.0	
Mill Lake	Mill Lake	9/17/2018	SW015_20180917	2.5 m	81	< 0.060	< 0.060	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.9	< 0.0040	0.0092	-	0.0000045	0.00023	0.00021	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.1	
Mill Lake	Mill Lake - 1.5 m depth	8/3/2019	ML_SW009_1.5_20190803	1.5 m	78	< 0.060	0.073	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.7	< 0.0040	0.024	0.0000033	-	0.00044	0.00026	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.1	1.0	
Mill Lake	Mill Lake - 3.0 m depth	8/3/2019	ML_SW010_3.0_20190803	3.0 m	78	< 0.060	0.072	< 0.00020	0.0024	< 0.00020	< 0.020	< 0.020	4.9	4.6	< 0.0040	0.023	0.0000034	-	0.00049	0.00032	< 0.00050	0.081	< 0.00050	< 0.10	< 0.10	1.0	1.0	
Mill Lake	0522774, 7036330	7/15/2021	MLWQ-01	1.0 m	64	< 0.060	< 0.060	< 0.00020	0.0018	< 0.00020	< 0.020	< 0.020	3.8	4.1	0.0074	0.015	< 0.0000019	< 0.0000019	0.00025	< 0.00020	< 0.00050	0.068	< 0.00050	< 0.10	< 0.10	0.76	0.85	
Mill Lake	0522760, 7036204	7/15/2021	MLWQ-02	1.65 m	62	< 0.060	< 0.060	< 0.00020	0.0017	< 0.00020	< 0.020	< 0.020	3.7	4.0	0.0068	0.013	< 0.0000019	< 0.0000019	0.00024	< 0.00020	< 0.00050	0.066	0.00094	< 0.10	< 0.10	0.71	0.84	
Mill Lake	0522688, 7036172	7/td																										

Table 5																																
Surface Water Analytical Results - General Metals (3 of 3) 2021 Field Program - Rayrock Mine Remediation Project Public Services and Procurement Canada																																
Sample Information					Hardness (as CaCO3)	Metals																										
Parameter						Selenium		Silicon		Silver		Sodium		Strontium		Sulfur, elemental		Thallium		Tin		Titanium		Uranium		Vanadium		Zinc		Zirconium		
Fraction						Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	
Unit						mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
CCME Freshwater ¹						NG	0.001	NG	NG	NG	0.00025	NG	NG	NG	NG	NG	NG	0.0008	NG	NG	NG	NG	NG	NG	0.015	NG	NG	NG	0.007	NG	NG	
WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)																								0.015					0.023			
Reportable Detection Limit						0.00020	0.00020	0.10	0.10	0.00010	0.00010	0.50	0.50	0.020	0.020	0.20	0.20	0.00020	0.00020	0.0010	0.0010	0.0010	0.0010	0.00010	0.00010	0.0010	0.0010	0.0030	0.0030			
Lake Group	Sample Location	Sample Date (mm/dd/yyyy)	Sample ID	Sample Depth																												
Mill Lake Surface Water																																
Mill Lake	Mill 9W1	7/13/1983	RR-0001-053			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.019	0.028	-	-	
Mill Lake	Mill W5	7/20/1995	RR-0001-057			-	-	-	-	-	< 0.00001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.001	-	< 0.005	-	-	
Mill Lake	SW3 Mill	11/20/1996	RR-0001-062			-	-	0.68	-	< 0.001	-	7.7	-	0.11	-	-	-	-	-	-	< 0.001	-	-	-	-	< 0.001	-	0.005	-	< 0.001	-	
Mill Lake	SW3 Mill	8/21/1997	RR-0001-098			-	-	0.22	-	< 0.001	-	2.5	-	0.1	-	-	-	-	-	< 0.001	-	-	-	-	-	< 0.001	-	< 0.005	-	< 0.001	-	
Mill Lake	Mill Lake	8/28/2007	RR-0002-068		85.1	-	-	0.187	0.193	< 0.00001	< 0.00001	2.33	2.29	0.107	0.107	-	-	-	-	-	-	-	-	-	-	0.000073	0.000087	< 0.001	< 0.001	-	-	
Mill Lake	Mill Lake	8/27/2008	RR-0002-073		84.2	-	-	0.266	0.291	< 0.00001	< 0.00001	2.19	2.4	0.0993	0.0871	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.01	< 0.01	-	-	0.000149	0.000072	0.0017	0.0036	-	-	
Mill Lake	Mill Lake	8/30/2009	RR-0002-082		80.1	-	-	0.183	0.171	< 0.00001	< 0.00001	2.3	2.1	0.105	0.105	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.01	< 0.01	-	-	< 0.001	< 0.001	< 0.001	< 0.001	-	-	
Mill Lake	Mill Lake	8/31/2011	RR-0002-096		80.5	-	-	0.368	0.38	< 0.00001	< 0.00001	2.09	2.08	0.105	0.103	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.01	< 0.01	-	-	< 0.001	0.000068	< 0.001	0.0039	-	-	
Mill Lake	Mill Lake	8/6/2014	RR-0003-004		94	-	-	0.14	0.15	< 0.0001	< 0.0001	2.4	2.3	0.12	0.12	14	15	< 0	< 0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	< 0.001	< 0.001	< 0.003	< 0.003	-	-	
Mill Lake	Mill Lake	5/26/2017	RR-0003-032			-	-	-	0.53	-	< 0.0001	-	2.1	-	0.092	-	11	-	< 0	< 0	< 0.001	-	< 0.001	-	-	-	< 0.001	-	< 0.003	-	-	
Mill Lake	Mill Lake	9/17/2018	SW007_20180917	0.5 m	81	0.00027	0.00031	0.21	0.25	< 0.00010	< 0.00010	2.1	2	0.084	0.098	12	12	< 0.00020	< 0.00020	0.0065	0.0038	< 0.0010	< 0.0010	0.077	0.082	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake	9/17/2018	SW008_20180917	2.0 m	78	0.00026	0.00034	0.22	0.26	< 0.00010	< 0.00010	2.0	2.0	0.091	0.098	12	11	< 0.00020	< 0.00020	0.0025	< 0.0010	< 0.0010	< 0.0010	0.081	0.083	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake	9/17/2018	SW009_20180917	3.0 m	79	0.00029	0.00038	0.23	0.3	< 0.00010	< 0.00010	2.0	2.0	0.092	0.099	12	12	< 0.00020	< 0.00020	0.016	0.009	< 0.0010	0.0013	0.075	0.086	< 0.0010	< 0.0010	< 0.0030	0.0045	-	-	
Mill Lake	Mill Lake	9/17/2018	SW010_20180917	0.5 m	80	0.00026	0.00033	0.23	0.24	< 0.00010	< 0.00010	2.0	2.0	0.093	0.097	12	11	< 0.00020	< 0.00020	0.0047	0.0016	< 0.0010	< 0.0010	0.079	0.082	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake (Duplicate)	9/17/2018	Duplicate of SW010_20180917	-	81	0.00026	0.0003	0.21	0.24	< 0.00010	< 0.00010	2.1	2.1	0.083	0.098	12	12	< 0.00020	< 0.00020	0.0048	0.0016	< 0.0010	< 0.0010	0.078	0.080	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake	9/17/2018	SW011_20180917	1.5 m	81	0.00026	0.00031	0.21	0.24	< 0.00010	< 0.00010	2.1	2.1	0.084	0.099	12	12	< 0.00020	< 0.00020	0.0052	0.0049	< 0.0010	< 0.0010	0.082	0.081	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake	9/17/2018	SW012_20180917	3.0 m	81	0.00027	0.00029	0.21	0.25	< 0.00010	< 0.00010	2	2.1	0.084	0.10	12	12	< 0.00020	< 0.00020	< 0.0010	0.012	< 0.0010	< 0.0010	0.079	0.089	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake	9/17/2018	SW013_20180917	0.5 m	81	0.00024	0.0003	0.21	0.24	< 0.00010	< 0.00010	2.1	2.1	0.084	0.099	12	11	< 0.00020	< 0.00020	0.0075	0.0056	< 0.0010	< 0.0010	0.08	0.081	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake	9/17/2018	SW014_20180917	1.5 m	81	0.00025	0.00031	0.21	0.23	< 0.00010	< 0.00010	2.0	2.1	0.084	0.099	12	12	< 0.00020	< 0.00020	0.0093	0.0081	< 0.0010	< 0.0010	0.081	0.082	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake	9/17/2018	SW015_20180917	2.5 m	81	0.00025	0.0003	0.2	0.23	< 0.00010	< 0.00010	2.0	2.1	0.084	0.10	12	12	< 0.00020	< 0.00020	0.0046	0.002	< 0.0010	0.0012	0.079	0.081	< 0.0010	< 0.0010	< 0.0030	< 0.0030	-	-	
Mill Lake	Mill Lake - 1.5 m depth	8/3/2019	ML_SW009_1.5_20190803	1.5 m	78	0.00028	0.00034	0.24	0.26	< 0.00010	< 0.00010	2.2	2.1	0.098	0.094	12	12	< 0.00020	< 0.00020	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.075	0.076	< 0.0010	< 0.0010	0.0036	< 0.0030	-	-	
Mill Lake	Mill Lake - 3.0 m depth	8/3/2019	ML_SW010_3.0_20190803	3.0 m	78	0.0003	0.00037	0.24	0.26	< 0.00010	< 0.00010	2.2	2.1	0.098	0.091	12	11	< 0.00020	< 0.00020	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.076	0.075	< 0.0010	< 0.0010	< 0.0030	0.0035	-	-	
Mill Lake	0522774, 7036330	7/15/2021	MLWQ-01	1.0 m	64	0.0003	0.00029	0.32	0.41	< 0.00010	< 0.00010	1.6	1.8	0.078	0.087	9.9	9.6	< 0.00020	< 0.													

Table 6

Water Analytical Results - Radionuclides
2021 Field Program - Rayrock Mine Remediation Project
Public Services and Procurement Canada

Sample Information			Laboratory Analytical Results (Bq/L)													
Sample ID	Sampling Location	Sampling Date	Gross Alpha	Gross Beta	Lead-210	Lead-212	Polonium-210	Radium-226	Radium-228	Thorium-228	Thorium-230	Thorium-232	Thorium-234	Uranium-234	Uranium-235	Uranium-238
Referenced Guidelines																
AT1 Guidelines, Fine and Coarse-Grained Soil, Residential/Parkland			NG	NG	0.2	NG	0.2	0.5	0.5	2	0.4	0.1	20	4	4	4
Reportable Detection Limit (RDL)			0.10	0.10	1.0	0.10	0.010	0.010	0.50	0.010	0.010	0.010	1.0	0.010	0.010	0.010
Mill Lake Surface Water																
WG5267-ML_SW009_1.5_20190803	Mill Lake	8/3/2019	2.70	1.49	<1.0	<0.10	-	<1.0	<0.50	-	<5.0	-	<1.0	1.060	0.043	0.960
WG5267-ML_SW010_3.0_20190803	Mill Lake	8/3/2019	1.80	1.51	<1.0	<0.10	-	<1.0	<0.50	-	<5.0	-	<1.0	1.070	0.046	0.950
MLWQ-01	0522774, 7036330	7/15/2021	-	-	<1.0	<0.10	0.028	0.14	<0.50	<0.010	<0.010	<0.010	<1.0	1.1	0.042	0.95
MLWQ-02	0522760, 7036204	7/15/2021	-	-	<1.0	<0.10	0.019	0.14	<0.50	<0.010	<0.010	<0.010	<1.0	1.0	0.045	0.85
MLWQ-03	0522688,7036172	7/15/2021	-	-	<1.0	<0.10	0.092	0.14	<0.50	<0.010	<0.010	<0.010	<1.0	1.1	0.049	0.96
MLWQ-04	0522686, 7036092	7/15/2021	-	-	<1.0	<0.10	0.031	0.12	<0.50	<0.010	<0.010	<0.010	<1.0	1.0	0.044	0.88
DUP01	Duplicate of MLWQ-04	7/15/2021	-	-	<1.0	<0.10	0.018	0.12	<0.50	<0.010	0.012	<0.010	<1.0	0.97	0.041	0.85
MLWQ-05	0522602, 7036125	7/15/2021	-	-	<1.0	<0.10	0.023	0.13	<0.50	<0.010	0.012	<0.010	<1.0	1.0	0.041	0.92
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (July 2021) - NO POLYMER ADDED																
MLVC-04 + MLVC-05 FILTRATE	Mill Lake (Filtrate)	7/25/2021	-	-	<1.0	<0.10	-	1.1	<0.50	-	<5.0	-	1.2	-	<0.50	-
MLVC-04 + MLVC-05 FILTRATE ^(b)	Mill Lake (Filtrate)	7/25/2021	-	-	0.63	-	0.115	0.51	-	-	0.46	-	-	-	-	2.3
ML24H FILT	Mill Lake (Filtrate)	7/27/2021	-	-	<1.0	<0.10	0.053	1.7	<0.50	-	<5.0	-	2.1	-	<0.50	-
ML24H FILT ^(b)	Mill Lake (Filtrate)	7/27/2021	-	-	-	-	-	0.75	-	<0.010	0.035	<0.010	-	3.6	0.16	3.2

NOTES

(a) Alberta Tier 1 Soil and Groundwater Remediation Guidelines, January 2019

^(b) Sample was originally processed within hold time. Data quality required investigation. Re-analysis was completed past recommended hold time. Detection limit raised based on sample volume used for analysis.

BOLD Exceeds AT1 Guidelines

Grey background indicates circumstance where the laboratory's minimum detection limit is greater than the referenced AT1 Guideline

NG - no guideline

RDL - Reportable Detection Limit

- parameter not analyzed

Bq/L - becquerel per litre

mbgs - meters below ground surface

Table 7														
Water Analytical Results - Petroleum Hydrocarbons 2021 Field Program - Rayrock Mine Remediation Project Public Services and Procurement Canada														
Water Sample Identification				Petroleum Hydrocarbons										
Parameter				Benzene	Toluene	Ethylbenzene	Xylene, O-	Xylene, m & p	Xylenes, Total	PHC F1 (C6-C10)	PHC F1 (C6-C10) minus BTEX	PHC F2 (>C10-C16)	PHC F3 (C16-C34)	PHC F4 (C34-C50)
Units				ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/L	mg/l
CCME Freshwater Guideline ¹				370	2	90	NG	NG	NG	NG	NG	NG	NG	NG
WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)										Total Petroleum Hydrocarbons Guideline = 5 mg/L				
Sample Location	Sample Date (mm/dd/yyyy)	Sample ID	Sample Depth mbws											
Mill Lake Surface Water														
Mill Lake	9/17/2018	SW007_20180917	0.5 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW008_20180917	2.0 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW009_20180917	3.0 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW010_20180917	0.5 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	DUP2 (Duplicate of SW010)	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW011_20180917	1.5 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW012_20180917	3.0 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW013_20180917	0.5 m	< 0.40	0.4	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW014_20180917	1.5 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake	9/17/2018	SW015_20180917	2.5 m	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.89	< 100	< 100	< 0.10	-	-
Mill Lake Surface Water Filtrate through Organic Sediment in Geotextile Tubes (October 2021) - POLYMER ADDED														
Mill Lake	10/2/2021	MLVC-0309-P	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	<0.89	< 100	< 100	< 0.10	0.36	<0.20
Mill Lake	10/2/2021	MLVC-0509-P	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	<0.89	< 100	< 100	< 0.10	0.36	<0.20
Notes:														
NG = No Guideline														
¹ Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, Freshwater Aquatic Life On-Line, Accessed 08.10.21. CCME guidelines for metals are only compared to total metal analysis														
mbws Meters below water surface														
RDL Reportable Detection Limit														
1001 Bold/Red font indicates reported concentration greater than CCME Freshwater Guideline														
Yellow background indicates concentration exceeding WLWB Rayrock Remediation Effluent Quality Criteria (September 30, 2021)														
"- " not analyzed / not applicable														

Appendix D

Laboratory Analytical Reports



Your P.O. #: 700595655
 Your Project #: 60608868-RAYROCK
 Site Location: Rayrock, NT
 Your C.O.C. #: M046356

Attention: Michael Zhao

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/09/24
 Report #: R3076515
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C151050

Received: 2021/07/16, 08:00

Sample Matrix: Water
 # Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH (1)	6	N/A	2021/07/19	AB SOP-00005	SM 23 2320 B m
Cadmium - low level CCME - Dissolved (1)	6	N/A	2021/07/24		Auto Calc
Cadmium - low level CCME (Total) (1)	6	N/A	2021/07/26		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	2	N/A	2021/07/24	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
Chloride/Sulphate by Auto Colourimetry (1)	3	N/A	2021/07/25	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2021/07/26	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
True Colour (1)	6	N/A	2021/07/18	CAL SOP-00049	SM 23 2120 C m
Carbon (DOC) (1, 3)	4	N/A	2021/07/24	AB SOP-00087	MMCW 119 1996 m
Carbon (DOC) (1, 3)	2	N/A	2021/08/04	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	6	N/A	2021/07/19	AB SOP-00005	SM 23 2510 B m
Fluoride (1)	6	N/A	2021/07/19	AB SOP-00005	SM 23 4500-F C m
Hardness (1)	6	N/A	2021/07/22		Auto Calc
Mercury (Dissolved) by CV-Lab Filtered (1)	5	2021/07/27	2021/07/27	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Dissolved) by CV-Lab Filtered (1)	1	2021/07/27	2021/07/28	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	1	2021/07/27	2021/07/27	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	5	2021/07/27	2021/07/28	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	5	N/A	2021/07/20	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Dissolved (1, 4)	1	N/A	2021/07/21	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	6	2021/07/23	2021/07/23	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 4)	6	N/A	2021/07/23	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	6	2021/07/23	2021/07/26	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	2	N/A	2021/07/24		Auto Calc
Ion Balance (1)	3	N/A	2021/07/25		Auto Calc
Ion Balance (1)	1	N/A	2021/07/26		Auto Calc
Sum of cations, anions (1)	6	N/A	2021/07/22		Auto Calc
Ammonia-N (Total) (1)	3	N/A	2021/07/19	AB SOP-00007	SM 23 4500 NH ₃ A G m
Ammonia-N (Total) (1)	3	N/A	2021/07/20	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate and Nitrite (1)	6	N/A	2021/07/19		Auto Calc
NO ₂ (N); NO ₂ (N) + NO ₃ (N) in Water (1)	6	N/A	2021/07/18	AB SOP-00091	SM 23 4500 NO ₃ m
Nitrate (as N) (1)	6	2021/07/18	2021/07/19		Auto Calc



Your P.O. #: 700595655
 Your Project #: 60608868-RAYROCK
 Site Location: Rayrock, NT
 Your C.O.C. #: M046356

Attention: Michael Zhao

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/09/24
 Report #: R3076515
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C151050

Received: 2021/07/16, 08:00

Sample Matrix: Water
 # Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH @25°C (1, 5)	6	N/A	2021/07/19	AB SOP-00005	SM 23 4500-H+B m
Total Dissolved Solids (Filt. Residue) (1)	6	2021/07/23	2021/07/23	AB SOP-00065	SM 23 2540 C m
Total Dissolved Solids (Calculated) (1)	2	N/A	2021/07/24		Auto Calc
Total Dissolved Solids (Calculated) (1)	3	N/A	2021/07/25		Auto Calc
Total Dissolved Solids (Calculated) (1)	1	N/A	2021/07/26		Auto Calc
Carbon (Total Organic) (1, 6)	6	N/A	2021/07/24	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR) (1)	6	2021/07/23	2021/07/23	AB SOP-00061	SM 23 2540 D m
NORM Group Analysis (2)	1	N/A	2021/07/30	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (2)	2	N/A	2021/07/31	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (2)	1	N/A	2021/08/01	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (2)	1	N/A	2021/08/02	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (2)	1	N/A	2021/08/04	BQL SOP-00007	Gamma Spectrometry
Lead 210 (2)	1	N/A	2021/09/15	BQL SOP-00008	GFPC
Lead 210 (2)	5	N/A	2021/09/19	BQL SOP-00008	GFPC
Polonium-210 by Alpha Spectrometry (2)	5	N/A	2021/09/08	BQL SOP-00006	Alpha Spectrometry
Polonium-210 by Alpha Spectrometry (2)	1	N/A	2021/09/09	BQL SOP-00006	Alpha Spectrometry
Radium Isotopes by Alpha Spectrometry (2, 7)	5	N/A	2021/09/13	BQL SOP-00006	Alpha Spectrometer
Radium Isotopes by Alpha Spectrometry (2, 7)	1	N/A	2021/09/18	BQL SOP-00006	Alpha Spectrometer
Thorium Isotopes by Alpha Spectrometry (2)	5	N/A	2021/09/14	BQL SOP-00006	Alpha Spectrometer
Thorium Isotopes by Alpha Spectrometry (2)	1	N/A	2021/09/16	BQL SOP-00006	Alpha Spectrometer
Uranium Isotopes by Alpha Spectrometry (2)	5	N/A	2021/09/09	BQL SOP-00006	Alpha Spectrometry
Uranium Isotopes by Alpha Spectrometry (2)	1	N/A	2021/09/20	BQL SOP-00006	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.



Your P.O. #: 700595655
 Your Project #: 60608868-RAYROCK
 Site Location: Rayrock, NT
 Your C.O.C. #: M046356

Attention: Michael Zhao

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/09/24
 Report #: R3076515
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C151050

Received: 2021/07/16, 08:00

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
- (2) This test was performed by Bureau Veritas Kitimat, 6790 Kitimat Rd., Unit 4, Mississauga, Ontario, L5N 5L9
- (3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.
- (6) TOC present in the sample should be considered as non-purgeable TOC.
- (7) Radium-226 results have not been corrected for blanks.

Encryption Key

Parminder Virk

Parminder Virk
 Key Account Specialist
 27 Sep 2021 12:56:58

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Key Account Specialist
 Email: Parminder.Virk@bureauveritas.com
 Phone# (403)735-2235

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ABZ425		ABZ426		ABZ427		
Sampling Date		2021/07/15 10:30		2021/07/15 10:45		2021/07/15 11:05		
COC Number		M046356		M046356		M046356		
	UNITS	MLWQ-01	QC Batch	MLWQ-02	QC Batch	MLWQ-03	RDL	QC Batch
Calculated Parameters								
Anion Sum	meq/L	1.6	A289811	1.9	A289811	1.7	N/A	A289811
Cation Sum	meq/L	1.4	A289811	1.3	A289811	1.4	N/A	A289811
Hardness (CaCO ₃)	mg/L	64	A289807	62	A289807	67	0.50	A289807
Ion Balance (% Difference)	%	NC	A289810	NC	A289810	NC	N/A	A289810
Dissolved Nitrate (N)	mg/L	<0.010	A289815	<0.010	A289815	<0.010	0.010	A289815
Dissolved Nitrate (NO ₃)	mg/L	<0.044	A289814	<0.044	A289814	<0.044	0.044	A289814
Dissolved Nitrite (NO ₂)	mg/L	<0.033	A289814	<0.033	A289814	<0.033	0.033	A289814
Calculated Total Dissolved Solids	mg/L	86	A289816	92	A289816	91	10	A289816
Elements								
Dissolved Cadmium (Cd)	ug/L	<0.020	A289804	<0.020	A289804	<0.020	0.020	A289804
Misc. Inorganics								
Conductivity	uS/cm	150	A290574	150	A290574	150	2.0	A290574
Anions								
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	A290572	<1.0	A290572	<1.0	1.0	A290572
Alkalinity (Total as CaCO ₃)	mg/L	48	A290572	59	A290572	52	1.0	A290572
Bicarbonate (HCO ₃)	mg/L	58	A290572	72	A290572	64	1.0	A290572
Carbonate (CO ₃)	mg/L	<1.0	A290572	<1.0	A290572	<1.0	1.0	A290572
Hydroxide (OH)	mg/L	<1.0	A290572	<1.0	A290572	<1.0	1.0	A290572
Dissolved Chloride (Cl)	mg/L	<1.0	A296924	<1.0	A296924	1.1	1.0	A296924
Dissolved Sulphate (SO ₄)	mg/L	32	A296924	32	A296924	32	1.0	A296924
Nutrients								
Dissolved Nitrite (N)	mg/L	<0.010	A289965	<0.010	A289962	<0.010	0.010	A289962
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	A289965	<0.010	A289962	<0.010	0.010	A289962
Elements								
Dissolved Aluminum (Al)	mg/L	0.039	A295219	0.038	A296610	0.039	0.0030	A295219
Dissolved Antimony (Sb)	mg/L	<0.00060	A295219	<0.00060	A296610	<0.00060	0.00060	A295219
Dissolved Arsenic (As)	mg/L	0.00031	A295219	0.00027	A296610	0.00033	0.00020	A295219
Dissolved Barium (Ba)	mg/L	<0.010	A292637	0.010	A292637	<0.010	0.010	A292637
Dissolved Beryllium (Be)	mg/L	<0.0010	A295219	<0.0010	A296610	<0.0010	0.0010	A295219
Dissolved Boron (B)	mg/L	<0.020	A292637	<0.020	A292637	<0.020	0.020	A292637
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ABZ425		ABZ426		ABZ427		
Sampling Date		2021/07/15 10:30		2021/07/15 10:45		2021/07/15 11:05		
COC Number		M046356		M046356		M046356		
	UNITS	MLWQ-01	QC Batch	MLWQ-02	QC Batch	MLWQ-03	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	19	A292637	19	A292637	20	0.30	A292637
Dissolved Chromium (Cr)	mg/L	<0.0010	A295219	0.0012	A296610	<0.0010	0.0010	A295219
Dissolved Cobalt (Co)	mg/L	<0.00030	A295219	<0.00030	A296610	<0.00030	0.00030	A295219
Dissolved Copper (Cu)	mg/L	0.0047	A295219	0.0073	A296610	0.0045	0.00020	A295219
Dissolved Iron (Fe)	mg/L	<0.060	A292637	<0.060	A292637	<0.060	0.060	A292637
Dissolved Lead (Pb)	mg/L	<0.00020	A295219	<0.00020	A296610	<0.00020	0.00020	A295219
Dissolved Lithium (Li)	mg/L	<0.020	A292637	<0.020	A292637	<0.020	0.020	A292637
Dissolved Magnesium (Mg)	mg/L	3.8	A292637	3.7	A292637	4.0	0.20	A292637
Dissolved Manganese (Mn)	mg/L	0.0074	A292637	0.0068	A292637	0.0077	0.0040	A292637
Dissolved Molybdenum (Mo)	mg/L	0.00025	A295219	0.00024	A296610	0.00023	0.00020	A295219
Dissolved Nickel (Ni)	mg/L	<0.00050	A295219	<0.00050	A296610	<0.00050	0.00050	A295219
Dissolved Phosphorus (P)	mg/L	<0.10	A292637	<0.10	A292637	<0.10	0.10	A292637
Dissolved Potassium (K)	mg/L	0.76	A292637	0.71	A292637	0.79	0.30	A292637
Dissolved Selenium (Se)	mg/L	0.00030	A295219	0.00027	A296610	0.00031	0.00020	A295219
Dissolved Silicon (Si)	mg/L	0.32	A292637	0.35	A292637	0.37	0.10	A292637
Dissolved Silver (Ag)	mg/L	<0.00010	A295219	<0.00010	A296610	<0.00010	0.00010	A295219
Dissolved Sodium (Na)	mg/L	1.6	A292637	1.6	A292637	1.8	0.50	A292637
Dissolved Strontium (Sr)	mg/L	0.078	A292637	0.075	A292637	0.079	0.020	A292637
Dissolved Sulphur (S)	mg/L	9.9	A292637	10	A292637	11	0.20	A292637
Dissolved Thallium (Tl)	mg/L	<0.00020	A295219	<0.00020	A296610	<0.00020	0.00020	A295219
Dissolved Tin (Sn)	mg/L	<0.0010	A295219	<0.0010	A296610	<0.0010	0.0010	A295219
Dissolved Titanium (Ti)	mg/L	<0.0010	A295219	<0.0010	A296610	<0.0010	0.0010	A295219
Dissolved Uranium (U)	mg/L	0.066	A295219	0.072	A296610	0.068	0.00010	A295219
Dissolved Vanadium (V)	mg/L	<0.0010	A295219	<0.0010	A296610	<0.0010	0.0010	A295219
Dissolved Zinc (Zn)	mg/L	<0.0030	A295219	0.0039	A296610	<0.0030	0.0030	A295219
RDL = Reportable Detection Limit								



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BV Labs Job #: C151050

Report Date: 2021/09/24

AECOM

Client Project #: 60608868-RAYROCK

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ABZ428		ABZ429		ABZ430		
Sampling Date		2021/07/15 11:30		2021/07/15 11:50		2021/07/15 11:30		
COC Number		M046356		M046356		M046356		
	UNITS	MLWQ-04	QC Batch	MLWQ-05	QC Batch	DUP01	RDL	QC Batch
Calculated Parameters								
Anion Sum	meq/L	1.8	A289811	2.2	A289811	1.7	N/A	A289811
Cation Sum	meq/L	1.4	A289811	1.5	A289811	1.5	N/A	A289811
Hardness (CaCO ₃)	mg/L	64	A289807	72	A289807	69	0.50	A289807
Ion Balance (% Difference)	%	NC	A289810	NC	A289810	NC	N/A	A289810
Dissolved Nitrate (N)	mg/L	0.012	A289815	<0.010	A289815	<0.010	0.010	A289815
Dissolved Nitrate (NO ₃)	mg/L	0.055	A289814	<0.044	A289814	<0.044	0.044	A289814
Dissolved Nitrite (NO ₂)	mg/L	<0.033	A289814	<0.033	A289814	<0.033	0.033	A289814
Calculated Total Dissolved Solids	mg/L	90	A289816	110	A289816	90	10	A289816
Elements								
Dissolved Cadmium (Cd)	ug/L	<0.020	A289804	<0.020	A289804	<0.020	0.020	A289804
Misc. Inorganics								
Conductivity	uS/cm	150	A290574	150	A290574	150	2.0	A290574
Anions								
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	A290572	<1.0	A290572	<1.0	1.0	A290572
Alkalinity (Total as CaCO ₃)	mg/L	56	A290572	61	A290572	50	1.0	A290572
Bicarbonate (HCO ₃)	mg/L	68	A290572	74	A290572	61	1.0	A290572
Carbonate (CO ₃)	mg/L	<1.0	A290572	<1.0	A290572	<1.0	1.0	A290572
Hydroxide (OH)	mg/L	<1.0	A290572	<1.0	A290572	<1.0	1.0	A290572
Dissolved Chloride (Cl)	mg/L	<1.0	A296789	1.7	A294711	1.1	1.0	A296789
Dissolved Sulphate (SO ₄)	mg/L	31	A296789	42	A294711	32	1.0	A296789
Nutrients								
Dissolved Nitrite (N)	mg/L	<0.010	A289962	<0.010	A289962	<0.010	0.010	A289962
Dissolved Nitrate plus Nitrite (N)	mg/L	0.012	A289962	<0.010	A289962	<0.010	0.010	A289962
Elements								
Dissolved Aluminum (Al)	mg/L	0.042	A296610	0.037	A296610	0.036	0.0030	A296610
Dissolved Antimony (Sb)	mg/L	<0.00060	A296610	<0.00060	A296610	<0.00060	0.00060	A296610
Dissolved Arsenic (As)	mg/L	0.00032	A296610	0.00036	A296610	0.00035	0.00020	A296610
Dissolved Barium (Ba)	mg/L	<0.010	A293272	<0.010	A292637	<0.010	0.010	A292637
Dissolved Beryllium (Be)	mg/L	<0.0010	A296610	<0.0010	A296610	<0.0010	0.0010	A296610
Dissolved Boron (B)	mg/L	<0.020	A293272	<0.020	A292637	<0.020	0.020	A292637
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

BV Labs Job #: C151050

Report Date: 2021/09/24

AECOM

Client Project #: 60608868-RAYROCK

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ABZ428		ABZ429		ABZ430		
Sampling Date		2021/07/15 11:30		2021/07/15 11:50		2021/07/15 11:30		
COC Number		M046356		M046356		M046356		
	UNITS	MLWQ-04	QC Batch	MLWQ-05	QC Batch	DUP01	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	19	A293272	22	A292637	21	0.30	A292637
Dissolved Chromium (Cr)	mg/L	0.0012	A296610	<0.0010	A296610	<0.0010	0.0010	A296610
Dissolved Cobalt (Co)	mg/L	<0.00030	A296610	<0.00030	A296610	<0.00030	0.00030	A296610
Dissolved Copper (Cu)	mg/L	0.0045	A296610	0.0042	A296610	0.0043	0.00020	A296610
Dissolved Iron (Fe)	mg/L	<0.060	A293272	<0.060	A292637	<0.060	0.060	A292637
Dissolved Lead (Pb)	mg/L	<0.00020	A296610	<0.00020	A296610	<0.00020	0.00020	A296610
Dissolved Lithium (Li)	mg/L	<0.020	A293272	<0.020	A292637	<0.020	0.020	A292637
Dissolved Magnesium (Mg)	mg/L	3.7	A293272	4.4	A292637	4.2	0.20	A292637
Dissolved Manganese (Mn)	mg/L	0.0068	A293272	0.0062	A292637	0.0065	0.0040	A292637
Dissolved Molybdenum (Mo)	mg/L	0.00024	A296610	0.00027	A296610	0.00026	0.00020	A296610
Dissolved Nickel (Ni)	mg/L	<0.00050	A296610	<0.00050	A296610	<0.00050	0.00050	A296610
Dissolved Phosphorus (P)	mg/L	<0.10	A293272	<0.10	A292637	<0.10	0.10	A292637
Dissolved Potassium (K)	mg/L	0.91	A293272	0.85	A292637	0.80	0.30	A292637
Dissolved Selenium (Se)	mg/L	0.00028	A296610	0.00032	A296610	0.00032	0.00020	A296610
Dissolved Silicon (Si)	mg/L	0.38	A293272	0.32	A292637	0.33	0.10	A292637
Dissolved Silver (Ag)	mg/L	<0.00010	A296610	<0.00010	A296610	<0.00010	0.00010	A296610
Dissolved Sodium (Na)	mg/L	1.7	A293272	1.8	A292637	1.7	0.50	A292637
Dissolved Strontium (Sr)	mg/L	0.077	A293272	0.083	A292637	0.080	0.020	A292637
Dissolved Sulphur (S)	mg/L	11	A293272	9.8	A292637	9.9	0.20	A292637
Dissolved Thallium (Tl)	mg/L	<0.00020	A296610	<0.00020	A296610	<0.00020	0.00020	A296610
Dissolved Tin (Sn)	mg/L	<0.0010	A296610	<0.0010	A296610	<0.0010	0.0010	A296610
Dissolved Titanium (Ti)	mg/L	<0.0010	A296610	<0.0010	A296610	<0.0010	0.0010	A296610
Dissolved Uranium (U)	mg/L	0.071	A296610	0.071	A296610	0.071	0.00010	A296610
Dissolved Vanadium (V)	mg/L	<0.0010	A296610	<0.0010	A296610	<0.0010	0.0010	A296610
Dissolved Zinc (Zn)	mg/L	<0.0030	A296610	<0.0030	A296610	<0.0030	0.0030	A296610
RDL = Reportable Detection Limit								

BUREAU
VERITASBV Labs Job #: C151050
Report Date: 2021/09/24AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS**REGULATED METALS (CCME/AT1) - TOTAL**

BV Labs ID		ABZ425	ABZ426	ABZ427		ABZ428		
Sampling Date		2021/07/15 10:30	2021/07/15 10:45	2021/07/15 11:05		2021/07/15 11:30		
COC Number		M046356	M046356	M046356		M046356		
	UNITS	MLWQ-01	MLWQ-02	MLWQ-03	QC Batch	MLWQ-04	RDL	QC Batch
Elements								
Total Cadmium (Cd)	ug/L	<0.020	<0.020	<0.020	A289746	<0.020	0.020	A289746
Total Aluminum (Al)	mg/L	0.044	0.045	0.042	A295709	0.041	0.0030	A295709
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	A295709	<0.00060	0.00060	A295709
Total Arsenic (As)	mg/L	0.00037	0.00027	0.00026	A295709	0.00027	0.00020	A295709
Total Barium (Ba)	mg/L	0.010	0.011	0.010	A295711	0.010	0.010	A295711
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	A295709	<0.0010	0.0010	A295709
Total Boron (B)	mg/L	0.021	0.032	0.025	A295711	<0.020	0.020	A295711
Total Calcium (Ca)	mg/L	21	21	20	A295711	20	0.30	A295711
Total Chromium (Cr)	mg/L	<0.0010	0.0011	0.0015	A295709	0.0011	0.0010	A295709
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	A295709	<0.00030	0.00030	A295709
Total Copper (Cu)	mg/L	0.0057	0.0059	0.0054	A295709	0.0076	0.00020	A295709
Total Iron (Fe)	mg/L	<0.060	<0.060	<0.060	A295711	<0.060	0.060	A311106
Total Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	A295709	<0.00020	0.00020	A295709
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	A295711	<0.020	0.020	A295711
Total Magnesium (Mg)	mg/L	4.1	4.0	4.1	A295711	4.0	0.20	A295711
Total Manganese (Mn)	mg/L	0.015	0.013	0.014	A295711	0.016	0.0040	A295711
Total Molybdenum (Mo)	mg/L	<0.00020	<0.00020	<0.00020	A295709	<0.00020	0.00020	A295709
Total Nickel (Ni)	mg/L	<0.00050	0.00094	<0.00050	A295709	<0.00050	0.00050	A295709
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	A295711	<0.10	0.10	A295711
Total Potassium (K)	mg/L	0.85	0.84	0.84	A295711	0.82	0.30	A295711
Total Selenium (Se)	mg/L	0.00029	0.00031	0.00033	A295709	0.00024	0.00020	A295709
Total Silicon (Si)	mg/L	0.41	0.41	0.42	A295711	0.41	0.10	A295711
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	A295709	<0.00010	0.00010	A295709
Total Sodium (Na)	mg/L	1.8	1.8	1.7	A295711	1.7	0.50	A295711
Total Strontium (Sr)	mg/L	0.087	0.088	0.086	A295711	0.084	0.020	A295711
Total Sulphur (S)	mg/L	9.6	9.5	9.4	A295711	9.4	0.20	A295711
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	A295709	<0.00020	0.00020	A295709
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	A295709	<0.0010	0.0010	A295709
Total Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	A295709	<0.0010	0.0010	A295709
Total Uranium (U)	mg/L	0.062	0.063	0.065	A295709	0.061	0.00010	A295709
Total Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	A295709	<0.0010	0.0010	A295709
RDL = Reportable Detection Limit								



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BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ABZ425	ABZ426	ABZ427		ABZ428		
Sampling Date		2021/07/15 10:30	2021/07/15 10:45	2021/07/15 11:05		2021/07/15 11:30		
COC Number		M046356	M046356	M046356		M046356		
	UNITS	MLWQ-01	MLWQ-02	MLWQ-03	QC Batch	MLWQ-04	RDL	QC Batch
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	A295709	<0.0030	0.0030	A295709
RDL = Reportable Detection Limit								



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BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ABZ429		ABZ430		
Sampling Date		2021/07/15 11:50		2021/07/15 11:30		
COC Number		M046356		M046356		
	UNITS	MLWQ-05	QC Batch	DUP01	RDL	QC Batch
Elements						
Total Cadmium (Cd)	ug/L	<0.020	A289746	<0.020	0.020	A289746
Total Aluminum (Al)	mg/L	0.042	A295709	0.043	0.0030	A295709
Total Antimony (Sb)	mg/L	<0.00060	A295709	<0.00060	0.00060	A295709
Total Arsenic (As)	mg/L	0.00026	A295709	0.00038	0.00020	A295709
Total Barium (Ba)	mg/L	0.011	A295711	0.010	0.010	A295711
Total Beryllium (Be)	mg/L	<0.0010	A295709	<0.0010	0.0010	A295709
Total Boron (B)	mg/L	0.021	A295711	0.029	0.020	A295711
Total Calcium (Ca)	mg/L	21	A295711	21	0.30	A295711
Total Chromium (Cr)	mg/L	0.0022	A295709	0.0010	0.0010	A295709
Total Cobalt (Co)	mg/L	<0.00030	A295709	<0.00030	0.00030	A295709
Total Copper (Cu)	mg/L	0.0086	A295709	0.0078	0.00020	A295709
Total Iron (Fe)	mg/L	<0.060	A295711	<0.060	0.060	A311106
Total Lead (Pb)	mg/L	<0.00020	A295709	<0.00020	0.00020	A295709
Total Lithium (Li)	mg/L	<0.020	A295711	<0.020	0.020	A295711
Total Magnesium (Mg)	mg/L	4.2	A295711	4.3	0.20	A295711
Total Manganese (Mn)	mg/L	0.015	A295711	0.015	0.0040	A295711
Total Molybdenum (Mo)	mg/L	<0.00020	A295709	0.00021	0.00020	A295709
Total Nickel (Ni)	mg/L	<0.00050	A295709	0.00057	0.00050	A295709
Total Phosphorus (P)	mg/L	<0.10	A295711	<0.10	0.10	A295711
Total Potassium (K)	mg/L	0.86	A295711	0.83	0.30	A295711
Total Selenium (Se)	mg/L	0.00033	A295709	0.00034	0.00020	A295709
Total Silicon (Si)	mg/L	0.43	A295711	0.48	0.10	A295711
Total Silver (Ag)	mg/L	<0.00010	A295709	<0.00010	0.00010	A295709
Total Sodium (Na)	mg/L	1.8	A295711	1.8	0.50	A295711
Total Strontium (Sr)	mg/L	0.087	A295711	0.088	0.020	A295711
Total Sulphur (S)	mg/L	9.6	A295711	11	0.20	A295711
Total Thallium (Tl)	mg/L	<0.00020	A295709	<0.00020	0.00020	A295709
Total Tin (Sn)	mg/L	<0.0010	A295709	<0.0010	0.0010	A295709
Total Titanium (Ti)	mg/L	<0.0010	A295709	<0.0010	0.0010	A295709
Total Uranium (U)	mg/L	0.065	A295709	0.063	0.00010	A295709
Total Vanadium (V)	mg/L	<0.0010	A295709	<0.0010	0.0010	A295709
RDL = Reportable Detection Limit						



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BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ABZ429		ABZ430		
Sampling Date		2021/07/15 11:50		2021/07/15 11:30		
COC Number		M046356		M046356		
	UNITS	MLWQ-05	QC Batch	DUP01	RDL	QC Batch
Total Zinc (Zn)	mg/L	<0.0030	A295709	<0.0030	0.0030	A295709
RDL = Reportable Detection Limit						



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BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ABZ425	ABZ426		ABZ427		ABZ428		
Sampling Date		2021/07/15 10:30	2021/07/15 10:45		2021/07/15 11:05		2021/07/15 11:30		
COC Number		M046356	M046356		M046356		M046356		
	UNITS	MLWQ-01	MLWQ-02	QC Batch	MLWQ-03	QC Batch	MLWQ-04	RDL	QC Batch
Parameter									
Radium 226	Bq/l	0.14	0.14	A351479	0.14	A351479	0.12	0.010	A351479
RADIONUCLIDE									
Thorium-228	Bq/l	<0.010	<0.010	A365593	<0.010	A365593	<0.010	0.010	A365593
Thorium-230	Bq/l	<0.010	<0.010	A365593	<0.010	A365593	<0.010	0.010	A365593
Thorium-232	Bq/l	<0.010	<0.010	A365593	<0.010	A365593	<0.010	0.010	A365593
Uranium-234	Bq/l	1.1	1.0	A359157	1.1	A359157	1.0	0.010	A359157
Uranium-235	Bq/l	0.042	0.045	A359157	0.049	A359157	0.044	0.010	A359157
Uranium-238	Bq/l	0.95	0.85	A359157	0.96	A359157	0.88	0.010	A359157
Misc. Inorganics									
Dissolved Organic Carbon (C)	mg/L	12	10	A296295	11	A296283	11	0.50	A308671
pH	pH	6.96	6.97	A290573	6.99	A290573	6.94	N/A	A290573
Total Organic Carbon (C)	mg/L	7.8	7.5	A296306	7.8	A296306	7.5	0.50	A296306
Total Dissolved Solids	mg/L	44	<10	A295447	32	A295447	16	10	A295447
Total Suspended Solids	mg/L	<1.0	<1.0	A295456	<1.0	A295456	<1.0	1.0	A295456
Anions									
Dissolved Fluoride (F)	mg/L	0.082	0.080	A290575	0.082	A290575	0.080	0.050	A290575
Nutrients									
Total Ammonia (N)	mg/L	<0.015	<0.015	A291937	<0.015	A291054	<0.015	0.015	A291054
Physical Properties									
True Colour	PtCo units	22	18	A289883	18	A289883	18	2.0	A289883
RADIONUCLIDE									
Lead-210	Bq/l	<1.0	<1.0	A311225	<1.0	A311225	<1.0	1.0	A311225
Lead-212	Bq/l	<0.10	<0.10	A311225	<0.10	A311225	<0.10	0.10	A311225
Polonium-210	Bq/l	0.028	0.019	A359158	0.092	A359158	0.031	0.010	A359158
Radium 226	Bq/l	<1.0	<1.0	A311225	<1.0	A311225	<1.0	1.0	A311225
Radium-228	Bq/l	<0.50	<0.50	A311225	<0.50	A311225	<0.50	0.50	A311225
Thorium-230	Bq/l	<5.0	<5.0	A311225	<5.0	A311225	<5.0	5.0	A311225
Thorium-234	Bq/l	<1.0	<1.0	A311225	<1.0	A311225	<1.0	1.0	A311225
Uranium-235	Bq/l	<0.50	<0.50	A311225	<0.50	A311225	<0.50	0.50	A311225
RDL = Reportable Detection Limit									
N/A = Not Applicable									



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VERITAS

BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ABZ429		ABZ430		
Sampling Date		2021/07/15 11:50		2021/07/15 11:30		
COC Number		M046356		M046356		
	UNITS	MLWQ-05	QC Batch	DUP01	RDL	QC Batch
Parameter						
Radium 226	Bq/l	0.13	A351479	0.12	0.010	A359159
RADIONUCLIDE						
Thorium-228	Bq/l	<0.010	A365593	<0.010	0.010	A359156
Thorium-230	Bq/l	0.012	A365593	0.012	0.010	A359156
Thorium-232	Bq/l	<0.010	A365593	<0.010	0.010	A359156
Uranium-234	Bq/l	1.0	A359157	0.97	0.010	A365594
Uranium-235	Bq/l	0.041	A359157	0.041	0.010	A365594
Uranium-238	Bq/l	0.92	A359157	0.85	0.010	A365594
Misc. Inorganics						
Dissolved Organic Carbon (C)	mg/L	10	A296295	9.5	0.50	A308671
pH	pH	7.02	A290573	6.96	N/A	A290573
Total Organic Carbon (C)	mg/L	7.9	A296306	7.8	0.50	A296306
Total Dissolved Solids	mg/L	40	A295447	48	10	A295447
Total Suspended Solids	mg/L	<1.0	A295456	<1.0	1.0	A295456
Anions						
Dissolved Fluoride (F)	mg/L	0.14	A290575	0.080	0.050	A290575
Nutrients						
Total Ammonia (N)	mg/L	<0.015	A291054	<0.015	0.015	A291937
Physical Properties						
True Colour	PtCo units	19	A289883	18	2.0	A289883
RADIONUCLIDE						
Lead-210	Bq/l	<1.0	A311225	<1.0	1.0	A311225
Lead-212	Bq/l	<0.10	A311225	<0.10	0.10	A311225
Polonium-210	Bq/l	0.023	A359158	0.018	0.010	A359158
Radium 226	Bq/l	<1.0	A311225	<1.0	1.0	A311225
Radium-228	Bq/l	<0.50	A311225	<0.50	0.50	A311225
Thorium-230	Bq/l	<5.0	A311225	<5.0	5.0	A311225
Thorium-234	Bq/l	<1.0	A311225	<1.0	1.0	A311225
Uranium-235	Bq/l	<0.50	A311225	<0.50	0.50	A311225
RDL = Reportable Detection Limit						
N/A = Not Applicable						



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BV Labs Job #: C151050
Report Date: 2021/09/24

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		ABZ425	ABZ426	ABZ427	ABZ428	ABZ429	ABZ430		
Sampling Date		2021/07/15 10:30	2021/07/15 10:45	2021/07/15 11:05	2021/07/15 11:30	2021/07/15 11:50	2021/07/15 11:30		
COC Number		M046356	M046356	M046356	M046356	M046356	M046356		
	UNITS	MLWQ-01	MLWQ-02	MLWQ-03	MLWQ-04	MLWQ-05	DUP01	RDL	QC Batch
Elements									
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	<0.0019	0.0020	<0.0019	0.0019	A300129
Lab Filtered Elements									
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	0.0019	A300097
RDL = Reportable Detection Limit									



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C
Package 2	9.3°C
Package 3	6.0°C

Version 2: Report reissued to include results listed below on ML samples as per client request received 2021/08/20.

Lead-210
Polonium-210
Radium-226
Thorium-230
Uranium-238

Sample ABZ425 [MLWQ-01] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR).

Sample ABZ426 [MLWQ-02] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR).

Sample ABZ427 [MLWQ-03] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR).

Sample ABZ428 [MLWQ-04] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR).

Sample ABZ429 [MLWQ-05] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR).

Sample ABZ430 [DUP01] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR).

Sample ABZ428, Elements by ICP - Total: Test repeated.

Sample ABZ430, Elements by ICP - Total: Test repeated.

Results relate only to the items tested.

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VERITAS

BV Labs Job #: C151050

Report Date: 2021/09/24

QUALITY ASSURANCE REPORT

AECOM

Client Project #: 60608868-RAYROCK

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A289883	True Colour	2021/07/18	113	80 - 120	107	80 - 120	<2.0	PtCo units	NC	20		
A289962	Dissolved Nitrate plus Nitrite (N)	2021/07/18	NC	80 - 120	97	80 - 120	<0.010	mg/L	1.0	20		
A289962	Dissolved Nitrite (N)	2021/07/18	113	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		
A289965	Dissolved Nitrate plus Nitrite (N)	2021/07/18	118	80 - 120	100	80 - 120	<0.010	mg/L	NC	20		
A289965	Dissolved Nitrite (N)	2021/07/18	108	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
A289967	Dissolved Nitrate plus Nitrite (N)	2021/07/18	133 (1)	80 - 120	101	80 - 120	<0.010	mg/L	7.6	20		
A289967	Dissolved Nitrite (N)	2021/07/18	106	80 - 120	105	80 - 120	<0.010	mg/L	0.53	20		
A290572	Alkalinity (PP as CaCO3)	2021/07/19					<1.0	mg/L	NC	20		
A290572	Alkalinity (Total as CaCO3)	2021/07/19			97	80 - 120	<1.0	mg/L	1.6	20		
A290572	Bicarbonate (HCO3)	2021/07/19					<1.0	mg/L	1.6	20		
A290572	Carbonate (CO3)	2021/07/19					<1.0	mg/L	NC	20		
A290572	Hydroxide (OH)	2021/07/19					<1.0	mg/L	NC	20		
A290573	pH	2021/07/19			100	97 - 103			1.6	N/A		
A290574	Conductivity	2021/07/19			103	90 - 110	<2.0	uS/cm	1.8	10		
A290575	Dissolved Fluoride (F)	2021/07/19	96	80 - 120	102	80 - 120	<0.050	mg/L	NC	20		
A291054	Total Ammonia (N)	2021/07/19	89	80 - 120	96	80 - 120	<0.015	mg/L	1.6	20		
A291937	Total Ammonia (N)	2021/07/20	96	80 - 120	99	80 - 120	<0.015	mg/L	4.0	20		
A292637	Dissolved Barium (Ba)	2021/07/20	93	80 - 120	98	80 - 120	<0.010	mg/L	0.35	20		
A292637	Dissolved Boron (B)	2021/07/20	95	80 - 120	97	80 - 120	<0.020	mg/L	7.5	20		
A292637	Dissolved Calcium (Ca)	2021/07/20	NC	80 - 120	100	80 - 120	<0.30	mg/L	0.069	20		
A292637	Dissolved Iron (Fe)	2021/07/20	NC	80 - 120	113	80 - 120	<0.060	mg/L	1.4	20		
A292637	Dissolved Lithium (Li)	2021/07/20	89	80 - 120	93	80 - 120	<0.020	mg/L	1.9	20		
A292637	Dissolved Magnesium (Mg)	2021/07/20	94	80 - 120	103	80 - 120	<0.20	mg/L	3.4	20		
A292637	Dissolved Manganese (Mn)	2021/07/20	93	80 - 120	106	80 - 120	<0.0040	mg/L	1.7	20		
A292637	Dissolved Phosphorus (P)	2021/07/20	99	80 - 120	100	80 - 120	<0.10	mg/L	NC	20		
A292637	Dissolved Potassium (K)	2021/07/20	97	80 - 120	99	80 - 120	<0.30	mg/L	0.68	20		
A292637	Dissolved Silicon (Si)	2021/07/20	NC	80 - 120	99	80 - 120	<0.10	mg/L	2.0	20		
A292637	Dissolved Sodium (Na)	2021/07/20	NC	80 - 120	100	80 - 120	<0.50	mg/L	0.039	20		
A292637	Dissolved Strontium (Sr)	2021/07/20	91	80 - 120	97	80 - 120	<0.020	mg/L	0.61	20		
A292637	Dissolved Sulphur (S)	2021/07/20	100	80 - 120	101	80 - 120	<0.20	mg/L	17	20		

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BV Labs Job #: C151050

Report Date: 2021/09/24

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868-RAYROCK

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A293272	Dissolved Barium (Ba)	2021/07/21	94	80 - 120	97	80 - 120	<0.010	mg/L	16	20		
A293272	Dissolved Boron (B)	2021/07/21	97	80 - 120	100	80 - 120	<0.020	mg/L	NC	20		
A293272	Dissolved Calcium (Ca)	2021/07/21	92	80 - 120	96	80 - 120	<0.30	mg/L	0.13	20		
A293272	Dissolved Iron (Fe)	2021/07/21	101	80 - 120	101	80 - 120	<0.060	mg/L	NC	20		
A293272	Dissolved Lithium (Li)	2021/07/21	93	80 - 120	95	80 - 120	<0.020	mg/L	NC	20		
A293272	Dissolved Magnesium (Mg)	2021/07/21	90	80 - 120	96	80 - 120	<0.20	mg/L	1.4	20		
A293272	Dissolved Manganese (Mn)	2021/07/21	98	80 - 120	99	80 - 120	<0.0040	mg/L	1.6	20		
A293272	Dissolved Phosphorus (P)	2021/07/21	106	80 - 120	107	80 - 120	<0.10	mg/L	NC	20		
A293272	Dissolved Potassium (K)	2021/07/21	97	80 - 120	98	80 - 120	<0.30	mg/L	4.9	20		
A293272	Dissolved Silicon (Si)	2021/07/21	91	80 - 120	100	80 - 120	<0.10	mg/L	1.3	20		
A293272	Dissolved Sodium (Na)	2021/07/21	84	80 - 120	91	80 - 120	<0.50	mg/L	0.27	20		
A293272	Dissolved Strontium (Sr)	2021/07/21	91	80 - 120	95	80 - 120	<0.020	mg/L	2.1	20		
A293272	Dissolved Sulphur (S)	2021/07/21	109	80 - 120	104	80 - 120	<0.20	mg/L	0.13	20		
A294711	Dissolved Chloride (Cl)	2021/07/26	109	80 - 120	111	80 - 120	<1.0	mg/L	15	20		
A294711	Dissolved Sulphate (SO4)	2021/07/26	126 (1)	80 - 120	107	80 - 120	<1.0	mg/L	NC	20		
A295219	Dissolved Aluminum (Al)	2021/07/23	100	80 - 120	97	80 - 120	<0.0030	mg/L	NC	20		
A295219	Dissolved Antimony (Sb)	2021/07/23	94	80 - 120	95	80 - 120	<0.00060	mg/L	NC	20		
A295219	Dissolved Arsenic (As)	2021/07/23	97	80 - 120	97	80 - 120	<0.00020	mg/L	NC	20		
A295219	Dissolved Beryllium (Be)	2021/07/23	92	80 - 120	87	80 - 120	<0.0010	mg/L	NC	20		
A295219	Dissolved Chromium (Cr)	2021/07/23	97	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
A295219	Dissolved Cobalt (Co)	2021/07/23	98	80 - 120	98	80 - 120	<0.00030	mg/L	NC	20		
A295219	Dissolved Copper (Cu)	2021/07/23	100	80 - 120	102	80 - 120	<0.00020	mg/L	2.0	20		
A295219	Dissolved Lead (Pb)	2021/07/23	95	80 - 120	91	80 - 120	<0.00020	mg/L	0.46	20		
A295219	Dissolved Molybdenum (Mo)	2021/07/23	97	80 - 120	96	80 - 120	<0.00020	mg/L	8.8	20		
A295219	Dissolved Nickel (Ni)	2021/07/23	97	80 - 120	99	80 - 120	<0.00050	mg/L	1.4	20		
A295219	Dissolved Selenium (Se)	2021/07/23	98	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		
A295219	Dissolved Silver (Ag)	2021/07/23	91	80 - 120	91	80 - 120	<0.00010	mg/L	NC	20		
A295219	Dissolved Thallium (Tl)	2021/07/23	94	80 - 120	91	80 - 120	<0.00020	mg/L	NC	20		
A295219	Dissolved Tin (Sn)	2021/07/23	94	80 - 120	91	80 - 120	<0.0010	mg/L	NC	20		
A295219	Dissolved Titanium (Ti)	2021/07/23	99	80 - 120	88	80 - 120	<0.0010	mg/L	NC	20		
A295219	Dissolved Uranium (U)	2021/07/23	96	80 - 120	94	80 - 120	<0.00010	mg/L	3.4	20		



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Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A295219	Dissolved Vanadium (V)	2021/07/23	100	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
A295219	Dissolved Zinc (Zn)	2021/07/23	NC	80 - 120	96	80 - 120	<0.0030	mg/L	0.84	20		
A295447	Total Dissolved Solids	2021/07/23	NC	80 - 120	102	80 - 120	<10	mg/L	0.60	20		
A295456	Total Suspended Solids	2021/07/23	95	80 - 120	92	80 - 120	<1.0	mg/L	NC	20		
A295709	Total Aluminum (Al)	2021/07/26	125 (1)	80 - 120	90	80 - 120	<0.0030	mg/L	0.81	20		
A295709	Total Antimony (Sb)	2021/07/26	92	80 - 120	93	80 - 120	<0.00060	mg/L	NC	20		
A295709	Total Arsenic (As)	2021/07/26	83	80 - 120	87	80 - 120	<0.00020	mg/L	NC	20		
A295709	Total Beryllium (Be)	2021/07/26	83	80 - 120	86	80 - 120	<0.0010	mg/L	NC	20		
A295709	Total Chromium (Cr)	2021/07/26	86	80 - 120	90	80 - 120	<0.0010	mg/L	NC	20		
A295709	Total Cobalt (Co)	2021/07/26	NC	80 - 120	89	80 - 120	<0.00030	mg/L	NC	20		
A295709	Total Copper (Cu)	2021/07/26	83	80 - 120	89	80 - 120	<0.00020	mg/L	0.41	20		
A295709	Total Lead (Pb)	2021/07/26	83	80 - 120	87	80 - 120	<0.00020	mg/L	NC	20		
A295709	Total Molybdenum (Mo)	2021/07/26	91	80 - 120	89	80 - 120	<0.00020	mg/L	4.2	20		
A295709	Total Nickel (Ni)	2021/07/26	NC	80 - 120	88	80 - 120	<0.00050	mg/L	13	20		
A295709	Total Selenium (Se)	2021/07/26	85	80 - 120	91	80 - 120	<0.00020	mg/L	NC	20		
A295709	Total Silver (Ag)	2021/07/26	86	80 - 120	89	80 - 120	<0.00010	mg/L	NC	20		
A295709	Total Thallium (Tl)	2021/07/26	86	80 - 120	91	80 - 120	<0.00020	mg/L	NC	20		
A295709	Total Tin (Sn)	2021/07/26	91	80 - 120	91	80 - 120	<0.0010	mg/L	NC	20		
A295709	Total Titanium (Ti)	2021/07/26	85	80 - 120	91	80 - 120	<0.0010	mg/L	NC	20		
A295709	Total Uranium (U)	2021/07/26	80	80 - 120	81	80 - 120	<0.00010	mg/L	3.3	20		
A295709	Total Vanadium (V)	2021/07/26	87	80 - 120	89	80 - 120	<0.0010	mg/L	NC	20		
A295709	Total Zinc (Zn)	2021/07/26	81	80 - 120	87	80 - 120	<0.0030	mg/L	NC	20		
A295711	Total Barium (Ba)	2021/07/23	97	80 - 120	104	80 - 120	<0.010	mg/L	15	20		
A295711	Total Boron (B)	2021/07/23	94	80 - 120	101	80 - 120	<0.020	mg/L	NC	20		
A295711	Total Calcium (Ca)	2021/07/23	NC	80 - 120	102	80 - 120	<0.30	mg/L	0.33	20		
A295711	Total Iron (Fe)	2021/07/23	NC	80 - 120	108	80 - 120	<0.060	mg/L				
A295711	Total Lithium (Li)	2021/07/23	98	80 - 120	102	80 - 120	<0.020	mg/L	NC	20		
A295711	Total Magnesium (Mg)	2021/07/23	NC	80 - 120	106	80 - 120	<0.20	mg/L	4.1	20		
A295711	Total Manganese (Mn)	2021/07/23	NC	80 - 120	106	80 - 120	<0.0040	mg/L	8.6	20		
A295711	Total Phosphorus (P)	2021/07/23	98	80 - 120	98	80 - 120	<0.10	mg/L	NC	20		
A295711	Total Potassium (K)	2021/07/23	103	80 - 120	107	80 - 120	<0.30	mg/L	2.8	20		

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QUALITY ASSURANCE REPORT(CONT'D)

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Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A295711	Total Silicon (Si)	2021/07/23	98	80 - 120	102	80 - 120	<0.10	mg/L	14	20		
A295711	Total Sodium (Na)	2021/07/23	NC	80 - 120	101	80 - 120	<0.50	mg/L	1.9	20		
A295711	Total Strontium (Sr)	2021/07/23	NC	80 - 120	103	80 - 120	<0.020	mg/L	6.9	20		
A295711	Total Sulphur (S)	2021/07/23	NC	80 - 120	80	80 - 120	<0.20	mg/L	13	20		
A296283	Dissolved Organic Carbon (C)	2021/07/24	NC	80 - 120	104	80 - 120	<0.50	mg/L	10	20		
A296295	Dissolved Organic Carbon (C)	2021/07/24	125 (1)	80 - 120	119	80 - 120	<0.50	mg/L	NC	20		
A296306	Total Organic Carbon (C)	2021/07/24	108	80 - 120	110	80 - 120	<0.50	mg/L				
A296610	Dissolved Aluminum (Al)	2021/07/23	98	80 - 120	96	80 - 120	<0.0030	mg/L	NC	20		
A296610	Dissolved Antimony (Sb)	2021/07/23	103	80 - 120	101	80 - 120	<0.00060	mg/L	NC	20		
A296610	Dissolved Arsenic (As)	2021/07/23	100	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20		
A296610	Dissolved Beryllium (Be)	2021/07/23	93	80 - 120	90	80 - 120	<0.0010	mg/L	NC	20		
A296610	Dissolved Chromium (Cr)	2021/07/23	105	80 - 120	106	80 - 120	<0.0010	mg/L	NC	20		
A296610	Dissolved Cobalt (Co)	2021/07/23	101	80 - 120	104	80 - 120	<0.00030	mg/L	4.0	20		
A296610	Dissolved Copper (Cu)	2021/07/23	103	80 - 120	109	80 - 120	<0.00020	mg/L	15	20		
A296610	Dissolved Lead (Pb)	2021/07/23	97	80 - 120	102	80 - 120	<0.00020	mg/L	NC	20		
A296610	Dissolved Molybdenum (Mo)	2021/07/23	106	80 - 120	102	80 - 120	<0.00020	mg/L	4.5	20		
A296610	Dissolved Nickel (Ni)	2021/07/23	101	80 - 120	105	80 - 120	<0.00050	mg/L	3.0	20		
A296610	Dissolved Selenium (Se)	2021/07/23	96	80 - 120	96	80 - 120	<0.00020	mg/L	NC	20		
A296610	Dissolved Silver (Ag)	2021/07/23	98	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20		
A296610	Dissolved Thallium (Tl)	2021/07/23	100	80 - 120	102	80 - 120	<0.00020	mg/L	NC	20		
A296610	Dissolved Tin (Sn)	2021/07/23	97	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
A296610	Dissolved Titanium (Ti)	2021/07/23	102	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
A296610	Dissolved Uranium (U)	2021/07/23	101	80 - 120	103	80 - 120	<0.00010	mg/L	3.3	20		
A296610	Dissolved Vanadium (V)	2021/07/23	106	80 - 120	104	80 - 120	<0.0010	mg/L	NC	20		
A296610	Dissolved Zinc (Zn)	2021/07/23	101	80 - 120	99	80 - 120	<0.0030	mg/L	0.36	20		
A296789	Dissolved Chloride (Cl)	2021/07/24	102	80 - 120	109	80 - 120	<1.0	mg/L	13	20		
A296789	Dissolved Sulphate (SO4)	2021/07/24	NC	80 - 120	100	80 - 120	<1.0	mg/L	1.5	20		
A296924	Dissolved Chloride (Cl)	2021/07/25	NC	80 - 120	99	80 - 120	<1.0	mg/L				
A296924	Dissolved Sulphate (SO4)	2021/07/25	NC	80 - 120	107	80 - 120	<1.0	mg/L				
A300097	Dissolved Mercury (Hg)	2021/07/27	88	80 - 120	90	80 - 120	<0.0019	ug/L	NC	20		
A300129	Total Mercury (Hg)	2021/07/27	93	80 - 120	103	80 - 120	<0.0019	ug/L	NC	20		



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Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A308671	Dissolved Organic Carbon (C)	2021/08/04	114	80 - 120	102	80 - 120	<0.50	mg/L	0.36	20		
A311106	Total Iron (Fe)	2021/08/05	NC	80 - 120	108	80 - 120	<0.060	mg/L	3.1	20		
A311225	Lead-210	2021/08/02					<1.0	Bq/l			92	74 - 126
A311225	Lead-212	2021/08/02					<0.10	Bq/l			101	74 - 126
A311225	Radium 226	2021/08/02					<1.0	Bq/l			93	74 - 126
A311225	Radium-228	2021/08/02					<0.50	Bq/l			105	74 - 126
A311225	Thorium-230	2021/08/02					<5.0	Bq/l			103	74 - 126
A311225	Thorium-234	2021/08/02					<1.0	Bq/l			92	74 - 126
A311225	Uranium-235	2021/08/02					<0.50	Bq/l			107	74 - 126
A351479	Radium 226	2021/09/10			98	85 - 115	<0.010	Bq/l	NC	N/A		
A359155	Lead-210	2021/09/15			106	80 - 120	<0.10	Bq/l				
A359156	Thorium-228	2021/09/16			98	63 - 137	<0.010	Bq/l				
A359156	Thorium-230	2021/09/16			112	63 - 137	<0.010	Bq/l				
A359156	Thorium-232	2021/09/16			104	63 - 137	<0.010	Bq/l				
A359157	Uranium-234	2021/09/09			101	N/A	<0.010	Bq/L				
A359157	Uranium-235	2021/09/09			109	N/A	<0.010	Bq/L				
A359157	Uranium-238	2021/09/09			104	N/A	<0.010	Bq/L				
A359158	Polonium-210	2021/09/08			99	74 - 126	<0.010	Bq/l	NC	N/A		
A359159	Radium 226	2021/09/17			94	85 - 115	<0.010	Bq/l				
A365593	Thorium-228	2021/09/14							NC	N/A		
A365593	Thorium-230	2021/09/14							NC	N/A		
A365593	Thorium-232	2021/09/14							NC	N/A		
A365594	Uranium-234	2021/09/20							7.0	N/A		
A365594	Uranium-235	2021/09/20							0	N/A		



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Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A365594	Uranium-238	2021/09/20							NC	N/A		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



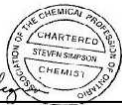
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BV Labs Job #: C151050
Report Date: 2021/09/24

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Client Project #: 60608868-RAYROCK
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Steven Simpson, Lab Director

Robert Allen, Scientific Specialist

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Sandy Yuan, M.Sc., QP, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Report Information		Comments		Analysis Requested															Same as CoC						
Company: AECOM		CALL UP NUMBER 700595655																							
Contact: Michael Zhao																			Project/LSD						
Phone: (403) 831-4629																			60608868 - RAYROCK						
Email: Michael.Zhao@AECOM.COM																			Special Instructions						
Sampled by: SS/MZ																									
Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	NITRATE	NITRITE	AMMONIA	SULPHATE	ROUTINE WATER	AMMONIUM	ARSENIC	MERCURY	Regulated Metals	Tot	Diss	COLOUR	DOC	TURB	FLUORIDE	TOTAL SUSPENDED SOLIDS	TOTAL DISSOLVED SOLIDS	NORM + POLONIUM 210	URANIUM 238	HOLD - DO NOT ANALYZE
11 MLWQ-01	1m	2021/07/15	10:30	WATER	11																				
12 MLWQ-02	1.65m		10:45		11																				
13 MLWQ-03	1.61m		11:05		11																				
14 MLWQ-04	1.2m		11:30		11																				
15 MLWQ-05	1.2m		11:50		11																				
16 MLWQ-06 DUP01	1.2m		11:30		11																				
17																									
18																									
19																									
20																									
21																									
22																									
23																									
24																									
25																									
26																									
27																									
28																									
29																									
30																									

Received in Yellowknife
By: J. McLean
@ 8:00 PM
JUL 16 2021

Temp: 1 / 1

ICE - YES / SEE ACTR
CS - NO

NORM PACKAGE
+ POLONIUM 210
+ URANIUM 238
TO BE RUN BY
ALPHA SPECTROMETRY

 RADIONUCLIDE
REQUESTED DETECTION
LIMITS (Bq/L)
 LEAD-210 : 0.1
 POLONIUM-210 : 0.01
 RADIUM 226 : 0.01
 THORIUM 230 : 0.01
 URANIUM 238 : 0.01

Please indicate Filtered, Preserved or Both (F, P, F/P)																									
Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #																			
<u>[Signature]</u> STEFANO SERAPAZZON	2021/07/15	19:00	<u>[Signature]</u> Stanley P Thorne	2021/07/17	16:00	C151050																			

MEAL Temp - SEE ACTR



Your P.O. #: 700595655
 Your Project #: 60608868-RAYROCK
 Site Location: Rayrock
 Your C.O.C. #: M046362

Attention: Michael Zhao

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/08/09

Report #: R3056006

Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151306

Received: 2021/07/17, 09:30

Sample Matrix: Water
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH (1)	4	N/A	2021/07/20	AB SOP-00005	SM 23 2320 B m
Cadmium - low level CCME (Total) (1)	4	N/A	2021/07/25		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	4	N/A	2021/07/27	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
Carbon (DOC) (1, 3)	3	N/A	2021/07/24	AB SOP-00087	MMCW 119 1996 m
Carbon (DOC) (1, 3)	1	N/A	2021/08/04	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	4	N/A	2021/07/20	AB SOP-00005	SM 23 2510 B m
Fluoride (1)	4	N/A	2021/07/20	AB SOP-00005	SM 23 4500-F C m
Hardness (1)	4	N/A	2021/07/21		Auto Calc
Mercury (Total) by CV (1)	4	2021/07/27	2021/07/27	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP-Dissolved-Lab Filtered (1, 4)	4	N/A	2021/07/21	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	4	2021/07/23	2021/07/24	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Total (1)	4	2021/07/23	2021/07/24	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	4	N/A	2021/07/27		Auto Calc
Ammonia-N (Total) (1)	3	N/A	2021/07/22	AB SOP-00007	SM 23 4500 NH ₃ A G m
Ammonia-N (Total) (1)	1	N/A	2021/07/24	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate and Nitrite (1)	4	N/A	2021/07/20		Auto Calc
NO ₂ (N); NO ₂ (N) + NO ₃ (N) in Water (1)	4	N/A	2021/07/19	AB SOP-00091	SM 23 4500 NO ₃ m
Nitrate (as N) (1)	4	2021/07/19	2021/07/20		Auto Calc
pH @25°C (1, 5)	4	N/A	2021/07/20	AB SOP-00005	SM 23 4500-H+B m
Total Dissolved Solids (Filt. Residue) (1)	4	2021/07/22	2021/07/22	AB SOP-00065	SM 23 2540 C m
Total Dissolved Solids (Calculated) (1)	4	N/A	2021/07/27		Auto Calc
Carbon (Total Organic) (1, 6)	3	N/A	2021/07/24	AB SOP-00087	MMCW 119 1996 m
Carbon (Total Organic) (1, 6)	1	N/A	2021/08/04	AB SOP-00087	MMCW 119 1996 m
Total Phosphorus (1)	4	2021/07/22	2021/07/24	AB SOP-00024	SM 23 4500-P A,B,F m
Total Suspended Solids (NFR) (1)	4	2021/07/23	2021/07/23	AB SOP-00061	SM 23 2540 D m
Turbidity (1)	4	N/A	2021/07/19	CAL SOP-00081	SM 23 2130 B m
Lead 210 (2)	3	N/A	2021/08/04	BQL SOP-00008	GFPC
Lead 210 (2)	1	N/A	2021/08/08	BQL SOP-00008	GFPC
Polonium-210 by Alpha Spectrometry (2)	2	N/A	2021/07/31	BQL SOP-00006	Alpha Spectrometry
Polonium-210 by Alpha Spectrometry (2)	2	N/A	2021/08/04	BQL SOP-00006	Alpha Spectrometry



Your P.O. #: 700595655
Your Project #: 60608868-RAYROCK
Site Location: Rayrock
Your C.O.C. #: M046362

Attention: Michael Zhao

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Report Date: 2021/08/09
Report #: R3056006
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151306

Received: 2021/07/17, 09:30

Sample Matrix: Water
Samples Received: 4

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Radium Isotopes by Alpha Spectrometry (2, 7)	4	N/A	2021/08/05	BQL SOP-00006	Alpha Spectrometer
Thorium Isotopes by Alpha Spectrometry (2)	4	N/A	2021/08/05	BQL SOP-00006	Alpha Spectrometer
Uranium Isotopes by Alpha Spectrometry (2)	2	N/A	2021/08/03	BQL SOP-00006	Alpha Spectrometry
Uranium Isotopes by Alpha Spectrometry (2)	2	N/A	2021/08/04	BQL SOP-00006	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary Environmental
- (2) This test was performed by Bureau Veritas Kitimat (From Calgary)
- (3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.
- (6) TOC present in the sample should be considered as non-purgeable TOC.
- (7) Radium-226 results have not been corrected for blanks.



Your P.O. #: 700595655
Your Project #: 60608868-RAYROCK
Site Location: Rayrock
Your C.O.C. #: M046362

Attention: Michael Zhao

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Report Date: 2021/08/09
Report #: R3056006
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151306

Received: 2021/07/17, 09:30

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas

09 Aug 2021 16:14:18

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Key Account Specialist

Email: Parminder.Virk@bureauveritas.com

Phone# (403)735-2235

=====

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BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		ACB041		ACB042		ACB043		
Sampling Date		2021/07/16 14:20		2021/07/16 14:45		2021/07/16 15:10		
COC Number		M046362		M046362		M046362		
	UNITS	RR-2021-00001-001	QC Batch	RR-2021-00001-007	QC Batch	RR-2021-00001-009	RDL	QC Batch
Calculated Parameters								
Hardness (CaCO ₃)	mg/L	36	A290451	36	A290451	36	0.50	A290451
Ion Balance (% Difference)	%	NC	A290452	NC	A290452	NC	N/A	A290452
Dissolved Nitrate (N)	mg/L	<0.010	A290456	<0.010	A290456	<0.010	0.010	A290456
Dissolved Nitrate (NO ₃)	mg/L	<0.044	A290454	<0.044	A290454	<0.044	0.044	A290454
Dissolved Nitrite (NO ₂)	mg/L	<0.033	A290454	<0.033	A290454	<0.033	0.033	A290454
Calculated Total Dissolved Solids	mg/L	60	A290457	68	A290457	67	10	A290457
Misc. Inorganics								
Conductivity	uS/cm	110	A292428	110	A292428	110	2.0	A292428
pH	pH	7.04	A292427	7.09	A292427	7.22	N/A	A292427
Anions								
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	A292426	<1.0	A292426	<1.0	1.0	A292426
Alkalinity (Total as CaCO ₃)	mg/L	68	A292426	77	A292426	75	1.0	A292426
Bicarbonate (HCO ₃)	mg/L	83	A292426	94	A292426	92	1.0	A292426
Carbonate (CO ₃)	mg/L	<1.0	A292426	<1.0	A292426	<1.0	1.0	A292426
Hydroxide (OH)	mg/L	<1.0	A292426	<1.0	A292426	<1.0	1.0	A292426
Dissolved Chloride (Cl)	mg/L	1.4	A298441	2.3	A298281	1.9	1.0	A298430
Dissolved Sulphate (SO ₄)	mg/L	<1.0	A298441	2.1	A298281	2.4	1.0	A298430
Nutrients								
Dissolved Nitrite (N)	mg/L	<0.010	A290671	<0.010	A290671	<0.010	0.010	A290671
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	A290671	<0.010	A290671	<0.010	0.010	A290671
Lab Filtered Elements								
Dissolved Calcium (Ca)	mg/L	7.0	A293242	7.2	A293242	7.2	0.30	A293242
Dissolved Iron (Fe)	mg/L	<0.060	A293242	<0.060	A293242	<0.060	0.060	A293242
Dissolved Magnesium (Mg)	mg/L	4.6	A293242	4.4	A293242	4.4	0.20	A293242
Dissolved Manganese (Mn)	mg/L	<0.0040	A293242	<0.0040	A293242	<0.0040	0.0040	A293242
Dissolved Potassium (K)	mg/L	1.5	A293242	1.5	A293242	1.5	0.30	A293242
Dissolved Sodium (Na)	mg/L	4.2	A293242	4.1	A293242	4.1	0.50	A293242
RDL = Reportable Detection Limit N/A = Not Applicable								



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BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		ACB045		
Sampling Date		2021/07/16 16:20		
COC Number		M046362		
	UNITS	RR-2021-00001-005	RDL	QC Batch
Calculated Parameters				
Hardness (CaCO ₃)	mg/L	37	0.50	A290451
Ion Balance (% Difference)	%	NC	N/A	A290452
Dissolved Nitrate (N)	mg/L	<0.010	0.010	A290456
Dissolved Nitrate (NO ₃)	mg/L	<0.044	0.044	A290454
Dissolved Nitrite (NO ₂)	mg/L	<0.033	0.033	A290454
Calculated Total Dissolved Solids	mg/L	69	10	A290457
Misc. Inorganics				
Conductivity	uS/cm	110	2.0	A292428
pH	pH	7.12	N/A	A292427
Anions				
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	A292426
Alkalinity (Total as CaCO ₃)	mg/L	78	1.0	A292426
Bicarbonate (HCO ₃)	mg/L	95	1.0	A292426
Carbonate (CO ₃)	mg/L	<1.0	1.0	A292426
Hydroxide (OH)	mg/L	<1.0	1.0	A292426
Dissolved Chloride (Cl)	mg/L	1.8	1.0	A298441
Dissolved Sulphate (SO ₄)	mg/L	2.8	1.0	A298441
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A290671
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	0.010	A290671
Lab Filtered Elements				
Dissolved Calcium (Ca)	mg/L	7.4	0.30	A293242
Dissolved Iron (Fe)	mg/L	0.23	0.060	A293242
Dissolved Magnesium (Mg)	mg/L	4.5	0.20	A293242
Dissolved Manganese (Mn)	mg/L	0.0090	0.0040	A293242
Dissolved Potassium (K)	mg/L	1.3	0.30	A293242
Dissolved Sodium (Na)	mg/L	4.2	0.50	A293242
RDL = Reportable Detection Limit N/A = Not Applicable				



BUREAU
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BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACB041	ACB042	ACB043	ACB045		
Sampling Date		2021/07/16 14:20	2021/07/16 14:45	2021/07/16 15:10	2021/07/16 16:20		
COC Number		M046362	M046362	M046362	M046362		
	UNITS	RR-2021-00001-001	RR-2021-00001-007	RR-2021-00001-009	RR-2021-00001-005	RDL	QC Batch
Elements							
Total Cadmium (Cd)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A291013
Total Aluminum (Al)	mg/L	0.049	0.040	0.044	0.038	0.0030	A296659
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	A296659
Total Arsenic (As)	mg/L	0.00049	0.00060	0.00056	0.00066	0.00020	A296659
Total Barium (Ba)	mg/L	<0.010	<0.010	<0.010	<0.010	0.010	A296661
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A296659
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	A296661
Total Calcium (Ca)	mg/L	9.7	9.9	9.6	10	0.30	A296661
Total Chromium (Cr)	mg/L	0.0010	0.0013	0.0013	0.0018	0.0010	A296659
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	0.00030	A296659
Total Copper (Cu)	mg/L	0.0019	0.0019	0.0019	0.0061	0.00020	A296659
Total Iron (Fe)	mg/L	0.083	0.095	0.068	0.15	0.060	A296661
Total Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A296659
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	A296661
Total Magnesium (Mg)	mg/L	5.1	5.3	5.1	5.3	0.20	A296661
Total Manganese (Mn)	mg/L	0.012	0.014	0.012	0.0050	0.0040	A296661
Total Molybdenum (Mo)	mg/L	0.00039	0.00029	0.00022	0.00042	0.00020	A296659
Total Nickel (Ni)	mg/L	0.00060	0.00071	0.00088	0.00060	0.00050	A296659
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	<0.10	0.10	A296661
Total Potassium (K)	mg/L	1.5	1.6	1.5	1.4	0.30	A296661
Total Selenium (Se)	mg/L	<0.00020	<0.00020	<0.00020	0.00025	0.00020	A296659
Total Silicon (Si)	mg/L	0.48	0.49	0.42	0.36	0.10	A296661
Total Silver (Ag)	mg/L	<0.00010	0.00011	<0.00010	<0.00010	0.00010	A296659
Total Sodium (Na)	mg/L	4.0	4.1	4.0	4.1	0.50	A296661
Total Strontium (Sr)	mg/L	0.046	0.047	0.045	0.049	0.020	A296661
Total Sulphur (S)	mg/L	0.89	0.92	0.85	1.1	0.20	A296661
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A296659
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A296659
Total Titanium (Ti)	mg/L	0.0020	0.0039	0.0021	0.0012	0.0010	A296659
Total Uranium (U)	mg/L	0.00054	0.00059	0.00057	0.0020	0.00010	A296659
Total Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A296659
RDL = Reportable Detection Limit							



BUREAU
VERITAS

BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACB041	ACB042	ACB043	ACB045		
Sampling Date		2021/07/16 14:20	2021/07/16 14:45	2021/07/16 15:10	2021/07/16 16:20		
COC Number		M046362	M046362	M046362	M046362		
	UNITS	RR-2021-00001-001	RR-2021-00001-007	RR-2021-00001-009	RR-2021-00001-005	RDL	QC Batch
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	A296659
RDL = Reportable Detection Limit							

BUREAU
VERITASBV Labs Job #: C151306
Report Date: 2021/08/09AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655**RESULTS OF CHEMICAL ANALYSES OF WATER**

BV Labs ID		ACB041		ACB042		ACB043		
Sampling Date		2021/07/16 14:20		2021/07/16 14:45		2021/07/16 15:10		
COC Number		M046362		M046362		M046362		
	UNITS	RR-2021-00001-001	QC Batch	RR-2021-00001-007	QC Batch	RR-2021-00001-009	RDL	QC Batch
Parameter								
Radium 226	Bq/l	<0.010	A314579	<0.010	A314579	<0.010	0.010	A314579
RADIONUCLIDE								
Thorium-230	Bq/l	<0.010	A314581	<0.010	A314581	<0.010	0.010	A314581
Uranium-238	Bq/l	0.018	A314580	<0.010	A314580	<0.010	0.010	A314580
Misc. Inorganics								
Dissolved Organic Carbon (C)	mg/L	13	A296300	12	A296300	13	0.50	A296300
Total Organic Carbon (C)	mg/L	9.3	A296313	9.3	A296313	9.3	0.50	A296313
Total Dissolved Solids	mg/L	24	A294171	84	A294171	110	10	A294171
Total Suspended Solids	mg/L	<1.0	A295458	<1.0	A295458	2.3	1.0	A295461
Anions								
Dissolved Fluoride (F)	mg/L	0.18	A292429	0.23	A292429	0.18	0.050	A292429
Nutrients								
Total Ammonia (N)	mg/L	0.017	A297058	<0.015	A294589	<0.015	0.015	A294589
Total Phosphorus (P)	mg/L	0.013	A294511	0.0097	A294511	0.012	0.0030	A294511
RADIONUCLIDE								
Lead-210	Bq/l	<0.10	A314577	<0.10	A314577	<0.10	0.10	A314577
Polonium-210	Bq/l	<0.010	A314578	<0.010	A314578	<0.010	0.010	A314578
Physical Properties								
Turbidity	NTU	1.9	A290498	1.5	A290498	1.7	0.10	A290498
RDL = Reportable Detection Limit								



BUREAU
VERITAS

BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ACB045		
Sampling Date		2021/07/16 16:20		
COC Number		M046362		
	UNITS	RR-2021-00001-005	RDL	QC Batch
Parameter				
Radium 226	Bq/l	0.055	0.010	A314579
RADIONUCLIDE				
Thorium-230	Bq/l	0.033	0.010	A314581
Uranium-238	Bq/l	0.033	0.010	A314580
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	12	0.50	A308671
Total Organic Carbon (C)	mg/L	13	0.50	A309275
Total Dissolved Solids	mg/L	<10	10	A294171
Total Suspended Solids	mg/L	1.3	1.0	A295461
Anions				
Dissolved Fluoride (F)	mg/L	0.20	0.050	A292429
Nutrients				
Total Ammonia (N)	mg/L	<0.015	0.015	A294589
Total Phosphorus (P)	mg/L	0.012	0.0030	A294511
RADIONUCLIDE				
Lead-210	Bq/l	<0.10	0.10	A314577
Polonium-210	Bq/l	0.018	0.010	A314578
Physical Properties				
Turbidity	NTU	1.1	0.10	A290498
RDL = Reportable Detection Limit				



BUREAU
VERITAS

BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		ACB041	ACB042	ACB043	ACB045		
Sampling Date		2021/07/16 14:20	2021/07/16 14:45	2021/07/16 15:10	2021/07/16 16:20		
COC Number		M046362	M046362	M046362	M046362		
	UNITS	RR-2021-00001-001	RR-2021-00001-007	RR-2021-00001-009	RR-2021-00001-005	RDL	QC Batch

Elements							
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	<0.0019	0.0019	A300129

RDL = Reportable Detection Limit



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BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	10.7°C
Package 2	12.7°C
Package 3	7.3°C
Package 4	6.7°C

Results relate only to the items tested.

BUREAU
VERITAS

BV Labs Job #: C151306

Report Date: 2021/08/09

QUALITY ASSURANCE REPORT

AECOM

Client Project #: 60608868-RAYROCK

Site Location: Rayrock

Your P.O. #: 700595655

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A290498	Turbidity	2021/07/19			102	80 - 120	<0.10	NTU	5.9	20		
A290671	Dissolved Nitrate plus Nitrite (N)	2021/07/19	131 (1)	80 - 120	101	80 - 120	<0.010	mg/L	8.2	20		
A290671	Dissolved Nitrite (N)	2021/07/19	112	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
A292426	Alkalinity (PP as CaCO ₃)	2021/07/20					<1.0	mg/L	NC	20		
A292426	Alkalinity (Total as CaCO ₃)	2021/07/20			94	80 - 120	<1.0	mg/L	8.5	20		
A292426	Bicarbonate (HCO ₃)	2021/07/20					<1.0	mg/L	8.5	20		
A292426	Carbonate (CO ₃)	2021/07/20					<1.0	mg/L	NC	20		
A292426	Hydroxide (OH)	2021/07/20					<1.0	mg/L	NC	20		
A292427	pH	2021/07/20			100	97 - 103			0.84	N/A		
A292428	Conductivity	2021/07/20			105	90 - 110	<2.0	uS/cm	0	10		
A292429	Dissolved Fluoride (F)	2021/07/20	101	80 - 120	105	80 - 120	<0.050	mg/L	3.2	20		
A293242	Dissolved Calcium (Ca)	2021/07/21	100	80 - 120	99	80 - 120	<0.30	mg/L	2.7	20		
A293242	Dissolved Iron (Fe)	2021/07/21	100	80 - 120	102	80 - 120	<0.060	mg/L	NC	20		
A293242	Dissolved Magnesium (Mg)	2021/07/21	108	80 - 120	100	80 - 120	<0.20	mg/L	0.73	20		
A293242	Dissolved Manganese (Mn)	2021/07/21	97	80 - 120	103	80 - 120	<0.0040	mg/L	2.9	20		
A293242	Dissolved Potassium (K)	2021/07/21	106	80 - 120	100	80 - 120	<0.30	mg/L	6.3	20		
A293242	Dissolved Sodium (Na)	2021/07/21	104	80 - 120	101	80 - 120	<0.50	mg/L	3.2	20		
A294171	Total Dissolved Solids	2021/07/22	NC	80 - 120	98	80 - 120	<10	mg/L	4.3	20		
A294511	Total Phosphorus (P)	2021/07/24	106	80 - 120	115	80 - 120	<0.0030	mg/L	8.6	20	97	80 - 120
A294589	Total Ammonia (N)	2021/07/22	96	80 - 120	100	80 - 120	<0.015	mg/L	NC	20		
A295458	Total Suspended Solids	2021/07/23	97	80 - 120	98	80 - 120	<1.0	mg/L	NC	20		
A295461	Total Suspended Solids	2021/07/23	90	80 - 120	99	80 - 120	<1.0	mg/L	12	20		
A296300	Dissolved Organic Carbon (C)	2021/07/24	120	80 - 120	109	80 - 120	<0.50	mg/L	11	20		
A296313	Total Organic Carbon (C)	2021/07/24	109	80 - 120	109	80 - 120	<0.50	mg/L	1.4	20		
A296659	Total Aluminum (Al)	2021/07/24	82	80 - 120	109	80 - 120	<0.0030	mg/L	NC	20		
A296659	Total Antimony (Sb)	2021/07/24	105	80 - 120	118	80 - 120	<0.00060	mg/L	NC	20		
A296659	Total Arsenic (As)	2021/07/24	92	80 - 120	106	80 - 120	<0.00020	mg/L	NC	20		
A296659	Total Beryllium (Be)	2021/07/24	85	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
A296659	Total Chromium (Cr)	2021/07/24	96	80 - 120	107	80 - 120	<0.0010	mg/L	NC	20		
A296659	Total Cobalt (Co)	2021/07/24	97	80 - 120	108	80 - 120	<0.00030	mg/L	NC	20		
A296659	Total Copper (Cu)	2021/07/24	98	80 - 120	110	80 - 120	<0.00020	mg/L	NC	20		
A296659	Total Lead (Pb)	2021/07/24	96	80 - 120	108	80 - 120	<0.00020	mg/L	NC	20		

BUREAU
VERITAS

BV Labs Job #: C151306

Report Date: 2021/08/09

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868-RAYROCK

Site Location: Rayrock

Your P.O. #: 700595655

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A296659	Total Molybdenum (Mo)	2021/07/24	101	80 - 120	110	80 - 120	<0.00020	mg/L	NC	20		
A296659	Total Nickel (Ni)	2021/07/24	96	80 - 120	107	80 - 120	<0.00050	mg/L	14	20		
A296659	Total Selenium (Se)	2021/07/24	92	80 - 120	108	80 - 120	<0.00020	mg/L	NC	20		
A296659	Total Silver (Ag)	2021/07/24	98	80 - 120	107	80 - 120	<0.00010	mg/L	NC	20		
A296659	Total Thallium (Tl)	2021/07/24	102	80 - 120	113	80 - 120	<0.00020	mg/L	NC	20		
A296659	Total Tin (Sn)	2021/07/24	96	80 - 120	107	80 - 120	<0.0010	mg/L	NC	20		
A296659	Total Titanium (Ti)	2021/07/24	95	80 - 120	108	80 - 120	<0.0010	mg/L	NC	20		
A296659	Total Uranium (U)	2021/07/24	100	80 - 120	111	80 - 120	<0.00010	mg/L	NC	20		
A296659	Total Vanadium (V)	2021/07/24	96	80 - 120	107	80 - 120	<0.0010	mg/L	NC	20		
A296659	Total Zinc (Zn)	2021/07/24	91	80 - 120	116	80 - 120	<0.0030	mg/L	NC	20		
A296661	Total Barium (Ba)	2021/07/24	91	80 - 120	102	80 - 120	<0.010	mg/L	NC	20		
A296661	Total Boron (B)	2021/07/24	93	80 - 120	103	80 - 120	<0.020	mg/L	NC	20		
A296661	Total Calcium (Ca)	2021/07/24	NC	80 - 120	104	80 - 120	<0.30	mg/L	NC	20		
A296661	Total Iron (Fe)	2021/07/24	NC	80 - 120	107	80 - 120	<0.060	mg/L	NC	20		
A296661	Total Lithium (Li)	2021/07/24	93	80 - 120	105	80 - 120	<0.020	mg/L	NC	20		
A296661	Total Magnesium (Mg)	2021/07/24	90	80 - 120	105	80 - 120	<0.20	mg/L	NC	20		
A296661	Total Manganese (Mn)	2021/07/24	93	80 - 120	104	80 - 120	<0.0040	mg/L	NC	20		
A296661	Total Phosphorus (P)	2021/07/24	88	80 - 120	98	80 - 120	<0.10	mg/L	NC	20		
A296661	Total Potassium (K)	2021/07/24	94	80 - 120	106	80 - 120	<0.30	mg/L	NC	20		
A296661	Total Silicon (Si)	2021/07/24	92	80 - 120	103	80 - 120	<0.10	mg/L	3.7	20		
A296661	Total Sodium (Na)	2021/07/24	91	80 - 120	104	80 - 120	<0.50	mg/L	NC	20		
A296661	Total Strontium (Sr)	2021/07/24	87	80 - 120	100	80 - 120	<0.020	mg/L	NC	20		
A296661	Total Sulphur (S)	2021/07/24	85	80 - 120	97	80 - 120	<0.20	mg/L	NC	20		
A297058	Total Ammonia (N)	2021/07/24	108	80 - 120	102	80 - 120	<0.015	mg/L	NC	20		
A298281	Dissolved Chloride (Cl)	2021/07/26	NC	80 - 120	111	80 - 120	<1.0	mg/L				
A298281	Dissolved Sulphate (SO4)	2021/07/26	125 (1)	80 - 120	101	80 - 120	<1.0	mg/L				
A298430	Dissolved Chloride (Cl)	2021/07/27	NC	80 - 120	112	80 - 120	<1.0	mg/L	1.7	20		
A298430	Dissolved Sulphate (SO4)	2021/07/27	NC	80 - 120	105	80 - 120	<1.0	mg/L	12	20		
A298441	Dissolved Chloride (Cl)	2021/07/27	117	80 - 120	113	80 - 120	<1.0	mg/L	0.87	20		
A298441	Dissolved Sulphate (SO4)	2021/07/27	115	80 - 120	105	80 - 120	<1.0	mg/L	4.9	20		
A300129	Total Mercury (Hg)	2021/07/27	93	80 - 120	103	80 - 120	<0.0019	ug/L	NC	20		
A308671	Dissolved Organic Carbon (C)	2021/08/04	114	80 - 120	102	80 - 120	<0.50	mg/L	0.36	20		



BUREAU
VERITAS

BV Labs Job #: C151306

Report Date: 2021/08/09

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868-RAYROCK

Site Location: Rayrock

Your P.O. #: 700595655

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A309275	Total Organic Carbon (C)	2021/08/04	NC	80 - 120	111	80 - 120	<0.50	mg/L	6.3	20		
A314577	Lead-210	2021/08/04			111	80 - 120	<0.10	Bq/l				
A314578	Polonium-210	2021/07/31			100	74 - 126	<0.010	Bq/l				
A314579	Radium 226	2021/08/04			94	85 - 115	<0.010	Bq/l				
A314580	Uranium-238	2021/08/01			101	N/A	<0.010	Bq/L				
A314581	Thorium-230	2021/07/28			105	63 - 137	<0.010	Bq/l				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



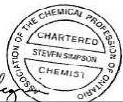
BUREAU
VERITAS

BV Labs Job #: C151306
Report Date: 2021/08/09

AECOM
Client Project #: 60608868-RAYROCK
Site Location: Rayrock
Your P.O. #: 700595655

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Steven Simpson, Lab Director

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Sandy Yuan, M.Sc., QP, Scientific Specialist

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[illegible]



Your P.O. #: 700595655
 Your Project #: 60608868
 Site Location: Rayrock, NT
 Your C.O.C. #: m086003

Attention: MICHAEL ZHAO

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/08/09

Report #: R3056009

Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151729

Received: 2021/07/19, 08:00

Sample Matrix: Water
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH (1)	4	N/A	2021/07/22	AB SOP-00005	SM 23 2320 B m
Cadmium - low level CCME (Total) (1)	4	N/A	2021/07/27		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	4	N/A	2021/07/27	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
Carbon (DOC) (1, 3)	3	N/A	2021/07/25	AB SOP-00087	MMCW 119 1996 m
Carbon (DOC) (1, 3)	1	N/A	2021/08/06	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	4	N/A	2021/07/22	AB SOP-00005	SM 23 2510 B m
Fluoride (1)	4	N/A	2021/07/22	AB SOP-00005	SM 23 4500-F C m
Hardness (1)	4	N/A	2021/07/22		Auto Calc
Mercury (Total) by CV (1)	2	2021/07/27	2021/07/27	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	2	2021/07/27	2021/07/28	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP-Dissolved-Lab Filtered (1, 4)	4	N/A	2021/07/22	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	4	2021/07/26	2021/07/26	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Total (1)	4	2021/07/26	2021/07/26	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	4	N/A	2021/07/27		Auto Calc
Ammonia-N (Total) (1)	4	N/A	2021/07/25	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate and Nitrite (1)	4	N/A	2021/07/23		Auto Calc
NO ₂ (N); NO ₂ (N) + NO ₃ (N) in Water (1)	4	N/A	2021/07/21	AB SOP-00091	SM 23 4500 NO ₃ m
Nitrate (as N) (1)	4	2021/07/21	2021/07/23		Auto Calc
pH @25°C (1, 5)	4	N/A	2021/07/22	AB SOP-00005	SM 23 4500-H+B m
Total Dissolved Solids (Filt. Residue) (1)	4	2021/07/23	2021/07/23	AB SOP-00065	SM 23 2540 C m
Total Dissolved Solids (Calculated) (1)	4	N/A	2021/07/27		Auto Calc
Carbon (Total Organic) (1, 6)	2	N/A	2021/07/25	AB SOP-00087	MMCW 119 1996 m
Carbon (Total Organic) (1, 6)	1	N/A	2021/07/26	AB SOP-00087	MMCW 119 1996 m
Carbon (Total Organic) (1, 6)	1	N/A	2021/08/06	AB SOP-00087	MMCW 119 1996 m
Total Phosphorus (1)	4	2021/07/25	2021/07/26	AB SOP-00024	SM 23 4500-P A,B,F m
Total Suspended Solids (NFR) (1)	4	2021/07/25	2021/07/25	AB SOP-00061	SM 23 2540 D m
Turbidity (1)	4	N/A	2021/07/21	CAL SOP-00081	SM 23 2130 B m
Lead 210 (2)	3	N/A	2021/08/04	BQL SOP-00008	GFPC
Lead 210 (2)	1	N/A	2021/08/08	BQL SOP-00008	GFPC
Polonium-210 by Alpha Spectrometry (2)	4	N/A	2021/07/31	BQL SOP-00006	Alpha Spectrometry



Your P.O. #: 700595655
 Your Project #: 60608868
 Site Location: Rayrock, NT
 Your C.O.C. #: m086003

Attention: MICHAEL ZHAO

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/08/09
 Report #: R3056009
 Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151729

Received: 2021/07/19, 08:00

Sample Matrix: Water
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Radium Isotopes by Alpha Spectrometry (2, 7)	4	N/A	2021/08/05	BQL SOP-00006	Alpha Spectrometer
Thorium Isotopes by Alpha Spectrometry (2)	3	N/A	2021/07/29	BQL SOP-00006	Alpha Spectrometer
Thorium Isotopes by Alpha Spectrometry (2)	1	N/A	2021/08/02	BQL SOP-00006	Alpha Spectrometer
Uranium Isotopes by Alpha Spectrometry (2)	4	N/A	2021/08/03	BQL SOP-00006	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary Environmental
- (2) This test was performed by Bureau Veritas Kitimat (From Calgary)
- (3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.
- (6) TOC present in the sample should be considered as non-purgeable TOC.
- (7) Radium-226 results have not been corrected for blanks.



Your P.O. #: 700595655
Your Project #: 60608868
Site Location: Rayrock, NT
Your C.O.C. #: m086003

Attention: MICHAEL ZHAO

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Report Date: 2021/08/09
Report #: R3056009
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151729

Received: 2021/07/19, 08:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Key Account Specialist

Email: Parminder.Virk@bureauveritas.com

Phone# (403)735-2235

=====

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BUREAU
VERITAS

BV Labs Job #: C151729

Report Date: 2021/08/09

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		ACD805	ACD806	ACD807	ACD808		
Sampling Date		2021/07/18 10:10	2021/07/18 11:15	2021/07/18 17:00	2021/07/18 14:15		
COC Number		m086003	m086003	m086003	m086003		
	UNITS	RR-2021-00001-004	RR-2021-00001-006	RR-2021-00001-010	RR-2021-00001-011	RDL	QC Batch

Calculated Parameters

Hardness (CaCO ₃)	mg/L	70	44	<0.50	45	0.50	A292991
Ion Balance (% Difference)	%	NC	NC	NC	NC	N/A	A292992
Dissolved Nitrate (N)	mg/L	<0.010	<0.010	<0.010	<0.010	0.010	A292911
Dissolved Nitrate (NO ₃)	mg/L	<0.044	<0.044	<0.044	<0.044	0.044	A292909
Dissolved Nitrite (NO ₂)	mg/L	<0.033	<0.033	<0.033	<0.033	0.033	A292909
Calculated Total Dissolved Solids	mg/L	78	60	<10	50	10	A292995

Misc. Inorganics

Conductivity	uS/cm	140	100	<2.0	93	2.0	A294891
pH	pH	6.96	6.85	5.22	6.74	N/A	A294890

Anions

Alkalinity (PP as CaCO ₃)	mg/L	<1.0	<1.0	<1.0	<1.0	1.0	A294885
Alkalinity (Total as CaCO ₃)	mg/L	68	64	<1.0	46	1.0	A294885
Bicarbonate (HCO ₃)	mg/L	83	78	<1.0	57	1.0	A294885
Carbonate (CO ₃)	mg/L	<1.0	<1.0	<1.0	<1.0	1.0	A294885
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	<1.0	1.0	A294885
Dissolved Chloride (Cl)	mg/L	2.3	1.4	<1.0	<1.0	1.0	A299157
Dissolved Sulphate (SO ₄)	mg/L	4.3 (1)	<1.0	<1.0	2.7	1.0	A299157

Nutrients

Dissolved Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	0.010	A294032
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	0.010	A294032

Lab Filtered Elements

Dissolved Calcium (Ca)	mg/L	16	9.1	<0.30	11	0.30	A294687
Dissolved Iron (Fe)	mg/L	1.3	<0.060	<0.060	0.31	0.060	A294687
Dissolved Magnesium (Mg)	mg/L	7.5	5.2	<0.20	4.4	0.20	A294687
Dissolved Manganese (Mn)	mg/L	0.020	<0.0040	<0.0040	0.013	0.0040	A294687
Dissolved Potassium (K)	mg/L	1.5	1.7	<0.30	0.82	0.30	A294687
Dissolved Sodium (Na)	mg/L	4.9	4.0	<0.50	2.7	0.50	A294687

RDL = Reportable Detection Limit

N/A = Not Applicable

(1) Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.

BUREAU
VERITASBV Labs Job #: C151729
Report Date: 2021/08/09AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACD805	ACD806	ACD807	ACD808		
Sampling Date		2021/07/18 10:10	2021/07/18 11:15	2021/07/18 17:00	2021/07/18 14:15		
COC Number		m086003	m086003	m086003	m086003		
	UNITS	RR-2021-00001-004	RR-2021-00001-006	RR-2021-00001-010	RR-2021-00001-011	RDL	QC Batch

Elements							
Total Cadmium (Cd)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A292990
Total Aluminum (Al)	mg/L	1.2	0.060	<0.0030	0.11	0.0030	A298694
Total Antimony (Sb)	mg/L	<0.00060	0.00073	<0.00060	<0.00060	0.00060	A298694
Total Arsenic (As)	mg/L	0.0015	0.00049	<0.00020	0.00042	0.00020	A298694
Total Barium (Ba)	mg/L	0.022	0.010	<0.010	0.013	0.010	A298697
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A298694
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	A298697
Total Calcium (Ca)	mg/L	14	8.8	<0.30	10	0.30	A298697
Total Chromium (Cr)	mg/L	0.0030	0.0013	<0.0010	0.0012	0.0010	A298694
Total Cobalt (Co)	mg/L	0.00038	<0.00030	<0.00030	<0.00030	0.00030	A298694
Total Copper (Cu)	mg/L	0.014	0.0016	<0.00020	0.00035	0.00020	A298694
Total Iron (Fe)	mg/L	2.0	0.18	<0.060	0.55	0.060	A298697
Total Lead (Pb)	mg/L	0.00075	<0.00020	<0.00020	<0.00020	0.00020	A298694
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	A298697
Total Magnesium (Mg)	mg/L	7.2	5.1	<0.20	4.2	0.20	A298697
Total Manganese (Mn)	mg/L	0.061	0.020	<0.0040	0.029	0.0040	A298697
Total Molybdenum (Mo)	mg/L	0.00051	0.00031	<0.00020	<0.00020	0.00020	A298694
Total Nickel (Ni)	mg/L	0.0024	<0.00050	<0.00050	<0.00050	0.00050	A298694
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	<0.10	0.10	A298697
Total Potassium (K)	mg/L	1.4	1.7	<0.30	0.71	0.30	A298697
Total Selenium (Se)	mg/L	0.0018	<0.00020	<0.00020	<0.00020	0.00020	A298694
Total Silicon (Si)	mg/L	5.3	0.54	<0.10	0.55	0.10	A298697
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A298694
Total Sodium (Na)	mg/L	4.8	4.0	<0.50	2.6	0.50	A298697
Total Strontium (Sr)	mg/L	0.057	0.043	<0.020	0.045	0.020	A298697
Total Sulphur (S)	mg/L	2.5	0.81	<0.20	2.0	0.20	A298697
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A298694
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A298694
Total Titanium (Ti)	mg/L	0.033	0.0075	<0.0010	0.0022	0.0010	A298694
Total Uranium (U)	mg/L	0.0096	0.00040	<0.00010	0.0034	0.00010	A298694
Total Vanadium (V)	mg/L	0.0022	<0.0010	<0.0010	<0.0010	0.0010	A298694
RDL = Reportable Detection Limit							



BUREAU
VERITAS

BV Labs Job #: C151729
Report Date: 2021/08/09

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACD805	ACD806	ACD807	ACD808		
Sampling Date		2021/07/18 10:10	2021/07/18 11:15	2021/07/18 17:00	2021/07/18 14:15		
COC Number		m086003	m086003	m086003	m086003		
	UNITS	RR-2021-00001-004	RR-2021-00001-006	RR-2021-00001-010	RR-2021-00001-011	RDL	QC Batch
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	A298694
RDL = Reportable Detection Limit							



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VERITAS

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Your P.O. #: 700595655
Sampler Initials: SS

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ACD805		ACD806		ACD807		
Sampling Date		2021/07/18 10:10		2021/07/18 11:15		2021/07/18 17:00		
COC Number		m086003		m086003		m086003		
	UNITS	RR-2021-00001-004	RDL	RR-2021-00001-006	QC Batch	RR-2021-00001-010	RDL	QC Batch
Parameter								
Radium 226	Bq/l	0.056	0.010	<0.010	A314579	<0.010	0.010	A314579
RADIONUCLIDE								
Thorium-228	Bq/l	<0.010	0.010	<0.010	A314581	<0.010	0.010	A314581
Thorium-230	Bq/l	0.60	0.010	<0.010	A314581	<0.010	0.010	A314581
Thorium-232	Bq/l	<0.010	0.010	<0.010	A314581	<0.010	0.010	A314581
Uranium-234	Bq/l	0.12	0.010	<0.010	A314580	<0.010	0.010	A314580
Uranium-235	Bq/l	<0.010	0.010	<0.010	A314580	<0.010	0.010	A314580
Uranium-238	Bq/l	0.11	0.010	<0.010	A314580	<0.010	0.010	A314580
Misc. Inorganics								
Dissolved Organic Carbon (C)	mg/L	36	2.5	12	A297752	<0.50	0.50	A297752
Total Organic Carbon (C)	mg/L	32	2.5	11	A297763	<0.50	0.50	A297771
Total Dissolved Solids	mg/L	80	10	52	A295455	<10	10	A295455
Total Suspended Solids	mg/L	8.9	1.0	5.2	A297694	<1.0	1.0	A297694
Anions								
Dissolved Fluoride (F)	mg/L	0.17	0.050	0.15	A294892	<0.050	0.050	A294892
Nutrients								
Total Ammonia (N)	mg/L	0.018	0.015	<0.015	A297667	<0.015	0.015	A297668
Total Phosphorus (P)	mg/L	0.053	0.0030	0.022	A297641	<0.0030	0.0030	A297641
RADIONUCLIDE								
Lead-210	Bq/l	0.12	0.10	<0.10	A314577	<0.10	0.10	A314577
Polonium-210	Bq/l	0.052	0.010	<0.010	A314578	<0.010	0.010	A314578
Physical Properties								
Turbidity	NTU	21	0.10	3.7	A293498	<0.10	0.10	A293498
RDL = Reportable Detection Limit								



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VERITAS

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Client Project #: 60608868
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Your P.O. #: 700595655
Sampler Initials: SS

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ACD808		
Sampling Date		2021/07/18 14:15		
COC Number		m086003		
	UNITS	RR-2021-00001-011	RDL	QC Batch
Parameter				
Radium 226	Bq/l	<0.010	0.010	A314579
RADIONUCLIDE				
Thorium-228	Bq/l	<0.010	0.010	A314581
Thorium-230	Bq/l	<0.010	0.010	A314581
Thorium-232	Bq/l	<0.010	0.010	A314581
Uranium-234	Bq/l	0.055	0.010	A314580
Uranium-235	Bq/l	<0.010	0.010	A314580
Uranium-238	Bq/l	0.050	0.010	A314580
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	28 (1)	2.5	A311941
Total Organic Carbon (C)	mg/L	29 (1)	2.5	A311945
Total Dissolved Solids	mg/L	60	10	A295455
Total Suspended Solids	mg/L	3.4	1.0	A297694
Anions				
Dissolved Fluoride (F)	mg/L	0.14	0.050	A294892
Nutrients				
Total Ammonia (N)	mg/L	0.017	0.015	A297667
Total Phosphorus (P)	mg/L	0.020	0.0030	A297641
RADIONUCLIDE				
Lead-210	Bq/l	<0.10	0.10	A314577
Polonium-210	Bq/l	<0.010	0.010	A314578
Physical Properties				
Turbidity	NTU	1.7	0.10	A293498
RDL = Reportable Detection Limit				
(1) Detection limits raised due to sample matrix.				



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Report Date: 2021/08/09

AECOM
Client Project #: 60608868
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Your P.O. #: 700595655
Sampler Initials: SS

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		ACD805	ACD806	ACD807	ACD808		
Sampling Date		2021/07/18 10:10	2021/07/18 11:15	2021/07/18 17:00	2021/07/18 14:15		
COC Number		m086003	m086003	m086003	m086003		
	UNITS	RR-2021-00001-004	RR-2021-00001-006	RR-2021-00001-010	RR-2021-00001-011	RDL	QC Batch
Elements							
Total Mercury (Hg)	ug/L	0.0051	<0.0019	<0.0019	0.0022	0.0019	A300129
RDL = Reportable Detection Limit							



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Report Date: 2021/08/09

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
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Sampler Initials: SS

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.0°C
Package 2	4.3°C
Package 3	6.7°C
Package 4	6.7°C

Results relate only to the items tested.

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VERITAS

BV Labs Job #: C151729

Report Date: 2021/08/09

QUALITY ASSURANCE REPORT

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A293498	Turbidity	2021/07/21			101	80 - 120	<0.10	NTU	0.67	20		
A294032	Dissolved Nitrate plus Nitrite (N)	2021/07/21	102	80 - 120	105	80 - 120	<0.010	mg/L	NC (1)	20		
A294032	Dissolved Nitrite (N)	2021/07/21	103	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		
A294687	Dissolved Calcium (Ca)	2021/07/22	95	80 - 120	99	80 - 120	<0.30	mg/L	3.0	20		
A294687	Dissolved Iron (Fe)	2021/07/22	100	80 - 120	98	80 - 120	<0.060	mg/L	NC	20		
A294687	Dissolved Magnesium (Mg)	2021/07/22	99	80 - 120	99	80 - 120	<0.20	mg/L	2.8	20		
A294687	Dissolved Manganese (Mn)	2021/07/22	98	80 - 120	98	80 - 120	<0.0040	mg/L	2.1	20		
A294687	Dissolved Potassium (K)	2021/07/22	95	80 - 120	101	80 - 120	<0.30	mg/L	3.9	20		
A294687	Dissolved Sodium (Na)	2021/07/22	95	80 - 120	98	80 - 120	<0.50	mg/L	2.3	20		
A294885	Alkalinity (PP as CaCO3)	2021/07/22					<1.0	mg/L	NC	20		
A294885	Alkalinity (Total as CaCO3)	2021/07/22			100	80 - 120	<1.0	mg/L	11	20		
A294885	Bicarbonate (HCO3)	2021/07/22					<1.0	mg/L	11	20		
A294885	Carbonate (CO3)	2021/07/22					<1.0	mg/L	NC	20		
A294885	Hydroxide (OH)	2021/07/22					<1.0	mg/L	NC	20		
A294890	pH	2021/07/22			100	97 - 103			0.11	N/A		
A294891	Conductivity	2021/07/22			105	90 - 110	<2.0	uS/cm	0.21	10		
A294892	Dissolved Fluoride (F)	2021/07/22	84	80 - 120	96	80 - 120	<0.050	mg/L	4.2	20		
A295455	Total Dissolved Solids	2021/07/23	87	80 - 120	94	80 - 120	<10	mg/L	14	20		
A297641	Total Phosphorus (P)	2021/07/26	103	80 - 120	97	80 - 120	<0.0030	mg/L	NC	20	86	80 - 120
A297667	Total Ammonia (N)	2021/07/25	109	80 - 120	101	80 - 120	<0.015	mg/L				
A297668	Total Ammonia (N)	2021/07/25	107	80 - 120	102	80 - 120	<0.015	mg/L	NC	20		
A297694	Total Suspended Solids	2021/07/25	76 (2)	80 - 120	102	80 - 120	<1.0	mg/L	NC	20		
A297752	Dissolved Organic Carbon (C)	2021/07/25	86	80 - 120	103	80 - 120	<0.50	mg/L	NC	20		
A297763	Total Organic Carbon (C)	2021/07/25	122 (2)	80 - 120	113	80 - 120	<0.50	mg/L	NC	20		
A297771	Total Organic Carbon (C)	2021/07/26	82	80 - 120	88	80 - 120	<0.50	mg/L	1.5	20		
A298694	Total Aluminum (Al)	2021/07/27	90	80 - 120	91	80 - 120	<0.0030	mg/L	6.3	20		
A298694	Total Antimony (Sb)	2021/07/27	110	80 - 120	108	80 - 120	<0.00060	mg/L	NC	20		
A298694	Total Arsenic (As)	2021/07/27	91	80 - 120	93	80 - 120	<0.00020	mg/L	14	20		
A298694	Total Beryllium (Be)	2021/07/27	90	80 - 120	90	80 - 120	<0.0010	mg/L	NC	20		
A298694	Total Chromium (Cr)	2021/07/27	97	80 - 120	99	80 - 120	<0.0010	mg/L	0.20	20		
A298694	Total Cobalt (Co)	2021/07/27	99	80 - 120	100	80 - 120	<0.00030	mg/L	NC	20		



BUREAU
VERITAS

BV Labs Job #: C151729

Report Date: 2021/08/09

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A298694	Total Copper (Cu)	2021/07/27	100	80 - 120	100	80 - 120	<0.00020	mg/L	9.2	20		
A298694	Total Lead (Pb)	2021/07/27	101	80 - 120	103	80 - 120	<0.00020	mg/L	NC	20		
A298694	Total Molybdenum (Mo)	2021/07/27	104	80 - 120	102	80 - 120	<0.00020	mg/L	7.0	20		
A298694	Total Nickel (Ni)	2021/07/27	98	80 - 120	98	80 - 120	<0.00050	mg/L	7.7	20		
A298694	Total Selenium (Se)	2021/07/27	94	80 - 120	93	80 - 120	<0.00020	mg/L	NC	20		
A298694	Total Silver (Ag)	2021/07/27	102	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20		
A298694	Total Thallium (Tl)	2021/07/27	108	80 - 120	110	80 - 120	<0.00020	mg/L	NC	20		
A298694	Total Tin (Sn)	2021/07/27	101	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
A298694	Total Titanium (Ti)	2021/07/27	96	80 - 120	100	80 - 120	<0.0010	mg/L	0.90	20		
A298694	Total Uranium (U)	2021/07/27	108	80 - 120	111	80 - 120	<0.00010	mg/L	2.0	20		
A298694	Total Vanadium (V)	2021/07/27	97	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
A298694	Total Zinc (Zn)	2021/07/27	92	80 - 120	97	80 - 120	<0.0030	mg/L	0.39	20		
A298697	Total Barium (Ba)	2021/07/26	99	80 - 120	96	80 - 120	<0.010	mg/L	0.61	20		
A298697	Total Boron (B)	2021/07/26	101	80 - 120	98	80 - 120	<0.020	mg/L	NC	20		
A298697	Total Calcium (Ca)	2021/07/26	NC	80 - 120	99	80 - 120	<0.30	mg/L	0.39	20		
A298697	Total Iron (Fe)	2021/07/26	110	80 - 120	106	80 - 120	<0.060	mg/L	1.6	20		
A298697	Total Lithium (Li)	2021/07/26	104	80 - 120	101	80 - 120	<0.020	mg/L	NC	20		
A298697	Total Magnesium (Mg)	2021/07/26	105	80 - 120	103	80 - 120	<0.20	mg/L	0.060	20		
A298697	Total Manganese (Mn)	2021/07/26	109	80 - 120	106	80 - 120	<0.0040	mg/L	0.87	20		
A298697	Total Phosphorus (P)	2021/07/26	98	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
A298697	Total Potassium (K)	2021/07/26	104	80 - 120	101	80 - 120	<0.30	mg/L	2.8	20		
A298697	Total Silicon (Si)	2021/07/26	103	80 - 120	100	80 - 120	<0.10	mg/L	1.1	20		
A298697	Total Sodium (Na)	2021/07/26	103	80 - 120	100	80 - 120	<0.50	mg/L	0.81	20		
A298697	Total Strontium (Sr)	2021/07/26	97	80 - 120	95	80 - 120	<0.020	mg/L	0.93	20		
A298697	Total Sulphur (S)	2021/07/26	101	80 - 120	97	80 - 120	<0.20	mg/L	0.12	20		
A299157	Dissolved Chloride (Cl)	2021/07/27	112	80 - 120	113	80 - 120	<1.0	mg/L	NC	20		
A299157	Dissolved Sulphate (SO4)	2021/07/27	132 (2)	80 - 120	106	80 - 120	<1.0	mg/L	4.9	20		
A300129	Total Mercury (Hg)	2021/07/27	93	80 - 120	103	80 - 120	<0.0019	ug/L	NC	20		
A311941	Dissolved Organic Carbon (C)	2021/08/06	107	80 - 120	116	80 - 120	<0.50	mg/L	8.0	20		
A311945	Total Organic Carbon (C)	2021/08/06	118	80 - 120	105	80 - 120	<0.50	mg/L	NC	20		
A314577	Lead-210	2021/08/04			111	80 - 120	<0.10	Bq/l				



BUREAU
VERITAS

BV Labs Job #: C151729

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QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A314578	Polonium-210	2021/07/31			100	74 - 126	<0.010	Bq/l				
A314579	Radium 226	2021/08/04			94	85 - 115	<0.010	Bq/l				
A314580	Uranium-234	2021/08/01			102	N/A	<0.010	Bq/L				
A314580	Uranium-235	2021/08/01			116	N/A	<0.010	Bq/L				
A314580	Uranium-238	2021/08/01			101	N/A	<0.010	Bq/L				
A314581	Thorium-228	2021/07/28			91	63 - 137	<0.010	Bq/l				
A314581	Thorium-230	2021/07/28			105	63 - 137	<0.010	Bq/l				
A314581	Thorium-232	2021/07/28			96	63 - 137	<0.010	Bq/l				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Detection limits raised due to matrix interference.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



BUREAU
VERITAS

BV Labs Job #: C151729
Report Date: 2021/08/09

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Steven Simpson, Lab Director

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Invoice Information				Report Information (if differs from invoice)				Project Information				Turnaround Time (TAT) Required																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Your P.O. #: 700595655
 Your Project #: 60608868
 Site Location: Rayrock, NT
 Your C.O.C. #: m086002

Attention: MICHAEL ZHAO

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/08/10
 Report #: R3056590
 Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151733

Received: 2021/07/19, 08:00

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH (1)	3	N/A	2021/07/22	AB SOP-00005	SM 23 2320 B m
Cadmium - low level CCME (Total) (1)	3	N/A	2021/07/27		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	3	N/A	2021/07/27	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
Carbon (DOC) (1, 3)	1	N/A	2021/07/25	AB SOP-00087	MMCW 119 1996 m
Carbon (DOC) (1, 3)	2	N/A	2021/08/05	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	3	N/A	2021/07/22	AB SOP-00005	SM 23 2510 B m
Fluoride (1)	3	N/A	2021/07/22	AB SOP-00005	SM 23 4500-F C m
Hardness (1)	3	N/A	2021/07/22		Auto Calc
Mercury (Total) by CV (1)	3	2021/08/04	2021/08/04	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP-Dissolved-Lab Filtered (1, 4)	3	N/A	2021/07/22	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	3	2021/07/26	2021/07/26	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Total (1)	2	2021/07/26	2021/07/26	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	1	2021/07/26	2021/07/27	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	3	N/A	2021/07/27		Auto Calc
Sum of cations, anions (1)	3	N/A	2021/07/22		Auto Calc
Ammonia-N (Total) (1)	1	N/A	2021/07/25	AB SOP-00007	SM 23 4500 NH ₃ A G m
Ammonia-N (Total) (1)	2	N/A	2021/08/04	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate and Nitrite (1)	1	N/A	2021/07/22		Auto Calc
Nitrate and Nitrite (1)	2	N/A	2021/07/23		Auto Calc
NO ₂ (N); NO ₂ (N) + NO ₃ (N) in Water (1)	2	N/A	2021/07/20	AB SOP-00091	SM 23 4500 NO ₃ m
NO ₂ (N); NO ₂ (N) + NO ₃ (N) in Water (1)	1	N/A	2021/07/21	AB SOP-00091	SM 23 4500 NO ₃ m
Nitrate (as N) (1)	1	2021/07/21	2021/07/22		Auto Calc
Nitrate (as N) (1)	2	2021/07/21	2021/07/23		Auto Calc
pH @25°C (1, 5)	3	N/A	2021/07/22	AB SOP-00005	SM 23 4500-H+B m
Total Dissolved Solids (Filt. Residue) (1)	3	2021/07/23	2021/07/23	AB SOP-00065	SM 23 2540 C m
Total Dissolved Solids (Calculated) (1)	3	N/A	2021/07/27		Auto Calc
Carbon (Total Organic) (1, 6)	1	N/A	2021/07/26	AB SOP-00087	MMCW 119 1996 m
Carbon (Total Organic) (1, 6)	2	N/A	2021/08/05	AB SOP-00087	MMCW 119 1996 m
Total Phosphorus (1)	2	2021/07/24	2021/07/26	AB SOP-00024	SM 23 4500-P A,B,F m



Your P.O. #: 700595655
 Your Project #: 60608868
 Site Location: Rayrock, NT
 Your C.O.C. #: m086002

Attention: MICHAEL ZHAO

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/08/10
 Report #: R3056590
 Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151733

Received: 2021/07/19, 08:00

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Phosphorus (1)	1	2021/07/24	2021/07/27	AB SOP-00024	SM 23 4500-P A,B,F m
Total Suspended Solids (NFR) (1)	3	2021/07/24	2021/07/24	AB SOP-00061	SM 23 2540 D m
Turbidity (1)	3	N/A	2021/07/21	CAL SOP-00081	SM 23 2130 B m
Lead 210 (2)	1	N/A	2021/08/04	BQL SOP-00008	GFPC
Lead 210 (2)	2	N/A	2021/08/08	BQL SOP-00008	GFPC
Polonium-210 by Alpha Spectrometry (2)	3	N/A	2021/07/31	BQL SOP-00006	Alpha Spectrometry
Radium Isotopes by Alpha Spectrometry (2, 7)	3	N/A	2021/08/06	BQL SOP-00006	Alpha Spectrometer
Thorium Isotopes by Alpha Spectrometry (2)	2	N/A	2021/07/29	BQL SOP-00006	Alpha Spectrometer
Thorium Isotopes by Alpha Spectrometry (2)	1	N/A	2021/08/05	BQL SOP-00006	Alpha Spectrometer
Uranium Isotopes by Alpha Spectrometry (2)	3	N/A	2021/08/03	BQL SOP-00006	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary Environmental

(2) This test was performed by Bureau Veritas Kitimat (From Calgary)



Your P.O. #: 700595655
Your Project #: 60608868
Site Location: Rayrock, NT
Your C.O.C. #: m086002

Attention: MICHAEL ZHAO

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Report Date: 2021/08/10
Report #: R3056590
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C151733

Received: 2021/07/19, 08:00

- (3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.
- (6) TOC present in the sample should be considered as non-purgeable TOC.
- (7) Radium-226 results have not been corrected for blanks.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas

10 Aug 2021 15:49:42

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Key Account Specialist

Email: Parminder.Virk@bureauveritas.com

Phone# (403)735-2235

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BUREAU
VERITASBV Labs Job #: C151733
Report Date: 2021/08/10AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		ACD812		ACD813		
Sampling Date		2021/07/17 15:15		2021/07/17 15:15		
COC Number		m086002		m086002		
	UNITS	RR-2021-00001-002	QC Batch	RR-2021-00001-003	RDL	QC Batch
Calculated Parameters						
Anion Sum	meq/L	1.4	A292994	1.3	N/A	A292994
Cation Sum	meq/L	1.1	A292994	1.1	N/A	A292994
Hardness (CaCO ₃)	mg/L	39	A292991	40	0.50	A292991
Ion Balance (% Difference)	%	NC	A292992	NC	N/A	A292992
Dissolved Nitrate (N)	mg/L	<0.010	A292911	<0.010	0.010	A292911
Dissolved Nitrate (NO ₃)	mg/L	<0.044	A292909	<0.044	0.044	A292909
Dissolved Nitrite (NO ₂)	mg/L	<0.033	A292909	<0.033	0.033	A292909
Calculated Total Dissolved Solids	mg/L	71	A292995	66	10	A292995
Misc. Inorganics						
Conductivity	uS/cm	92	A294551	94	2.0	A294891
pH	pH	6.77	A294548	6.83	N/A	A294890
Anions						
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	A294549	<1.0	1.0	A294885
Alkalinity (Total as CaCO ₃)	mg/L	43	A294549	41	1.0	A294885
Bicarbonate (HCO ₃)	mg/L	53	A294549	49	1.0	A294885
Carbonate (CO ₃)	mg/L	<1.0	A294549	<1.0	1.0	A294885
Hydroxide (OH)	mg/L	<1.0	A294549	<1.0	1.0	A294885
Dissolved Chloride (Cl)	mg/L	3.0	A299157	3.1	1.0	A299157
Dissolved Sulphate (SO ₄)	mg/L	21 (1)	A299157	18 (1)	5.0	A299157
Nutrients						
Dissolved Nitrite (N)	mg/L	<0.010	A294032	<0.010	0.010	A294032
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	A294032	<0.010	0.010	A294032
Lab Filtered Elements						
Dissolved Calcium (Ca)	mg/L	7.7	A294687	7.7	0.30	A294687
Dissolved Iron (Fe)	mg/L	2.0	A294687	2.2	0.060	A294687
Dissolved Magnesium (Mg)	mg/L	4.9	A294687	4.9	0.20	A294687
Dissolved Manganese (Mn)	mg/L	0.014	A294687	0.015	0.0040	A294687
Dissolved Potassium (K)	mg/L	1.8	A294687	1.8	0.30	A294687
Dissolved Sodium (Na)	mg/L	4.4	A294687	4.4	0.50	A294687
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Detection limits raised due to matrix interference.						



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BV Labs Job #: C151733
Report Date: 2021/08/10

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		ACD814		
Sampling Date		2021/07/17 16:30		
COC Number		m086002		
	UNITS	RR-2021-00001-013	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	0.0000	N/A	A292994
Cation Sum	meq/L	0.0050	N/A	A292994
Hardness (CaCO ₃)	mg/L	<0.50	0.50	A292991
Ion Balance (% Difference)	%	NC	N/A	A292992
Dissolved Nitrate (N)	mg/L	<0.010	0.010	A292911
Dissolved Nitrate (NO ₃)	mg/L	<0.044	0.044	A292909
Dissolved Nitrite (NO ₂)	mg/L	<0.033	0.033	A292909
Calculated Total Dissolved Solids	mg/L	<10	10	A292995
Misc. Inorganics				
Conductivity	uS/cm	<2.0	2.0	A294551
pH	pH	5.29	N/A	A294548
Anions				
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	A294549
Alkalinity (Total as CaCO ₃)	mg/L	<1.0	1.0	A294549
Bicarbonate (HCO ₃)	mg/L	<1.0	1.0	A294549
Carbonate (CO ₃)	mg/L	<1.0	1.0	A294549
Hydroxide (OH)	mg/L	<1.0	1.0	A294549
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	A299157
Dissolved Sulphate (SO ₄)	mg/L	<1.0	1.0	A299157
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A294030
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	0.010	A294030
Lab Filtered Elements				
Dissolved Calcium (Ca)	mg/L	<0.30	0.30	A294687
Dissolved Iron (Fe)	mg/L	<0.060	0.060	A294687
Dissolved Magnesium (Mg)	mg/L	<0.20	0.20	A294687
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	A294687
Dissolved Potassium (K)	mg/L	<0.30	0.30	A294687
Dissolved Sodium (Na)	mg/L	<0.50	0.50	A294687
RDL = Reportable Detection Limit N/A = Not Applicable				



BV Labs Job #: C151733
Report Date: 2021/08/10

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACD812	ACD813	ACD814		
Sampling Date		2021/07/17 15:15	2021/07/17 15:15	2021/07/17 16:30		
COC Number		m086002	m086002	m086002		
	UNITS	RR-2021-00001-002	RR-2021-00001-003	RR-2021-00001-013	RDL	QC Batch
Elements						
Total Cadmium (Cd)	ug/L	<0.020	<0.020	0.039	0.020	A292990
Total Aluminum (Al)	mg/L	0.092	0.088	<0.0030	0.0030	A298694
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	A298694
Total Arsenic (As)	mg/L	0.0012	0.0011	<0.00020	0.00020	A298694
Total Barium (Ba)	mg/L	0.018	0.018	<0.010	0.010	A298697
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	A298694
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	0.020	A298697
Total Calcium (Ca)	mg/L	7.5	7.4	<0.30	0.30	A298697
Total Chromium (Cr)	mg/L	0.0015	0.0014	<0.0010	0.0010	A298694
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	A298694
Total Copper (Cu)	mg/L	0.014	0.014	<0.00020	0.00020	A298694
Total Iron (Fe)	mg/L	3.3	3.1	<0.060	0.060	A298697
Total Lead (Pb)	mg/L	0.0012	0.0011	<0.00020	0.00020	A298694
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	0.020	A298697
Total Magnesium (Mg)	mg/L	4.9	4.8	<0.20	0.20	A298697
Total Manganese (Mn)	mg/L	0.039	0.037	<0.0040	0.0040	A298697
Total Molybdenum (Mo)	mg/L	0.00032	0.00025	<0.00020	0.00020	A298694
Total Nickel (Ni)	mg/L	0.00073	<0.00050	<0.00050	0.00050	A298694
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	A298697
Total Potassium (K)	mg/L	1.7	1.7	<0.30	0.30	A298697
Total Selenium (Se)	mg/L	0.00047	0.00049	<0.00020	0.00020	A298694
Total Silicon (Si)	mg/L	1.5	1.4	<0.10	0.10	A298697
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	A298694
Total Sodium (Na)	mg/L	4.4	4.3	<0.50	0.50	A298697
Total Strontium (Sr)	mg/L	0.037	0.036	<0.020	0.020	A298697
Total Sulphur (S)	mg/L	1.0	1.1	<0.20	0.20	A298697
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	A298694
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	A298694
Total Titanium (Ti)	mg/L	0.0029	0.0013	<0.0010	0.0010	A298694
Total Uranium (U)	mg/L	0.0037	0.0035	<0.00010	0.00010	A298694
Total Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	A298694
RDL = Reportable Detection Limit						



BUREAU
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BV Labs Job #: C151733
Report Date: 2021/08/10

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACD812	ACD813	ACD814		
Sampling Date		2021/07/17 15:15	2021/07/17 15:15	2021/07/17 16:30		
COC Number		m086002	m086002	m086002		
	UNITS	RR-2021-00001-002	RR-2021-00001-003	RR-2021-00001-013	RDL	QC Batch
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	A298694
RDL = Reportable Detection Limit						

BUREAU
VERITASBV Labs Job #: C151733
Report Date: 2021/08/10AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS**RESULTS OF CHEMICAL ANALYSES OF WATER**

BV Labs ID		ACD812			ACD813		
Sampling Date		2021/07/17 15:15			2021/07/17 15:15		
COC Number		m086002			m086002		
	UNITS	RR-2021-00001-002	RDL	QC Batch	RR-2021-00001-003	RDL	QC Batch
Parameter							
Radium 226	Bq/l	0.59	0.010	A315732	0.54	0.010	A315732
RADIONUCLIDE							
Thorium-230	Bq/l	0.59	0.010	A314581	0.48	0.010	A314581
Uranium-238	Bq/l	0.051	0.010	A314580	0.056	0.010	A314580
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	21	0.50	A297752	32 (1)	2.5	A310782
Total Organic Carbon (C)	mg/L	14	0.50	A297771	32 (1)	2.5	A310783
Total Dissolved Solids	mg/L	56	10	A295453	56	10	A295453
Total Suspended Solids	mg/L	2.5	1.0	A297322	1.7	1.0	A297322
Anions							
Dissolved Fluoride (F)	mg/L	0.16	0.050	A294540	0.15	0.050	A294892
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	A309442	<0.015	0.015	A309442
Total Phosphorus (P)	mg/L	0.023 (2)	0.015	A297057	0.038	0.0030	A297335
RADIONUCLIDE							
Lead-210	Bq/l	0.42	0.10	A314577	0.47	0.10	A314577
Polonium-210	Bq/l	0.118	0.010	A314578	0.106	0.010	A314578
Physical Properties							
Turbidity	NTU	5.4	0.10	A293496	5.5	0.10	A293496
RDL = Reportable Detection Limit							
(1) Detection limits raised due to sample matrix.							
(2) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.							



BUREAU
VERITAS

BV Labs Job #: C151733
Report Date: 2021/08/10

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ACD814		
Sampling Date		2021/07/17 16:30		
COC Number		m086002		
	UNITS	RR-2021-00001-013	RDL	QC Batch
Parameter				
Radium 226	Bq/l	<0.010	0.010	A315732
RADIONUCLIDE				
Thorium-230	Bq/l	<0.010	0.010	A314581
Uranium-238	Bq/l	<0.010	0.010	A314580
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	5.2	0.50	A310782
Total Organic Carbon (C)	mg/L	<0.50	0.50	A311137
Total Dissolved Solids	mg/L	<10	10	A295453
Total Suspended Solids	mg/L	<1.0	1.0	A297322
Anions				
Dissolved Fluoride (F)	mg/L	<0.050	0.050	A294540
Nutrients				
Total Ammonia (N)	mg/L	<0.015	0.015	A297665
Total Phosphorus (P)	mg/L	<0.0030	0.0030	A297057
RADIONUCLIDE				
Lead-210	Bq/l	<0.10	0.10	A314577
Polonium-210	Bq/l	<0.010	0.010	A314578
Physical Properties				
Turbidity	NTU	<0.10	0.10	A293496
RDL = Reportable Detection Limit				



BUREAU
VERITAS

BV Labs Job #: C151733
Report Date: 2021/08/10

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		ACD812	ACD813	ACD814		
Sampling Date		2021/07/17 15:15	2021/07/17 15:15	2021/07/17 16:30		
COC Number		m086002	m086002	m086002		
	UNITS	RR-2021-00001-002	RR-2021-00001-003	RR-2021-00001-013	RDL	QC Batch
Elements						
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	A309181
RDL = Reportable Detection Limit						



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C
Package 2	4.7°C
Package 3	5.3°C

Sample ACD812 [RR-2021-00001-002] : Sample was analyzed past method specified hold time for Turbidity. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample ACD813 [RR-2021-00001-003] : Sample was analyzed past method specified hold time for Turbidity. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample ACD814 [RR-2021-00001-013] : Sample was analyzed past method specified hold time for Turbidity. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for NO₂ (N); NO₂ (N) + NO₃ (N) in Water.

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: C151733

Report Date: 2021/08/10

QUALITY ASSURANCE REPORT

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A293496	Turbidity	2021/07/21			102	80 - 120	<0.10	NTU	3.1	20		
A294030	Dissolved Nitrate plus Nitrite (N)	2021/07/21	122 (1)	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
A294030	Dissolved Nitrite (N)	2021/07/21	103	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		
A294032	Dissolved Nitrate plus Nitrite (N)	2021/07/21	102	80 - 120	105	80 - 120	<0.010	mg/L	NC (2)	20		
A294032	Dissolved Nitrite (N)	2021/07/21	103	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		
A294540	Dissolved Fluoride (F)	2021/07/22	111	80 - 120	104	80 - 120	<0.050	mg/L	2.6	20		
A294548	pH	2021/07/22			99	97 - 103			1.9	N/A		
A294549	Alkalinity (PP as CaCO ₃)	2021/07/22					<1.0	mg/L	13	20		
A294549	Alkalinity (Total as CaCO ₃)	2021/07/22			94	80 - 120	<1.0	mg/L	4.2	20		
A294549	Bicarbonate (HCO ₃)	2021/07/22					<1.0	mg/L	3.6	20		
A294549	Carbonate (CO ₃)	2021/07/22					<1.0	mg/L	13	20		
A294549	Hydroxide (OH)	2021/07/22					<1.0	mg/L	NC	20		
A294551	Conductivity	2021/07/22			103	90 - 110	<2.0	uS/cm	0.40	10		
A294687	Dissolved Calcium (Ca)	2021/07/22	95	80 - 120	99	80 - 120	<0.30	mg/L	3.0	20		
A294687	Dissolved Iron (Fe)	2021/07/22	100	80 - 120	98	80 - 120	<0.060	mg/L	NC	20		
A294687	Dissolved Magnesium (Mg)	2021/07/22	99	80 - 120	99	80 - 120	<0.20	mg/L	2.8	20		
A294687	Dissolved Manganese (Mn)	2021/07/22	98	80 - 120	98	80 - 120	<0.0040	mg/L	2.1	20		
A294687	Dissolved Potassium (K)	2021/07/22	95	80 - 120	101	80 - 120	<0.30	mg/L	3.9	20		
A294687	Dissolved Sodium (Na)	2021/07/22	95	80 - 120	98	80 - 120	<0.50	mg/L	2.3	20		
A294885	Alkalinity (PP as CaCO ₃)	2021/07/22					<1.0	mg/L	NC	20		
A294885	Alkalinity (Total as CaCO ₃)	2021/07/22			100	80 - 120	<1.0	mg/L	11	20		
A294885	Bicarbonate (HCO ₃)	2021/07/22					<1.0	mg/L	11	20		
A294885	Carbonate (CO ₃)	2021/07/22					<1.0	mg/L	NC	20		
A294885	Hydroxide (OH)	2021/07/22					<1.0	mg/L	NC	20		
A294890	pH	2021/07/22			100	97 - 103			0.11	N/A		
A294891	Conductivity	2021/07/22			105	90 - 110	<2.0	uS/cm	0.21	10		
A294892	Dissolved Fluoride (F)	2021/07/22	84	80 - 120	96	80 - 120	<0.050	mg/L	4.2	20		
A295453	Total Dissolved Solids	2021/07/23	97	80 - 120	95	80 - 120	<10	mg/L	5.9	20		
A297057	Total Phosphorus (P)	2021/07/26	114	80 - 120	106	80 - 120	<0.0030	mg/L	NC	20	93	80 - 120
A297322	Total Suspended Solids	2021/07/24	102	80 - 120	99	80 - 120	<1.0	mg/L	2.6	20		
A297335	Total Phosphorus (P)	2021/07/27	NC	80 - 120	89	80 - 120	<0.0030	mg/L	9.5	20	85	80 - 120



BUREAU
VERITAS

BV Labs Job #: C151733

Report Date: 2021/08/10

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A297665	Total Ammonia (N)	2021/07/25	101	80 - 120	99	80 - 120	<0.015	mg/L	1.5	20		
A297752	Dissolved Organic Carbon (C)	2021/07/25	86	80 - 120	103	80 - 120	<0.50	mg/L	NC	20		
A297771	Total Organic Carbon (C)	2021/07/26	82	80 - 120	88	80 - 120	<0.50	mg/L	1.5	20		
A298694	Total Aluminum (Al)	2021/07/27	90	80 - 120	91	80 - 120	<0.0030	mg/L	6.3	20		
A298694	Total Antimony (Sb)	2021/07/27	110	80 - 120	108	80 - 120	<0.00060	mg/L	NC	20		
A298694	Total Arsenic (As)	2021/07/27	91	80 - 120	93	80 - 120	<0.00020	mg/L	14	20		
A298694	Total Beryllium (Be)	2021/07/27	90	80 - 120	90	80 - 120	<0.0010	mg/L	NC	20		
A298694	Total Chromium (Cr)	2021/07/27	97	80 - 120	99	80 - 120	<0.0010	mg/L	0.20	20		
A298694	Total Cobalt (Co)	2021/07/27	99	80 - 120	100	80 - 120	<0.00030	mg/L	NC	20		
A298694	Total Copper (Cu)	2021/07/27	100	80 - 120	100	80 - 120	<0.00020	mg/L	9.2	20		
A298694	Total Lead (Pb)	2021/07/27	101	80 - 120	103	80 - 120	<0.00020	mg/L	NC	20		
A298694	Total Molybdenum (Mo)	2021/07/27	104	80 - 120	102	80 - 120	<0.00020	mg/L	7.0	20		
A298694	Total Nickel (Ni)	2021/07/27	98	80 - 120	98	80 - 120	<0.00050	mg/L	7.7	20		
A298694	Total Selenium (Se)	2021/07/27	94	80 - 120	93	80 - 120	<0.00020	mg/L	NC	20		
A298694	Total Silver (Ag)	2021/07/27	102	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20		
A298694	Total Thallium (Tl)	2021/07/27	108	80 - 120	110	80 - 120	<0.00020	mg/L	NC	20		
A298694	Total Tin (Sn)	2021/07/27	101	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
A298694	Total Titanium (Ti)	2021/07/27	96	80 - 120	100	80 - 120	<0.0010	mg/L	0.90	20		
A298694	Total Uranium (U)	2021/07/27	108	80 - 120	111	80 - 120	<0.00010	mg/L	2.0	20		
A298694	Total Vanadium (V)	2021/07/27	97	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
A298694	Total Zinc (Zn)	2021/07/27	92	80 - 120	97	80 - 120	<0.0030	mg/L	0.39	20		
A298697	Total Barium (Ba)	2021/07/26	99	80 - 120	96	80 - 120	<0.010	mg/L	0.61	20		
A298697	Total Boron (B)	2021/07/26	101	80 - 120	98	80 - 120	<0.020	mg/L	NC	20		
A298697	Total Calcium (Ca)	2021/07/26	NC	80 - 120	99	80 - 120	<0.30	mg/L	0.39	20		
A298697	Total Iron (Fe)	2021/07/26	110	80 - 120	106	80 - 120	<0.060	mg/L	1.6	20		
A298697	Total Lithium (Li)	2021/07/26	104	80 - 120	101	80 - 120	<0.020	mg/L	NC	20		
A298697	Total Magnesium (Mg)	2021/07/26	105	80 - 120	103	80 - 120	<0.20	mg/L	0.060	20		
A298697	Total Manganese (Mn)	2021/07/26	109	80 - 120	106	80 - 120	<0.0040	mg/L	0.87	20		
A298697	Total Phosphorus (P)	2021/07/26	98	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
A298697	Total Potassium (K)	2021/07/26	104	80 - 120	101	80 - 120	<0.30	mg/L	2.8	20		
A298697	Total Silicon (Si)	2021/07/26	103	80 - 120	100	80 - 120	<0.10	mg/L	1.1	20		

BUREAU
VERITAS

BV Labs Job #: C151733

Report Date: 2021/08/10

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A298697	Total Sodium (Na)	2021/07/26	103	80 - 120	100	80 - 120	<0.50	mg/L	0.81	20		
A298697	Total Strontium (Sr)	2021/07/26	97	80 - 120	95	80 - 120	<0.020	mg/L	0.93	20		
A298697	Total Sulphur (S)	2021/07/26	101	80 - 120	97	80 - 120	<0.20	mg/L	0.12	20		
A299157	Dissolved Chloride (Cl)	2021/07/27	112	80 - 120	113	80 - 120	<1.0	mg/L	NC	20		
A299157	Dissolved Sulphate (SO4)	2021/07/27	132 (1)	80 - 120	106	80 - 120	<1.0	mg/L	4.9	20		
A309181	Total Mercury (Hg)	2021/08/04	96	80 - 120	98	80 - 120	<0.0019	ug/L	NC	20		
A309442	Total Ammonia (N)	2021/08/04	100	80 - 120	102	80 - 120	<0.015	mg/L	0.67	20		
A310782	Dissolved Organic Carbon (C)	2021/08/05	NC	80 - 120	109	80 - 120	<0.50	mg/L	2.1	20		
A310783	Total Organic Carbon (C)	2021/08/05	114	80 - 120	105	80 - 120	<0.50	mg/L	10	20		
A311137	Total Organic Carbon (C)	2021/08/05	110	80 - 120	110	80 - 120	<0.50	mg/L	1.9	20		
A314577	Lead-210	2021/08/04			111	80 - 120	<0.10	Bq/l				
A314578	Polonium-210	2021/07/31			100	74 - 126	<0.010	Bq/l				
A314580	Uranium-238	2021/08/01			101	N/A	<0.010	Bq/L				
A314581	Thorium-230	2021/07/28			105	63 - 137	<0.010	Bq/l				
A315732	Radium 226	2021/08/06			99	85 - 115	<0.010	Bq/l				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Detection limits raised due to matrix interference.



BUREAU
VERITAS

BV Labs Job #: C151733
Report Date: 2021/08/10

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Steven Simpson, Lab Director

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Sandy Yuan, M.Sc., QP, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required																																																														
Company: <u>PSPC</u>		IN ADDITION TO INVOICE INFO, SEND TO Company: <u>AECOM</u>		Quotation #:		<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)																																																														
Contact Name: <u>CALL UP NUMBER</u>		Contact Name: <u>MORAG McPHERSON</u>		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																														
Address: <u>700595655</u>		Address:		Project #: <u>60608868</u>		Rush TAT (Surcharges will be applied)																																																														
Phone:		Phone: <u>780-901-8340</u>		Site Location: <u>NWT - RAYBROOK</u>		<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days																																																														
Email:		Email: <u>morag.mcperson@aecom.com</u>		Site #:		Date Required:																																																														
Copies:		Copies: <u>STEFANO STRAPAZZON @ AECOM.COM</u>		Sampled By: <u>STEFANO STRAPAZZON // MICHAEL ZHANG</u>		Rush Confirmation #:																																																														
Laboratory Use Only				Analysis Requested				Regulatory Criteria																																																												
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Sample Identification				Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix																																																													
1	LR-2021-00001-002	0.2m	2021/07/17	15:15	H ₂ O	12																																																														
2	LR-2021-00001-003			15:15		12																																																														
3	LR-2021-00001-013			16:30		12																																																														
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STEFANO STRAPAZZON		2021/07/17		Maria Mann		2021/07/20	14:55																																																													

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca

MAN INS-0162



Your P.O. #: 700595655
 Your Project #: 60608868
 Site Location: Rayrock, NT
 Your C.O.C. #: M086129

Attention: MICHAEL ZHAO

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/09/28
 Report #: R3077628
 Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C154191

Received: 2021/07/27, 10:00

Sample Matrix: Water
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH (1)	1	N/A	2021/07/30	AB SOP-00005	SM 23 2320 B m
Cadmium - low level CCME - Dissolved (1)	1	N/A	2021/07/31		Auto Calc
Cadmium - low level CCME (Total) (1)	1	N/A	2021/08/06		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2021/08/05	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
True Colour (1)	1	N/A	2021/07/29	CAL SOP-00049	SM 23 2120 C m
Carbon (DOC) (1, 4)	1	N/A	2021/08/13	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	1	N/A	2021/07/30	AB SOP-00005	SM 23 2510 B m
NORM (water) (2)	1	N/A	N/A		
Fluoride (1)	1	N/A	2021/07/30	AB SOP-00005	SM 23 4500-F C m
Hardness (1)	1	N/A	2021/08/09		Auto Calc
Mercury (Dissolved) by CV-Lab Filtered (1)	1	2021/07/30	2021/08/03	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	1	2021/08/06	2021/08/09	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 5)	1	N/A	2021/08/09	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	1	2021/08/04	2021/08/05	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 5)	1	N/A	2021/07/30	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	1	2021/08/04	2021/08/05	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	1	N/A	2021/08/09		Auto Calc
Sum of cations, anions (1)	1	N/A	2021/08/09		Auto Calc
Ammonia-N (Total) (1)	1	N/A	2021/07/31	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate and Nitrite (1)	1	N/A	2021/07/30		Auto Calc
NO ₂ (N); NO ₂ (N) + NO ₃ (N) in Water (1)	1	N/A	2021/07/29	AB SOP-00091	SM 23 4500 NO ₃ m
Nitrate (as N) (1)	1	2021/07/28	2021/07/30		Auto Calc
pH @25°C (1, 6)	1	N/A	2021/07/30	AB SOP-00005	SM 23 4500-H+B m
Total Dissolved Solids (Filt. Residue) (1)	1	2021/08/13	2021/08/13	AB SOP-00065	SM 23 2540 C m
Total Dissolved Solids (Calculated) (1)	1	N/A	2021/08/09		Auto Calc
Carbon (Total Organic) (1, 7)	1	N/A	2021/08/13	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR) (1)	1	2021/07/31	2021/07/31	AB SOP-00061	SM 23 2540 D m
Lead 210 (3)	1	N/A	2021/09/19	BQL SOP-00008	GFPC
Polonium-210 by Alpha Spectrometry (3)	1	N/A	2021/09/08	BQL SOP-00006	Alpha Spectrometry
Radium Isotopes by Alpha Spectrometry (3, 8)	1	N/A	2021/09/26	BQL SOP-00006	Alpha Spectrometer



Your P.O. #: 700595655
Your Project #: 60608868
Site Location: Rayrock, NT
Your C.O.C. #: M086129

Attention: MICHAEL ZHAO

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Report Date: 2021/09/28
Report #: R3077628
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C154191

Received: 2021/07/27, 10:00

Sample Matrix: Water
Samples Received: 1

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Thorium Isotopes by Alpha Spectrometry (3)	1	N/A	2021/09/16	BQL SOP-00006	Alpha Spectrometer
Uranium Isotopes by Alpha Spectrometry (3)	1	N/A	2021/09/09	BQL SOP-00006	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) This test was performed by Bureau Veritas Kitimat, 6790 Kitimat Rd. Unit 4 , Mississauga, ON, L5N 5L9

(3) This test was performed by Bureau Veritas Kitimat, 6790 Kitimat Rd., Unit 4, Mississauga, Ontario, L5N 5L9

(4) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(5) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(6) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

(7) TOC present in the sample should be considered as non-purgeable TOC.

(8) Radium-226 results have not been corrected for blanks.



Your P.O. #: 700595655
Your Project #: 60608868
Site Location: Rayrock, NT
Your C.O.C. #: M086129

Attention: MICHAEL ZHAO

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Report Date: 2021/09/28
Report #: R3077628
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C154191

Received: 2021/07/27, 10:00

Encryption Key

Parminder Virk
Key Account Specialist
28 Sep 2021 16:36:56

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Key Account Specialist

Email: Parminder.Virk@bureauveritas.com

Phone# (403)735-2235

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

BV Labs Job #: C154191

Report Date: 2021/09/28

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ACS829		
Sampling Date		2021/07/25		
COC Number		M086129		
	UNITS	MLVC-04 + MLVC-05 FILTRATE	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	2.2	N/A	A302189
Cation Sum	meq/L	1.6	N/A	A302189
Hardness (CaCO ₃)	mg/L	65	0.50	A302180
Ion Balance (% Difference)	%	NC	N/A	A302185
Dissolved Nitrate (N)	mg/L	<0.010	0.010	A301881
Dissolved Nitrate (NO ₃)	mg/L	<0.044	0.044	A302244
Dissolved Nitrite (NO ₂)	mg/L	<0.033	0.033	A302244
Calculated Total Dissolved Solids	mg/L	110	10	A302248
Elements				
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	A301490
Misc. Inorganics				
Conductivity	uS/cm	170	2.0	A305710
pH	pH	6.92	N/A	A305704
Anions				
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	A305702
Alkalinity (Total as CaCO ₃)	mg/L	77	1.0	A305702
Bicarbonate (HCO ₃)	mg/L	94	1.0	A305702
Carbonate (CO ₃)	mg/L	<1.0	1.0	A305702
Hydroxide (OH)	mg/L	<1.0	1.0	A305702
Dissolved Chloride (Cl)	mg/L	1.0	1.0	A310784
Dissolved Sulphate (SO ₄)	mg/L	28	1.0	A310784
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A304228
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	0.010	A304228
Elements				
Dissolved Aluminum (Al)	mg/L	0.10	0.0030	A306216
Dissolved Antimony (Sb)	mg/L	0.00063	0.00060	A306216
Dissolved Arsenic (As)	mg/L	0.00099	0.00020	A306216
Dissolved Barium (Ba)	mg/L	0.023	0.010	A313944
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	A306216
RDL = Reportable Detection Limit				
N/A = Not Applicable				



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VERITAS

BV Labs Job #: C154191
Report Date: 2021/09/28

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ACS829		
Sampling Date		2021/07/25		
COC Number		M086129		
	UNITS	MLVC-04 + MLVC-05 FILTRATE	RDL	QC Batch
Dissolved Boron (B)	mg/L	0.026	0.020	A313944
Dissolved Calcium (Ca)	mg/L	20	0.30	A313944
Dissolved Chromium (Cr)	mg/L	0.0011	0.0010	A306216
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	A306216
Dissolved Copper (Cu)	mg/L	0.0026	0.00020	A306216
Dissolved Iron (Fe)	mg/L	0.077	0.060	A313944
Dissolved Lead (Pb)	mg/L	0.00029	0.00020	A306216
Dissolved Lithium (Li)	mg/L	<0.020	0.020	A313944
Dissolved Magnesium (Mg)	mg/L	3.8	0.20	A313944
Dissolved Manganese (Mn)	mg/L	0.10	0.0040	A313944
Dissolved Molybdenum (Mo)	mg/L	0.00093	0.00020	A306216
Dissolved Nickel (Ni)	mg/L	<0.00050	0.00050	A306216
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	A313944
Dissolved Potassium (K)	mg/L	1.2	0.30	A313944
Dissolved Selenium (Se)	mg/L	0.00022	0.00020	A306216
Dissolved Silicon (Si)	mg/L	2.4	0.10	A313944
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	A306216
Dissolved Sodium (Na)	mg/L	2.6	0.50	A313944
Dissolved Strontium (Sr)	mg/L	0.080	0.020	A313944
Dissolved Sulphur (S)	mg/L	8.6	0.20	A313944
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	A306216
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	A306216
Dissolved Titanium (Ti)	mg/L	0.0011	0.0010	A306216
Dissolved Uranium (U)	mg/L	0.059	0.00010	A306216
Dissolved Vanadium (V)	mg/L	0.0021	0.0010	A306216
Dissolved Zinc (Zn)	mg/L	0.0031	0.0030	A306216
RDL = Reportable Detection Limit				



BUREAU
VERITAS

BV Labs Job #: C154191
Report Date: 2021/09/28

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACS829		
Sampling Date		2021/07/25		
COC Number		M086129		
	UNITS	MLVC-04 + MLVC-05 FILTRATE	RDL	QC Batch
Elements				
Total Cadmium (Cd)	ug/L	0.30	0.020	A301491
Total Aluminum (Al)	mg/L	2.9	0.0030	A309165
Total Antimony (Sb)	mg/L	0.00071	0.00060	A309165
Total Arsenic (As)	mg/L	0.0017	0.00020	A309165
Total Barium (Ba)	mg/L	0.042	0.010	A309168
Total Beryllium (Be)	mg/L	<0.0010	0.0010	A309165
Total Boron (B)	mg/L	0.021	0.020	A309168
Total Calcium (Ca)	mg/L	24	0.30	A309168
Total Chromium (Cr)	mg/L	0.0057	0.0010	A309165
Total Cobalt (Co)	mg/L	0.0025	0.00030	A309165
Total Copper (Cu)	mg/L	0.079	0.00020	A309165
Total Iron (Fe)	mg/L	3.8	0.060	A309168
Total Lead (Pb)	mg/L	0.0043	0.00020	A309165
Total Lithium (Li)	mg/L	<0.020	0.020	A309168
Total Magnesium (Mg)	mg/L	4.9	0.20	A309168
Total Manganese (Mn)	mg/L	0.17	0.0040	A309168
Total Molybdenum (Mo)	mg/L	0.0020	0.00020	A309165
Total Nickel (Ni)	mg/L	0.0056	0.00050	A309165
Total Phosphorus (P)	mg/L	0.43	0.10	A309168
Total Potassium (K)	mg/L	1.5	0.30	A309168
Total Selenium (Se)	mg/L	0.0014	0.00020	A309165
Total Silicon (Si)	mg/L	5.2	0.10	A309168
Total Silver (Ag)	mg/L	<0.00010	0.00010	A309165
Total Sodium (Na)	mg/L	2.7	0.50	A309168
Total Strontium (Sr)	mg/L	0.090	0.020	A309168
Total Sulphur (S)	mg/L	12	0.20	A309168
Total Thallium (Tl)	mg/L	<0.00020	0.00020	A309165
Total Tin (Sn)	mg/L	<0.0010	0.0010	A309165
Total Titanium (Ti)	mg/L	0.048	0.0010	A309165
Total Uranium (U)	mg/L	0.26	0.00010	A309165
Total Vanadium (V)	mg/L	0.0047	0.0010	A309165
RDL = Reportable Detection Limit				



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VERITAS

BV Labs Job #: C154191
Report Date: 2021/09/28

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		ACS829		
Sampling Date		2021/07/25		
COC Number		M086129		
	UNITS	MLVC-04 + MLVC-05 FILTRATE	RDL	QC Batch
Total Zinc (Zn)	mg/L	0.084	0.0030	A309165
RDL = Reportable Detection Limit				



RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ACS829		
Sampling Date		2021/07/25		
COC Number		M086129		
	UNITS	MLVC-04 + MLVC-05 FILTRATE	RDL	QC Batch
Parameter				
Radium 226	Bq/l	0.51	0.010	A367288
Subcontract Parameter	Bq/l	ATTACHED	N/A	A323184
RADIONUCLIDE				
Thorium-230	Bq/l	0.46	0.010	A359156
Uranium-238	Bq/l	2.3	0.010	A359157
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	16	0.50	A319271
Total Organic Carbon (C)	mg/L	13	0.50	A319326
Total Dissolved Solids	mg/L	220 (1)	25	A318877
Total Suspended Solids	mg/L	330 (2)	6.0	A306739
Anions				
Dissolved Fluoride (F)	mg/L	0.074	0.050	A305714
Nutrients				
Total Ammonia (N)	mg/L	1.7	0.015	A307068
Physical Properties				
True Colour	PtCo units	48	2.0	A303652
RADIONUCLIDE				
Lead-210	Bq/l	0.63	0.10	A359155
Polonium-210	Bq/l	0.115	0.010	A359158
RDL = Reportable Detection Limit N/A = Not Applicable (1) Sample was originally processed within hold time. Data quality required investigation. Re-analysis was completed past recommended hold time. Detection limit raised based on sample volume used for analysis. (2) Detection limit raised based on sample volume used for analysis.				



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VERITAS

BV Labs Job #: C154191
Report Date: 2021/09/28

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		ACS829		
Sampling Date		2021/07/25		
COC Number		M086129		
	UNITS	MLVC-04 + MLVC-05 FILTRATE	RDL	QC Batch
Elements				
Total Mercury (Hg)	ug/L	0.0166	0.0019	A312192
Lab Filtered Elements				
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	A305915
RDL = Reportable Detection Limit				



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C
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Version 3: Report reissued to include results listed below on ML samples as per client request received 2021/08/20.

Lead-210

Polonium-210

Radium-226

Thorium-230

Uranium-238

The Ra-226 results by alpha and gamma do not agree. The results were verified and the sample may be changing over time. The gamma result may be a more accurate indication of the Ra-226 activity in the water.

Sample ACS829 [MLVC-04 + MLVC-05 FILTRATE] : Sample was analyzed past method specified hold time for True Colour. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for NO₂ (N); NO₂ (N) + NO₃ (N) in Water. Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue).

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

Matrix Spike Carbon (DOC): Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: C154191

Report Date: 2021/09/28

QUALITY ASSURANCE REPORT

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A303652	True Colour	2021/07/29	89	80 - 120	91	80 - 120	<2.0	PtCo units	0.054	20
A304228	Dissolved Nitrate plus Nitrite (N)	2021/07/29	122 (1)	80 - 120	102	80 - 120	<0.010	mg/L	NC	20
A304228	Dissolved Nitrite (N)	2021/07/29	99	80 - 120	100	80 - 120	<0.010	mg/L	NC	20
A305702	Alkalinity (PP as CaCO ₃)	2021/07/30					<1.0	mg/L	6.2	20
A305702	Alkalinity (Total as CaCO ₃)	2021/07/30			96	80 - 120	<1.0	mg/L	0.87	20
A305702	Bicarbonate (HCO ₃)	2021/07/30					<1.0	mg/L	1.8	20
A305702	Carbonate (CO ₃)	2021/07/30					<1.0	mg/L	6.2	20
A305702	Hydroxide (OH)	2021/07/30					<1.0	mg/L	NC	20
A305704	pH	2021/07/30			99	97 - 103			0.035	N/A
A305710	Conductivity	2021/07/30			109	90 - 110	<2.0	uS/cm	1.2	10
A305714	Dissolved Fluoride (F)	2021/07/30	105	80 - 120	100	80 - 120	<0.050	mg/L	2.9	20
A305915	Dissolved Mercury (Hg)	2021/07/30	97	80 - 120	103	80 - 120	<0.0019	ug/L	NC	20
A306216	Dissolved Aluminum (Al)	2021/07/30	97	80 - 120	90	80 - 120	<0.0030	mg/L		
A306216	Dissolved Antimony (Sb)	2021/07/30	125 (1)	80 - 120	121 (1)	80 - 120	<0.00060	mg/L		
A306216	Dissolved Arsenic (As)	2021/07/30	NC	80 - 120	97	80 - 120	<0.00020	mg/L	2.7	20
A306216	Dissolved Beryllium (Be)	2021/07/30	105	80 - 120	102	80 - 120	<0.0010	mg/L		
A306216	Dissolved Chromium (Cr)	2021/07/30	100	80 - 120	101	80 - 120	<0.0010	mg/L		
A306216	Dissolved Cobalt (Co)	2021/07/30	96	80 - 120	100	80 - 120	<0.00030	mg/L		
A306216	Dissolved Copper (Cu)	2021/07/30	96	80 - 120	102	80 - 120	<0.00020	mg/L		
A306216	Dissolved Lead (Pb)	2021/07/30	98	80 - 120	102	80 - 120	<0.00020	mg/L		
A306216	Dissolved Molybdenum (Mo)	2021/07/30	107	80 - 120	106	80 - 120	<0.00020	mg/L		
A306216	Dissolved Nickel (Ni)	2021/07/30	97	80 - 120	97	80 - 120	<0.00050	mg/L		
A306216	Dissolved Selenium (Se)	2021/07/30	85	80 - 120	101	80 - 120	<0.00020	mg/L		
A306216	Dissolved Silver (Ag)	2021/07/30	82	80 - 120	103	80 - 120	<0.00010	mg/L		
A306216	Dissolved Thallium (Tl)	2021/07/30	102	80 - 120	105	80 - 120	<0.00020	mg/L		
A306216	Dissolved Tin (Sn)	2021/07/30	106	80 - 120	105	80 - 120	<0.0010	mg/L		
A306216	Dissolved Titanium (Ti)	2021/07/30	99	80 - 120	103	80 - 120	<0.0010	mg/L		
A306216	Dissolved Uranium (U)	2021/07/30	101	80 - 120	101	80 - 120	<0.00010	mg/L		
A306216	Dissolved Vanadium (V)	2021/07/30	99	80 - 120	100	80 - 120	<0.0010	mg/L		
A306216	Dissolved Zinc (Zn)	2021/07/30	94	80 - 120	100	80 - 120	<0.0030	mg/L		
A306739	Total Suspended Solids	2021/07/31	96	80 - 120	89	80 - 120	<1.0	mg/L	8.3	20



BUREAU
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BV Labs Job #: C154191

Report Date: 2021/09/28

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A307068	Total Ammonia (N)	2021/07/31	112	80 - 120	100	80 - 120	<0.015	mg/L	NC	20
A309165	Total Aluminum (Al)	2021/08/05	75 (1)	80 - 120	93	80 - 120	<0.0030	mg/L	127 (1)	20
A309165	Total Antimony (Sb)	2021/08/05	100	80 - 120	97	80 - 120	<0.00060	mg/L	NC	20
A309165	Total Arsenic (As)	2021/08/05	99	80 - 120	98	80 - 120	<0.00020	mg/L	2.8	20
A309165	Total Beryllium (Be)	2021/08/05	95	80 - 120	93	80 - 120	<0.0010	mg/L	NC	20
A309165	Total Chromium (Cr)	2021/08/05	101	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20
A309165	Total Cobalt (Co)	2021/08/05	100	80 - 120	99	80 - 120	<0.00030	mg/L	NC	20
A309165	Total Copper (Cu)	2021/08/05	101	80 - 120	102	80 - 120	<0.00020	mg/L	149 (1)	20
A309165	Total Lead (Pb)	2021/08/05	97	80 - 120	98	80 - 120	<0.00020	mg/L	1.3	20
A309165	Total Molybdenum (Mo)	2021/08/05	102	80 - 120	98	80 - 120	<0.00020	mg/L	7.4	20
A309165	Total Nickel (Ni)	2021/08/05	99	80 - 120	99	80 - 120	<0.00050	mg/L	NC	20
A309165	Total Selenium (Se)	2021/08/05	101	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20
A309165	Total Silver (Ag)	2021/08/05	98	80 - 120	96	80 - 120	<0.00010	mg/L	NC	20
A309165	Total Thallium (Tl)	2021/08/05	98	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20
A309165	Total Tin (Sn)	2021/08/05	97	80 - 120	96	80 - 120	<0.0010	mg/L	NC	20
A309165	Total Titanium (Ti)	2021/08/05	104	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20
A309165	Total Uranium (U)	2021/08/05	103	80 - 120	102	80 - 120	<0.00010	mg/L	4.6	20
A309165	Total Vanadium (V)	2021/08/05	102	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20
A309165	Total Zinc (Zn)	2021/08/05	100	80 - 120	100	80 - 120	<0.0030	mg/L	129 (1)	20
A309168	Total Barium (Ba)	2021/08/05	95	80 - 120	95	80 - 120	<0.010	mg/L	NC	20
A309168	Total Boron (B)	2021/08/05	96	80 - 120	96	80 - 120	<0.020	mg/L	16	20
A309168	Total Calcium (Ca)	2021/08/05	101	80 - 120	100	80 - 120	<0.30	mg/L	2.8	20
A309168	Total Iron (Fe)	2021/08/05	106	80 - 120	105	80 - 120	<0.060	mg/L	NC	20
A309168	Total Lithium (Li)	2021/08/05	101	80 - 120	100	80 - 120	<0.020	mg/L	NC	20
A309168	Total Magnesium (Mg)	2021/08/05	106	80 - 120	105	80 - 120	<0.20	mg/L	3.2	20
A309168	Total Manganese (Mn)	2021/08/05	104	80 - 120	102	80 - 120	<0.0040	mg/L	10	20
A309168	Total Phosphorus (P)	2021/08/05	98	80 - 120	98	80 - 120	<0.10	mg/L	NC	20
A309168	Total Potassium (K)	2021/08/05	105	80 - 120	104	80 - 120	<0.30	mg/L	5.0	20
A309168	Total Silicon (Si)	2021/08/05	98	80 - 120	99	80 - 120	<0.10	mg/L	1.0	20
A309168	Total Sodium (Na)	2021/08/05	98	80 - 120	95	80 - 120	<0.50	mg/L	2.9	20
A309168	Total Strontium (Sr)	2021/08/05	96	80 - 120	96	80 - 120	<0.020	mg/L	5.3	20



BUREAU
VERITAS

BV Labs Job #: C154191

Report Date: 2021/09/28

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A309168	Total Sulphur (S)	2021/08/05	94	80 - 120	94	80 - 120	<0.20	mg/L	0.34	20
A310784	Dissolved Chloride (Cl)	2021/08/05	114	80 - 120	107	80 - 120	<1.0	mg/L	1.2	20
A310784	Dissolved Sulphate (SO ₄)	2021/08/05	NC	80 - 120	104	80 - 120	<1.0	mg/L	0.32	20
A312192	Total Mercury (Hg)	2021/08/09	96	80 - 120	97	80 - 120	<0.0019	ug/L	NC	20
A313944	Dissolved Barium (Ba)	2021/08/09	96	80 - 120	99	80 - 120	<0.010	mg/L	11	20
A313944	Dissolved Boron (B)	2021/08/09	100	80 - 120	104	80 - 120	<0.020	mg/L	NC	20
A313944	Dissolved Calcium (Ca)	2021/08/09	100	80 - 120	102	80 - 120	<0.30	mg/L	5.0	20
A313944	Dissolved Iron (Fe)	2021/08/09	93	80 - 120	107	80 - 120	<0.060	mg/L	1.0	20
A313944	Dissolved Lithium (Li)	2021/08/09	98	80 - 120	101	80 - 120	<0.020	mg/L	NC	20
A313944	Dissolved Magnesium (Mg)	2021/08/09	98	80 - 120	101	80 - 120	<0.20	mg/L	7.1	20
A313944	Dissolved Manganese (Mn)	2021/08/09	99	80 - 120	110	80 - 120	<0.0040	mg/L	0.096	20
A313944	Dissolved Phosphorus (P)	2021/08/09	91	80 - 120	99	80 - 120	<0.10	mg/L	NC	20
A313944	Dissolved Potassium (K)	2021/08/09	102	80 - 120	107	80 - 120	<0.30	mg/L	8.1	20
A313944	Dissolved Silicon (Si)	2021/08/09	89	80 - 120	99	80 - 120	<0.10	mg/L	0.94	20
A313944	Dissolved Sodium (Na)	2021/08/09	99	80 - 120	103	80 - 120	<0.50	mg/L	7.0	20
A313944	Dissolved Strontium (Sr)	2021/08/09	91	80 - 120	98	80 - 120	<0.020	mg/L	6.5	20
A313944	Dissolved Sulphur (S)	2021/08/09	94	80 - 120	99	80 - 120	<0.20	mg/L	0.46	20
A318877	Total Dissolved Solids	2021/08/13	90	80 - 120	103	80 - 120	<10	mg/L	4.9	20
A319271	Dissolved Organic Carbon (C)	2021/08/13	NC	80 - 120	99	80 - 120	<0.50	mg/L	4.2	20
A319326	Total Organic Carbon (C)	2021/08/13	NC	80 - 120	99	80 - 120	<0.50	mg/L	3.6	20
A359155	Lead-210	2021/09/15			106	80 - 120	<0.10	Bq/l		
A359156	Thorium-230	2021/09/16			112	63 - 137	<0.010	Bq/l		
A359157	Uranium-238	2021/09/09			104	N/A	<0.010	Bq/L		
A359158	Polonium-210	2021/09/08			99	74 - 126	<0.010	Bq/l	NC	N/A



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VERITAS**

BV Labs Job #: C154191

Report Date: 2021/09/28

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A367288	Radium 226	2021/09/26			99	85 - 115	<0.010	Bq/l	NC	N/A

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



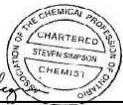
BUREAU
VERITAS

BV Labs Job #: C154191
Report Date: 2021/09/28

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Steven Simpson, Lab Director

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Sandy Yuan, M.Sc., QP, Scientific Specialist

Thomas Pinchin, Project Solutions Representative

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

M 086129

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: <u>PSPC</u>	Company: <u>AECOM</u>	Quotation #: _____	<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)
Contact Name: <u>REFERENCE CALL</u>	Contact Name: <u>STEFANO STRAPAZZON</u> <u>MORAG MCPHERSON</u>	P.O. #/ AFE#: _____	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: <u>UP NUMBER</u> <u>700595655</u>	Address: <u>EDMONTON AB</u> <u>18817 STONY PLAIN RD NW</u>	Project #: <u>60608868</u>	Rush TAT (Surcharges will be applied)
Phone: _____	Phone: <u>204-683-2009</u> <u>780-901-8340</u>	Site Location: <u>NWT</u>	<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days
Email: _____	Email: <u>stefano.strapazzon@aecom.com</u> <u>morag.mcperson@aecom.com</u>	Site #: _____	<input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days
Copies: _____	Copies: _____	Sampled By: <u>STEFANO STRAPAZZON / MICHAEL ZHAO</u>	Date Required: _____
			Rush Confirmation #: _____

Laboratory Use Only				Analysis Requested												Regulatory Criteria							
Depot Reception																							
Seal Present	YES	NO	Cooler ID																				
Seal Intact	<input checked="" type="checkbox"/>		Temp																				
Cooling Media	<input checked="" type="checkbox"/>																						
Seal Present	YES	NO	Cooler ID																				
Seal Intact			Temp																				
Cooling Media																							
Seal Present	YES	NO	Cooler ID																				
Seal Intact			Temp																				
Cooling Media																							
Sample Identification				Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	ROUTINE WATER AMMONIA	Regulated Metals	Tot	Diss	FLUORIDE	DOC	TOC	TOTAL SUSPENDED SOLID	TOTAL DISSOLVED SOLID	NORM PACKAGE	POLONIUM 210	URANIUM 238	HOLD - DO NOT ANALYZE	Regulatory Criteria	
1 MLVC-04 + MLVC-05 FILTRATE				-	2021/07/25	-	H2O	11															
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							

Received in Yellowknife

By: J. McPherson

JUL 27 2021

Temp: 7 / 11 / 16

100 - 400 - 100 - 100

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)
<u>STEFANO STRAPAZZON</u>	2021/07/27	10:00	<u>Reem Phillipos, Reem</u>	2021/07/28	15:10

27-Jul-21 10:00

Parminder Virk



C154191

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca



Your P.O. #: 700595655
 Your Project #: 60608868
 Site Location: Rayrock, NT
 Your C.O.C. #: M046134

Attention: MICHAEL ZHAO

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/09/08
 Report #: R3068401
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C154897

Received: 2021/07/27, 16:40

Sample Matrix: Water
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH (1)	1	N/A	2021/08/01	AB SOP-00005	SM 23 2320 B m
Cadmium - low level CCME - Dissolved (1)	1	N/A	2021/08/04		Auto Calc
Cadmium - low level CCME (Total) (1)	1	N/A	2021/08/04		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2021/08/04	AB SOP-00020	SM23-4500-Cl/SO ₄ -E m
True Colour (1)	1	N/A	2021/07/30	CAL SOP-00049	SM 23 2120 C m
Carbon (DOC) (1, 3)	1	N/A	2021/08/15	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	1	N/A	2021/08/01	AB SOP-00005	SM 23 2510 B m
Fluoride (1)	1	N/A	2021/08/01	AB SOP-00005	SM 23 4500-F C m
Hardness (1)	1	N/A	2021/08/04		Auto Calc
Mercury (Dissolved) by CV-Lab Filtered (1)	1	2021/08/05	2021/08/06	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	1	2021/08/05	2021/08/06	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	1	N/A	2021/08/04	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	1	2021/08/03	2021/08/04	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 4)	1	N/A	2021/08/03	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	1	2021/08/03	2021/08/04	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	1	N/A	2021/08/05		Auto Calc
Sum of cations, anions (1)	1	N/A	2021/08/04		Auto Calc
Ammonia-N (Total) (1)	1	N/A	2021/07/31	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate and Nitrite (1)	1	N/A	2021/07/31		Auto Calc
NO ₂ (N); NO ₂ (N) + NO ₃ (N) in Water (1)	1	N/A	2021/07/30	AB SOP-00091	SM 23 4500 NO ₃ m
Nitrate (as N) (1)	1	2021/07/30	2021/07/31		Auto Calc
pH @25°C (1, 5)	1	N/A	2021/08/01	AB SOP-00005	SM 23 4500-H+B m
Total Dissolved Solids (Filt. Residue) (1)	1	2021/08/14	2021/08/14	AB SOP-00065	SM 23 2540 C m
Total Dissolved Solids (Calculated) (1)	1	N/A	2021/08/05		Auto Calc
Carbon (Total Organic) (1, 6)	1	N/A	2021/08/15	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR) (1)	1	2021/08/03	2021/08/03	AB SOP-00061	SM 23 2540 D m
NORM Group Analysis (2)	1	N/A	2021/08/07	BQL SOP-00007	Gamma Spectrometry
Lead 210 (2)	1	N/A	2021/09/08	BQL SOP-00008	GFPC
Polonium-210 by Alpha Spectrometry (2)	1	N/A	2021/08/30	BQL SOP-00006	Alpha Spectrometry
Radium Isotopes by Alpha Spectrometry (2, 7)	1	N/A	2021/09/03	BQL SOP-00006	Alpha Spectrometer



Your P.O. #: 700595655
 Your Project #: 60608868
 Site Location: Rayrock, NT
 Your C.O.C. #: M046134

Attention: MICHAEL ZHAO

AECOM
 48 QUARRY PARK BLVD SE
 CALGARY, AB
 Canada T2C 5P2

Report Date: 2021/09/08
 Report #: R3068401
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C154897

Received: 2021/07/27, 16:40

Sample Matrix: Water
 # Samples Received: 1

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Thorium Isotopes by Alpha Spectrometry (2)	1	N/A	2021/08/31	BQL SOP-00006	Alpha Spectrometer
Uranium Isotopes by Alpha Spectrometry (2)	1	N/A	2021/08/31	BQL SOP-00006	Alpha Spectrometry

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary Environmental
- (2) This test was performed by Bureau Veritas Kitimat (From Calgary)
- (3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.
- (6) TOC present in the sample should be considered as non-purgeable TOC.
- (7) Radium-226 results have not been corrected for blanks.



Your P.O. #: 700595655
Your Project #: 60608868
Site Location: Rayrock, NT
Your C.O.C. #: M046134

Attention: MICHAEL ZHAO

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Report Date: 2021/09/08
Report #: R3068401
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C154897

Received: 2021/07/27, 16:40

Encryption Key

Parminder Virk
Key Account Specialist
08 Sep 2021 15:32:50

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Key Account Specialist

Email: Parminder.Virk@bureauveritas.com

Phone# (403)735-2235

=====

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BV Labs Job #: C154897

Report Date: 2021/09/08

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ACW569		
Sampling Date		2021/07/27		
COC Number		M046134		
	UNITS	ML24H FILT	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	2.1	N/A	A306237
Cation Sum	meq/L	1.6	N/A	A306237
Hardness (CaCO ₃)	mg/L	67	0.50	A306232
Ion Balance (% Difference)	%	NC	N/A	A306235
Dissolved Nitrate (N)	mg/L	<0.010	0.010	A306096
Dissolved Nitrate (NO ₃)	mg/L	<0.044	0.044	A306276
Dissolved Nitrite (NO ₂)	mg/L	<0.033	0.033	A306276
Calculated Total Dissolved Solids	mg/L	110	10	A306242
Elements				
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	A305514
Misc. Inorganics				
Conductivity	uS/cm	160	2.0	A307443
pH	pH	7.17	N/A	A307442
Anions				
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	A307441
Alkalinity (Total as CaCO ₃)	mg/L	76	1.0	A307441
Bicarbonate (HCO ₃)	mg/L	93	1.0	A307441
Carbonate (CO ₃)	mg/L	<1.0	1.0	A307441
Hydroxide (OH)	mg/L	<1.0	1.0	A307441
Dissolved Chloride (Cl)	mg/L	1.6	1.0	A309258
Dissolved Sulphate (SO ₄)	mg/L	27	1.0	A309258
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A306517
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	0.010	A306517
Elements				
Dissolved Aluminum (Al)	mg/L	0.12	0.0030	A308465
Dissolved Antimony (Sb)	mg/L	0.0010	0.00060	A308465
Dissolved Arsenic (As)	mg/L	0.0013	0.00020	A308465
Dissolved Barium (Ba)	mg/L	0.023	0.010	A308649
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	A308465
Dissolved Boron (B)	mg/L	0.027	0.020	A308649
RDL = Reportable Detection Limit				
N/A = Not Applicable				



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VERITAS

BV Labs Job #: C154897
Report Date: 2021/09/08

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		ACW569		
Sampling Date		2021/07/27		
COC Number		M046134		
	UNITS	ML24H FILT	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	20	0.30	A308649
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	A308465
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	A308465
Dissolved Copper (Cu)	mg/L	0.0079	0.00020	A308465
Dissolved Iron (Fe)	mg/L	<0.060	0.060	A308649
Dissolved Lead (Pb)	mg/L	0.00024	0.00020	A308465
Dissolved Lithium (Li)	mg/L	<0.020	0.020	A308649
Dissolved Magnesium (Mg)	mg/L	3.9	0.20	A308649
Dissolved Manganese (Mn)	mg/L	0.072	0.0040	A308649
Dissolved Molybdenum (Mo)	mg/L	0.0018	0.00020	A308465
Dissolved Nickel (Ni)	mg/L	<0.00050	0.00050	A308465
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	A308649
Dissolved Potassium (K)	mg/L	1.2	0.30	A308649
Dissolved Selenium (Se)	mg/L	0.00071	0.00020	A308465
Dissolved Silicon (Si)	mg/L	2.7	0.10	A308649
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	A308465
Dissolved Sodium (Na)	mg/L	3.0	0.50	A308649
Dissolved Strontium (Sr)	mg/L	0.080	0.020	A308649
Dissolved Sulphur (S)	mg/L	7.8	0.20	A308649
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	A308465
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	A308465
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	A308465
Dissolved Uranium (U)	mg/L	0.095	0.00010	A308465
Dissolved Vanadium (V)	mg/L	0.0027	0.0010	A308465
Dissolved Zinc (Zn)	mg/L	0.0083	0.0030	A308465
RDL = Reportable Detection Limit				



BUREAU
VERITAS

BV Labs Job #: C154897

Report Date: 2021/09/08

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

REGULATED METALS + HG (CCME/AT1) - HGT-V

BV Labs ID		ACW569		
Sampling Date		2021/07/27		
COC Number		M046134		
	UNITS	ML24H FILT	RDL	QC Batch
Elements				
Total Cadmium (Cd)	ug/L	0.45	0.040	A305516
Total Mercury (Hg)	ug/L	0.0130	0.0019	A311000
Total Aluminum (Al)	mg/L	3.4	0.0060	A308468
Total Antimony (Sb)	mg/L	0.0015	0.0012	A308468
Total Arsenic (As)	mg/L	0.0021	0.00040	A308468
Total Barium (Ba)	mg/L	0.060	0.010	A308471
Total Beryllium (Be)	mg/L	<0.0020	0.0020	A308468
Total Boron (B)	mg/L	0.025	0.020	A308471
Total Calcium (Ca)	mg/L	25	0.30	A308471
Total Chromium (Cr)	mg/L	0.0069	0.0020	A308468
Total Cobalt (Co)	mg/L	0.0037	0.00060	A308468
Total Copper (Cu)	mg/L	0.12	0.00040	A308468
Total Iron (Fe)	mg/L	5.4	0.060	A308471
Total Lead (Pb)	mg/L	0.0093	0.00040	A308468
Total Lithium (Li)	mg/L	<0.020	0.020	A308471
Total Magnesium (Mg)	mg/L	5.1	0.20	A308471
Total Manganese (Mn)	mg/L	0.21	0.0040	A308471
Total Molybdenum (Mo)	mg/L	0.0029	0.00040	A308468
Total Nickel (Ni)	mg/L	0.0069	0.0010	A308468
Total Phosphorus (P)	mg/L	0.59	0.10	A308471
Total Potassium (K)	mg/L	1.6	0.30	A308471
Total Selenium (Se)	mg/L	0.0021	0.00040	A308468
Total Silicon (Si)	mg/L	7.3	0.10	A308471
Total Silver (Ag)	mg/L	<0.00020	0.00020	A308468
Total Sodium (Na)	mg/L	3.0	0.50	A308471
Total Strontium (Sr)	mg/L	0.10	0.020	A308471
Total Sulphur (S)	mg/L	14	0.20	A308471
Total Thallium (Tl)	mg/L	<0.00040	0.00040	A308468
Total Tin (Sn)	mg/L	<0.0020	0.0020	A308468
Total Titanium (Ti)	mg/L	0.066	0.0020	A308468
Total Uranium (U)	mg/L	0.36	0.00020	A308468
Total Vanadium (V)	mg/L	0.0062	0.0020	A308468
RDL = Reportable Detection Limit				



BUREAU
VERITAS

BV Labs Job #: C154897
Report Date: 2021/09/08

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

REGULATED METALS + HG (CCME/AT1) - HGT-V

BV Labs ID		ACW569		
Sampling Date		2021/07/27		
COC Number		M046134		
	UNITS	ML24H FILT	RDL	QC Batch
Total Zinc (Zn)	mg/L	0.16	0.0060	A308468
RDL = Reportable Detection Limit				



BUREAU
VERITAS

BV Labs Job #: C154897
Report Date: 2021/09/08

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ACW569		
Sampling Date		2021/07/27		
COC Number		M046134		
	UNITS	ML24H FILT	RDL	QC Batch
Parameter				
Radium 226	Bq/l	0.75	0.010	A342698
RADIONUCLIDE				
Thorium-228	Bq/l	<0.010	0.010	A344328
Thorium-230	Bq/l	0.035	0.010	A344328
Thorium-232	Bq/l	<0.010	0.010	A344328
Uranium-234	Bq/l	3.6	0.010	A344329
Uranium-235	Bq/l	0.16	0.010	A344329
Uranium-238	Bq/l	3.2	0.010	A344329
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	15	0.50	A320653
Total Organic Carbon (C)	mg/L	13	0.50	A320670
Total Dissolved Solids	mg/L	170 (1)	17	A320197
Total Suspended Solids	mg/L	340 (1)	15	A307707
Anions				
Dissolved Fluoride (F)	mg/L	0.079	0.050	A307444
Nutrients				
Total Ammonia (N)	mg/L	1.9	0.015	A307073
Physical Properties				
True Colour	PtCo units	55	2.0	A306453
RADIONUCLIDE				
Lead-210	Bq/l	<1.0	1.0	A318936
Lead-212	Bq/l	<0.10	0.10	A318936
Polonium-210	Bq/l	0.053	0.010	A344327
Radium 226	Bq/l	1.7	1.0	A318936
Radium-228	Bq/l	<0.50	0.50	A318936
Thorium-230	Bq/l	<5.0	5.0	A318936
Thorium-234	Bq/l	2.1	1.0	A318936
Uranium-235	Bq/l	<0.50	0.50	A318936
RDL = Reportable Detection Limit				
(1) Detection limit raised based on sample volume used for analysis.				



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VERITAS

BV Labs Job #: C154897
Report Date: 2021/09/08

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		ACW569		
Sampling Date		2021/07/27		
COC Number		M046134		
	UNITS	ML24H FILT	RDL	QC Batch
Lab Filtered Elements				
Dissolved Mercury (Hg)	ug/L	0.0026	0.0019	A310993
RDL = Reportable Detection Limit				



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.3°C
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Version 2: Report reissued to include results listed below on ML sample as per client request received 2021/08/20.

Lead-210

Polonium-210

Radium-226

Thorium-230

Uranium-238

There was sediment in the sample bottles and the sample does not appear to be homogeneous .

Sample ACW569 [ML24H FILT] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

REGULATED METALS + HG (CCME/AT1) - HGT-V Comments

Sample ACW569 [ML24H FILT] Elements by ICPMS - Total: Detection limits raised due to sample matrix.

Results relate only to the items tested.

BUREAU
VERITAS

BV Labs Job #: C154897

Report Date: 2021/09/08

QUALITY ASSURANCE REPORT

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A306453	True Colour	2021/08/01	102	80 - 120	97	80 - 120	<2.0	PtCo units	0.041	20		
A306517	Dissolved Nitrate plus Nitrite (N)	2021/07/30	107	80 - 120	100	80 - 120	<0.010	mg/L	11	20		
A306517	Dissolved Nitrite (N)	2021/07/30	97	80 - 120	100	80 - 120	<0.010	mg/L	NC	20		
A307073	Total Ammonia (N)	2021/07/31	106	80 - 120	103	80 - 120	<0.015	mg/L	0.76	20		
A307441	Alkalinity (PP as CaCO3)	2021/08/01					<1.0	mg/L	22 (1)	20		
A307441	Alkalinity (Total as CaCO3)	2021/08/01			99	80 - 120	<1.0	mg/L	0.38	20		
A307441	Bicarbonate (HCO3)	2021/08/01					<1.0	mg/L	5.0	20		
A307441	Carbonate (CO3)	2021/08/01					<1.0	mg/L	22 (1)	20		
A307441	Hydroxide (OH)	2021/08/01					<1.0	mg/L	NC	20		
A307442	pH	2021/08/01			100	97 - 103			0.10	N/A		
A307443	Conductivity	2021/08/01			104	90 - 110	<2.0	uS/cm	0	10		
A307444	Dissolved Fluoride (F)	2021/08/01	94	80 - 120	110	80 - 120	<0.050	mg/L	3.3	20		
A307707	Total Suspended Solids	2021/08/03	82	80 - 120	94	80 - 120	<1.0	mg/L	NC	20		
A308465	Dissolved Aluminum (Al)	2021/08/03	109	80 - 120	101	80 - 120	<0.0030	mg/L	15	20		
A308465	Dissolved Antimony (Sb)	2021/08/03	118	80 - 120	109	80 - 120	<0.00060	mg/L	NC	20		
A308465	Dissolved Arsenic (As)	2021/08/03	NC	80 - 120	102	80 - 120	<0.00020	mg/L	0.91	20		
A308465	Dissolved Beryllium (Be)	2021/08/03	107	80 - 120	105	80 - 120	<0.0010	mg/L	NC	20		
A308465	Dissolved Chromium (Cr)	2021/08/03	104	80 - 120	106	80 - 120	<0.0010	mg/L	7.4	20		
A308465	Dissolved Cobalt (Co)	2021/08/03	103	80 - 120	105	80 - 120	<0.00030	mg/L	0.063	20		
A308465	Dissolved Copper (Cu)	2021/08/03	107	80 - 120	108	80 - 120	<0.00020	mg/L	NC	20		
A308465	Dissolved Lead (Pb)	2021/08/03	95	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		
A308465	Dissolved Molybdenum (Mo)	2021/08/03	108	80 - 120	103	80 - 120	<0.00020	mg/L	9.2	20		
A308465	Dissolved Nickel (Ni)	2021/08/03	103	80 - 120	104	80 - 120	<0.00050	mg/L	6.4	20		
A308465	Dissolved Selenium (Se)	2021/08/03	112	80 - 120	101	80 - 120	<0.00020	mg/L	0.97	20		
A308465	Dissolved Silver (Ag)	2021/08/03	99	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20		
A308465	Dissolved Thallium (Tl)	2021/08/03	96	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		
A308465	Dissolved Tin (Sn)	2021/08/03	97	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
A308465	Dissolved Titanium (Ti)	2021/08/03	103	80 - 120	113	80 - 120	<0.0010	mg/L	NC	20		
A308465	Dissolved Uranium (U)	2021/08/03	93	80 - 120	94	80 - 120	<0.00010	mg/L	0.64	20		
A308465	Dissolved Vanadium (V)	2021/08/03	111	80 - 120	107	80 - 120	<0.0010	mg/L	5.6	20		



BUREAU
VERITAS

BV Labs Job #: C154897

Report Date: 2021/09/08

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A308465	Dissolved Zinc (Zn)	2021/08/03	107	80 - 120	102	80 - 120	<0.0030	mg/L	1.9	20		
A308468	Total Aluminum (Al)	2021/08/04	82	80 - 120	85	80 - 120	<0.0030	mg/L	3.0	20		
A308468	Total Antimony (Sb)	2021/08/04	117	80 - 120	116	80 - 120	<0.00060	mg/L				
A308468	Total Arsenic (As)	2021/08/04	100	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20		
A308468	Total Beryllium (Be)	2021/08/04	94	80 - 120	92	80 - 120	<0.0010	mg/L				
A308468	Total Chromium (Cr)	2021/08/04	103	80 - 120	103	80 - 120	<0.0010	mg/L	NC	20		
A308468	Total Cobalt (Co)	2021/08/04	101	80 - 120	101	80 - 120	<0.00030	mg/L				
A308468	Total Copper (Cu)	2021/08/04	102	80 - 120	103	80 - 120	<0.00020	mg/L	1.4	20		
A308468	Total Lead (Pb)	2021/08/04	99	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20		
A308468	Total Molybdenum (Mo)	2021/08/04	107	80 - 120	105	80 - 120	<0.00020	mg/L				
A308468	Total Nickel (Ni)	2021/08/04	99	80 - 120	101	80 - 120	<0.00050	mg/L				
A308468	Total Selenium (Se)	2021/08/04	104	80 - 120	105	80 - 120	<0.00020	mg/L	17	20		
A308468	Total Silver (Ag)	2021/08/04	102	80 - 120	102	80 - 120	<0.00010	mg/L				
A308468	Total Thallium (Tl)	2021/08/04	101	80 - 120	100	80 - 120	<0.00020	mg/L				
A308468	Total Tin (Sn)	2021/08/04	107	80 - 120	105	80 - 120	<0.0010	mg/L				
A308468	Total Titanium (Ti)	2021/08/04	110	80 - 120	103	80 - 120	<0.0010	mg/L				
A308468	Total Uranium (U)	2021/08/04	103	80 - 120	103	80 - 120	<0.00010	mg/L	7.9	20		
A308468	Total Vanadium (V)	2021/08/04	104	80 - 120	102	80 - 120	<0.0010	mg/L				
A308468	Total Zinc (Zn)	2021/08/04	100	80 - 120	101	80 - 120	<0.0030	mg/L	NC	20		
A308471	Total Barium (Ba)	2021/08/04	101	80 - 120	103	80 - 120	<0.010	mg/L	0.17	20		
A308471	Total Boron (B)	2021/08/04	101	80 - 120	101	80 - 120	<0.020	mg/L	NC	20		
A308471	Total Calcium (Ca)	2021/08/04	NC	80 - 120	101	80 - 120	<0.30	mg/L				
A308471	Total Iron (Fe)	2021/08/04	115	80 - 120	118	80 - 120	<0.060	mg/L	NC	20		
A308471	Total Lithium (Li)	2021/08/04	101	80 - 120	102	80 - 120	<0.020	mg/L				
A308471	Total Magnesium (Mg)	2021/08/04	101	80 - 120	103	80 - 120	<0.20	mg/L				
A308471	Total Manganese (Mn)	2021/08/04	112	80 - 120	113	80 - 120	<0.0040	mg/L	NC	20		
A308471	Total Phosphorus (P)	2021/08/04	104	80 - 120	105	80 - 120	<0.10	mg/L				
A308471	Total Potassium (K)	2021/08/04	103	80 - 120	104	80 - 120	<0.30	mg/L				
A308471	Total Silicon (Si)	2021/08/04	105	80 - 120	107	80 - 120	<0.10	mg/L				
A308471	Total Sodium (Na)	2021/08/04	99	80 - 120	101	80 - 120	<0.50	mg/L				
A308471	Total Strontium (Sr)	2021/08/04	98	80 - 120	102	80 - 120	<0.020	mg/L				



BUREAU
VERITAS

BV Labs Job #: C154897

Report Date: 2021/09/08

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A308471	Total Sulphur (S)	2021/08/04	101	80 - 120	100	80 - 120	<0.20	mg/L				
A308649	Dissolved Barium (Ba)	2021/08/04	99	80 - 120	98	80 - 120	<0.010	mg/L	3.5	20		
A308649	Dissolved Boron (B)	2021/08/04	107	80 - 120	101	80 - 120	<0.020	mg/L	NC	20		
A308649	Dissolved Calcium (Ca)	2021/08/04	98	80 - 120	98	80 - 120	<0.30	mg/L	2.6	20		
A308649	Dissolved Iron (Fe)	2021/08/04	112	80 - 120	112	80 - 120	<0.060	mg/L	NC	20		
A308649	Dissolved Lithium (Li)	2021/08/04	97	80 - 120	98	80 - 120	<0.020	mg/L	NC	20		
A308649	Dissolved Magnesium (Mg)	2021/08/04	97	80 - 120	98	80 - 120	<0.20	mg/L	3.0	20		
A308649	Dissolved Manganese (Mn)	2021/08/04	110	80 - 120	110	80 - 120	<0.0040	mg/L	0.087	20		
A308649	Dissolved Phosphorus (P)	2021/08/04	107	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
A308649	Dissolved Potassium (K)	2021/08/04	102	80 - 120	102	80 - 120	<0.30	mg/L	4.3	20		
A308649	Dissolved Silicon (Si)	2021/08/04	102	80 - 120	103	80 - 120	<0.10	mg/L	5.1	20		
A308649	Dissolved Sodium (Na)	2021/08/04	100	80 - 120	100	80 - 120	<0.50	mg/L	3.3	20		
A308649	Dissolved Strontium (Sr)	2021/08/04	96	80 - 120	97	80 - 120	<0.020	mg/L	2.3	20		
A308649	Dissolved Sulphur (S)	2021/08/04	120	80 - 120	100	80 - 120	<0.20	mg/L	0.30	20		
A309258	Dissolved Chloride (Cl)	2021/08/04	108	80 - 120	104	80 - 120	<1.0	mg/L	3.7	20		
A309258	Dissolved Sulphate (SO4)	2021/08/04	NC	80 - 120	101	80 - 120	<1.0	mg/L	0.80	20		
A310993	Dissolved Mercury (Hg)	2021/08/05	105	80 - 120	107	80 - 120	<0.0019	ug/L	NC	20		
A311000	Total Mercury (Hg)	2021/08/05	100	80 - 120	103	80 - 120	<0.0019	ug/L	NC	20		
A318936	Lead-210	2021/08/07					<1.0	Bq/l	NC	N/A	92	74 - 126
A318936	Lead-212	2021/08/07					<0.10	Bq/l	NC	N/A	99	74 - 126
A318936	Radium 226	2021/08/07					<1.0	Bq/l	NC	N/A	92	74 - 126
A318936	Radium-228	2021/08/07					<0.50	Bq/l	NC	N/A	106	74 - 126
A318936	Thorium-230	2021/08/07					<5.0	Bq/l	NC	N/A	103	74 - 126
A318936	Thorium-234	2021/08/07					<1.0	Bq/l	0	N/A	90	74 - 126
A318936	Uranium-235	2021/08/07					<0.50	Bq/l	NC	N/A	98	74 - 126
A320197	Total Dissolved Solids	2021/08/14	59 (1)	80 - 120	105	80 - 120	<10	mg/L	4.1 (2)	20		
A320653	Dissolved Organic Carbon (C)	2021/08/15	94	80 - 120	97	80 - 120	<0.50	mg/L	NC	20		
A320670	Total Organic Carbon (C)	2021/08/15	103	80 - 120	99	80 - 120	<0.50	mg/L	NC	20		
A342698	Radium 226	2021/09/03					<0.010	Bq/l				
A344326	Lead-210	2021/09/08			106	80 - 120	<0.10	Bq/l	NC	N/A		
A344327	Polonium-210	2021/08/30			97	74 - 126	<0.010	Bq/l	NC	N/A		



BUREAU
VERITAS

BV Labs Job #: C154897

Report Date: 2021/09/08

QUALITY ASSURANCE REPORT(CONT'D)

AECOM

Client Project #: 60608868

Site Location: Rayrock, NT

Your P.O. #: 700595655

Sampler Initials: SS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A344328	Thorium-228	2021/08/31			93	63 - 137	<0.010	Bq/l				
A344328	Thorium-230	2021/08/31			111	63 - 137	<0.010	Bq/l				
A344328	Thorium-232	2021/08/31			100	63 - 137	<0.010	Bq/l				
A344329	Uranium-234	2021/08/31			102	N/A	<0.010	Bq/L	13	N/A		
A344329	Uranium-235	2021/08/31			103	N/A	<0.010	Bq/L	NC	N/A		
A344329	Uranium-238	2021/08/31			104	N/A	<0.010	Bq/L	9.0	N/A		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times$ RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Detection limit raised based on sample volume used for analysis.



BUREAU
VERITAS

BV Labs Job #: C154897
Report Date: 2021/09/08

AECOM
Client Project #: 60608868
Site Location: Rayrock, NT
Your P.O. #: 700595655
Sampler Initials: SS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Steven Simpson, Lab Director

Robert Allen, Scientific Specialist

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Sandy Yuan, M.Sc., QP, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

AB FCD-00331/7



Michael Zhao reported via email

Created by *Parminder Virk* | 2 hours ago (Fri, 20 Aug 2021 at 8:50 AM)



Hello Parminder,

Please proceed with the following low level parameters now for all Mill lake samples. Mill Lake samples should be reported the same as AEMP sample reports.

lead-210	0.1
polonium-210	0.01
radium-226	0.01
thorium-230	0.01
uranium-238	0.01

Thanks,

Michael Zhao, P. Eng.

Environmental Engineer, Environmental, Canada

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AECOM

300-48 Quarry Park Blvd. SE

Calgary, AB T2C 5P2, Canada

T +1-403-254-3301

aecom.com



Attention: Michael Zhao

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Your P.O. #: 700595655
Your Project #: 60608868, Ray Rock
Site#: Ray Rock
Site Location: Rayrock, NT
Your C.O.C. #: 648554-01-01

Report Date: 2021/10/08
Report #: R3082662
Version: 2 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C174622

Received: 2021/10/03, 16:47

Sample Matrix: Water
Samples Received: 2

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
BTEX/F1 in Water by HS GC/MS/FID (1)	2	N/A	2021/10/08	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	2	N/A	2021/10/08		Auto Calc
CCME Hydrocarbons (F2-F4 in water) (1, 2)	2	2021/10/08	2021/10/08	AB SOP-00037	CCME PHC-CWS m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Silica gel clean up employed.

Attention: Michael Zhao

AECOM
48 QUARRY PARK BLVD SE
CALGARY, AB
Canada T2C 5P2

Your P.O. #: 700595655
Your Project #: 60608868, Ray Rock
Site#: Ray Rock
Site Location: Rayrock, NT
Your C.O.C. #: 648554-01-01

Report Date: 2021/10/08
Report #: R3082662
Version: 2 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C174622

Received: 2021/10/03, 16:47

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas

08 Oct 2021 15:33:19

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Key Account Specialist

Email: Parminder.Virk@bureauveritas.com

Phone# (403)735-2235

=====

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BUREAU
VERITAS

BV Labs Job #: C174622
Report Date: 2021/10/08

AECOM
Client Project #: 60608868, Ray Rock
Site Location: Rayrock, NT
Your P.O. #: 700595655

AT1 BTEX AND F1-F4 IN WATER (WATER)

BV Labs ID		AHI359	AHI367		
Sampling Date		2021/10/02	2021/10/02		
COC Number		648554-01-01	648554-01-01		
	UNITS	MLVC-0309-P	MLVC-0509-P	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	A380467
F3 (C16-C34 Hydrocarbons)	mg/L	0.36	0.36	0.10	A380467
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	0.20	A380467
Volatiles					
Benzene	ug/L	<0.40	<0.40	0.40	A377712
Toluene	ug/L	<0.40	<0.40	0.40	A377712
Ethylbenzene	ug/L	<0.40	<0.40	0.40	A377712
m & p-Xylene	ug/L	<0.80	<0.80	0.80	A377712
o-Xylene	ug/L	<0.40	<0.40	0.40	A377712
Xylenes (Total)	ug/L	<0.89	<0.89	0.89	A378908
F1 (C6-C10) - BTEX	ug/L	<100	<100	100	A378908
F1 (C6-C10)	ug/L	<100	<100	100	A377712
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	106	105		A377712
4-Bromofluorobenzene (sur.)	%	99	94		A377712
D4-1,2-Dichloroethane (sur.)	%	92	91		A377712
O-TERPHENYL (sur.)	%	100	106		A380467
RDL = Reportable Detection Limit					



BUREAU
VERITAS

BV Labs Job #: C174622
Report Date: 2021/10/08

AECOM
Client Project #: 60608868, Ray Rock
Site Location: Rayrock, NT
Your P.O. #: 700595655

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C
Package 2	7.3°C
Package 3	1.7°C

AT1 BTEX AND F1-F4 IN WATER (WATER) Comments

Sample AHI359 [MLVC-0309-P] CCME Hydrocarbons (F2-F4 in water): Sample required decanting due to inappropriate sample container.
Sample AHI367 [MLVC-0509-P] CCME Hydrocarbons (F2-F4 in water): Sample required decanting due to inappropriate sample container.

Results relate only to the items tested.

BV Labs - Partial/Rush Results



BUREAU
VERITAS

BV Labs Job #: C174622

Report Date: 2021/10/08

QUALITY ASSURANCE REPORT

AECOM

Client Project #: 60608868, Ray Rock

Site Location: Rayrock, NT

Your P.O. #: 700595655

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A377712	1,4-Difluorobenzene (sur.)	2021/10/07	103	50 - 140	101	50 - 140	109	%		
A377712	4-Bromofluorobenzene (sur.)	2021/10/07	100	50 - 140	101	50 - 140	102	%		
A377712	D4-1,2-Dichloroethane (sur.)	2021/10/07	112	50 - 140	110	50 - 140	105	%		
A380467	O-TERPHENYL (sur.)	2021/10/08	126	60 - 140	105	60 - 140	97	%		
A377712	Benzene	2021/10/07	94	50 - 140	96	60 - 130	<0.40	ug/L	NC	30
A377712	Ethylbenzene	2021/10/07	97	50 - 140	100	60 - 130	<0.40	ug/L	NC	30
A377712	F1 (C6-C10)	2021/10/07	72	60 - 140	87	60 - 140	<100	ug/L	NC	30
A377712	m & p-Xylene	2021/10/07	97	50 - 140	100	60 - 130	<0.80	ug/L	NC	30
A377712	o-Xylene	2021/10/07	98	50 - 140	101	60 - 130	<0.40	ug/L	NC	30
A377712	Toluene	2021/10/07	92	50 - 140	94	60 - 130	<0.40	ug/L	NC	30
A380467	F2 (C10-C16 Hydrocarbons)	2021/10/08	131	60 - 140	112	60 - 140	<0.10	mg/L	NC	30
A380467	F3 (C16-C34 Hydrocarbons)	2021/10/08	135	60 - 140	113	60 - 140	<0.10	mg/L	NC	30
A380467	F4 (C34-C50 Hydrocarbons)	2021/10/08	139	60 - 140	111	60 - 140	<0.20	mg/L	NC	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).



BUREAU
VERITAS

BV Labs Job #: C174622
Report Date: 2021/10/08

AECOM
Client Project #: 60608868, Ray Rock
Site Location: Rayrock, NT
Your P.O. #: 700595655

VALIDATION SIGNATURE PAGE


The analytical data and all QC contained in this report were reviewed and validated by:

Gita Pokhrel, Laboratory Supervisor

Janet Gao, B.Sc., QP, Supervisor, Organics

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.


BV Labs - Partial/Rush Results



Bureau Veritas Laboratories
4000 19st N.E. Calgary, Alberta Canada T2E 6P8 Tel (403) 291-3077 Toll-free: 800-563-6266 Fax: (403) 291-9468 www.bvlabs.com

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information		Laboratory Use Only												
Company Name	#2597 PUBLIC WORKS & GOVERNMENT SERVICE	Company Name	#41737 AECOM	Quotation #	C10882	BV Labs Job #	Bottle Order #:											
Contact Name	Rebecca Studer-Halbach	Contact Name	Michael Zhao	P.O. #	700595655	C174622												
Address	9700 JASPER AVENUE NW EDMONTON AB T5J 4C3	Address	48 QUARRY PARK BLVD SE CALGARY AB T2C 5P2	Project #	60608868													
Phone	(780) 497-3886 Fax: (780) 982-1887	Phone	(403) 254-3301 Fax: (403) 254-3301	Project Name	Rayrock, NT	Chain Of Custody Record												
Email	REBECCA.STUDER-HALBACH@tpsgc-pwgsc.gc.ca	Email	michael.zhao@aecom.com; michael.zhao@tpsgc-pwgsc.gc.ca	Site #		Project Manager												
Regulatory Criteria		Special Instructions		Analysis Requested		Turnaround Time (TAT) Required												
		Rob. McCullough @AECOM.COM		Regulated Drinking Water (Y/N) <input checked="" type="checkbox"/> Metals Field Filtered (Y/N) <input checked="" type="checkbox"/> Carbon (DOC) <input checked="" type="checkbox"/> Carbon (Total Organic) <input checked="" type="checkbox"/> Fluoride <input checked="" type="checkbox"/> Regulated Metals (C/M/E/A/T1) <input checked="" type="checkbox"/> Routine Water + Ammonia <input checked="" type="checkbox"/> Radionuclides (Lead-210, Polonium-210, Radium-226, Thorium-230, Uranium-238) <input checked="" type="checkbox"/> True Colour <input checked="" type="checkbox"/> TSS/TDS <input checked="" type="checkbox"/> Regulated Metals (C/M/E/A/T1) - Dissolved <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/>		Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: OCT 6, 2021 Time Required: <input checked="" type="checkbox"/> Rush Confirmation Number _____ (call lab for #)												
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form Samples must be kept cool (< 10°C) from time of sampling until delivery to BV Labs																		
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water (Y/N)	Metals Field Filtered (Y/N)	Carbon (DOC)	Carbon (Total Organic)	Fluoride	Regulated Metals (C/M/E/A/T1) - Total	Routine Water + Ammonia	Radionuclides (Lead-210, Polonium-210, Radium-226, Thorium-230, Uranium-238)	True Colour	TSS/TDS	Regulated Metals (C/M/E/A/T1) - Dissolved	Turbidity	# of Bottles	Comments
1	MLVC-0309-P	10/2/2021		Water	Y	Y	X	X	X	X	X	X	X	X	X	X	17	Radionuclides on Regular TAT; other parameters Rush
2	MLVC-0309-P	10/2/2021		Water	Y	Y	X	X	X	X	X	X	X	X	X	X	17	Radionuclides on Regular TAT; other parameters Rush
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted		Lab Use Only								
M Zhao		21/10/21	10:10	Amelia Kristylin Amiga		2021/10/24	15:10			Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?						
										<input type="checkbox"/>	see ACTR	<input type="checkbox"/> Yes <input type="checkbox"/> No						

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.