Annual Report of Monitoring

Riondel Water System

Developed in accordance with the
British Columbia Drinking Water Protection Act

rdck.ca

BALFOUR WATER SYSTEM	
Period of Monitoring Covered by this Report:	January 1 - December 31, 2023
Interior Health Permit to Operate Facility Number:	12-098-00377
EOCP Classification:	SWS
IHA Permit:	Drinking Water System 15 - 300 Connections
Location of Water Supply System:	Riondel, BC

Contact Information:
Regional District of Central Kootenay
Box 590, 202 Lakeside Drive
Nelson, BC V1L 5R4
PH: (250) 352-8171
Email: WaterContact@rdck.bc.ca

TABLE OF CONTENTS

1. Introduction

Riondel is a community located on the east Shore of Kootenay Lake with access off of Highway 3A. It is within the RDCK Electoral Area A. The Riondel system was first developed in the mid-1900s to service the Bluebell mine site. It was converted to an RDCK service in 1972 and services 198 active connections. The RDCK receives community-specific advice and policy guidance from the Riondel Commission of Management. The commission also coordinates the operation and maintenance of the system, and facilitates communication with the community.

As part of the British Columbia Provincial *Drinking Water Protection Act (2001)* and *Drinking Water Protection Regulation (2003)* an annual water system report to water users is required. This annual report summarizes information collected and recorded throughout the reporting period, and details additional relevant information to the water system.

2. Water Treatment Objectives

The provincial technical document *Drinking Water Treatment objectives (Microbiological) for Surface Water Supplies in British Columbia (2012)* provides performance targets for water suppliers to ensure the provision of biologically safe drinking water. Interior Health supports water suppliers to meet these objectives as risk to human health is substantially reduced. The general treatment objectives are:

- 4-log (99.99%) removal/inactivation of viruses
- 3-log (99.9%) removal/inactivation of Giardia and Cryptosporidium (oocysts)
- Two separate treatment processes (multi-barrier) for surface water supplies
- Turbidity less than 1 NTU (Nephelometric Turbidity Unit)
- Zero total and fecal coliforms (E. coli)

The Riondel water treatment plant provides biologically safe drinking water to its users and achieves the above listed treatment objectives through various system components installed and maintained at the water treatment plant.

3. Water System Overview

The water system derives source water from Indian Creek. A low, concrete weir with diversion inlets has been built on this creek, which delivers the source water to the treatment plant. Water is filtered through a coarse 100 micron self-cleaning screen, then filtered through a semi-permeable membrane, also known as ultra-filtration. The filtered water is then disinfected with chlorine. The treated water is stored in a reservoir and then released into the distribution system.

4. Monitoring

The Riondel water system includes monitoring for bacteriological testing (total/fecal coliforms), turbidity, chlorine residual (free and total), consumption, and chemical constituents.

4.1 Bacteriological

Sampling is done weekly from various locations within the distribution system. Tests for total and fecal coliforms are performed in accordance with the methods outlined in the *Standard Methods for the Examination of Water and Wastewater (2005).* Colony forming units (cfu) per 100 ml are determined for each sample. There were no adverse sample results in 2023.

4.2 Turbidity

Turbidity is measured on the raw and post ultra-filtration water using both in-line and handheld turbidity meters. The Regional District targets a turbidity level post ultrafiltration treatment below 0.10 NTU. Turbidity levels did not exceed this target within the reporting period. Figure 1 outlines raw water turbidity levels, and Figure 2 outlines treated water turbidity levels. Comparing these two figures demonstrates the effectiveness of membrane filtration to reduce turbidity in source water.

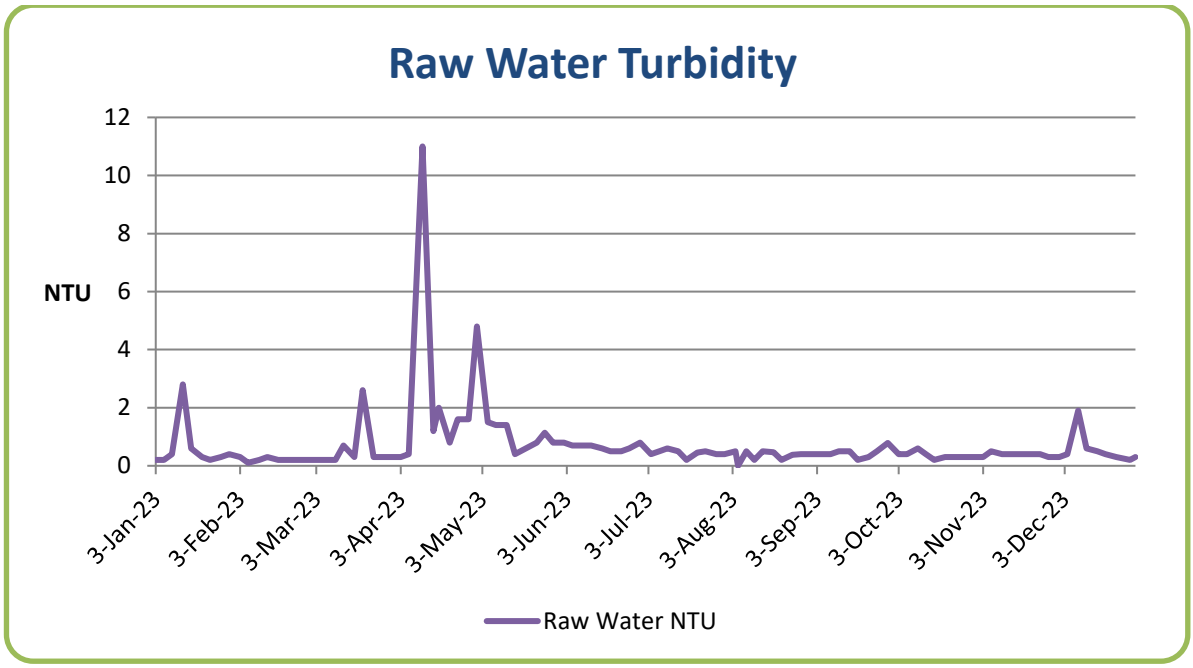

Figure 1 – Raw Water Turbidity Levels for Reporting Period

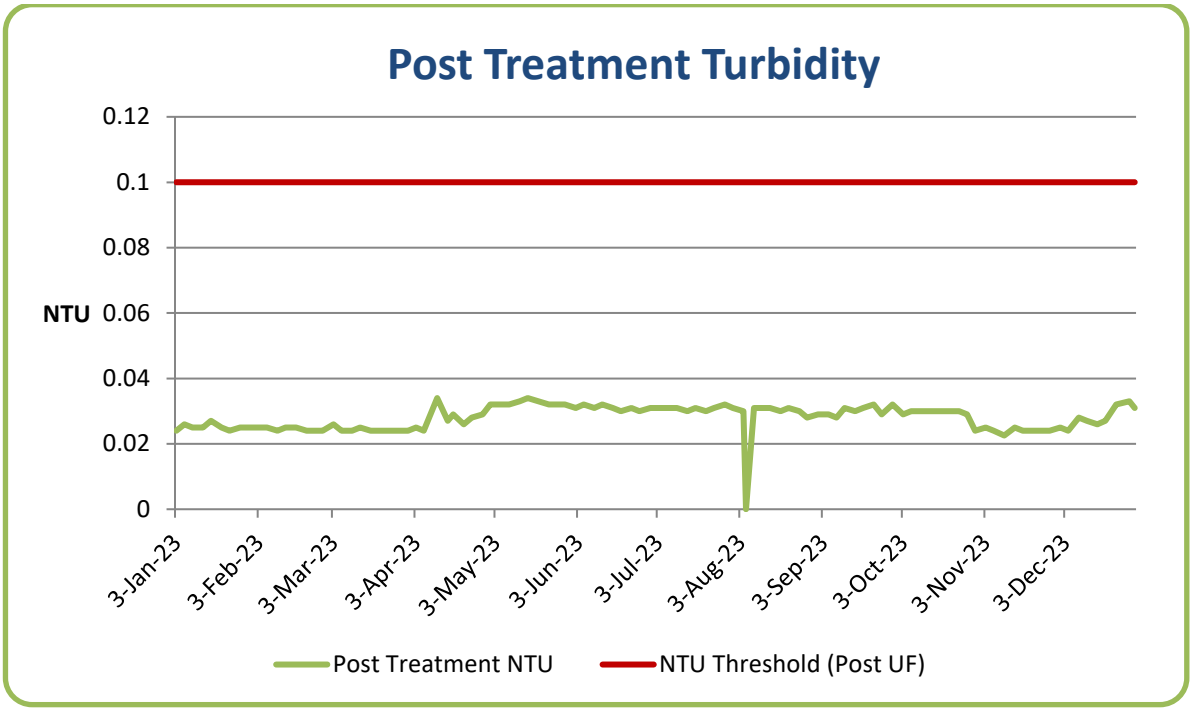

Figure 2 – Post Treatment Turbidity Levels for Reporting Period

4.3 Chlorine Residual

Chlorine residual levels are measured at the water treatment plant and within the distribution system using both in-line and handheld chlorine meters. Figure 3 shows chlorine residual levels at the water treatment plant and within the distribution system. The Regional District targets a minimum chlorine residual of 0.70 mg/l leaving the reservoir to achieve the required 0.2 mg/L in all areas of the distribution system. Chlorine residual levels within the distribution system did not drop below the 0.2 mg/L minimum during the reporting period. If residual targets are not met the issue is immediately addressed by operators to raise chlorine residual levels.

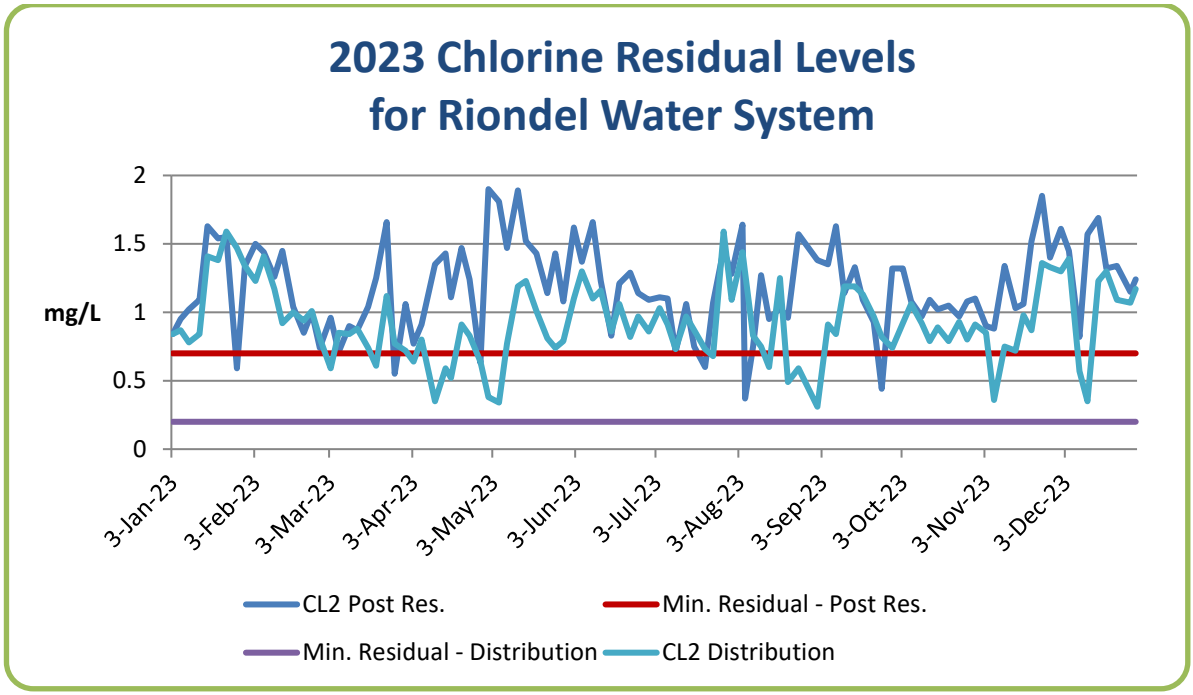

Figure 3 – Free Chlorine Residual Levels for Reporting Period

4.4 Consumption

Flow rates are measured at the ultra-filtration treatment system. The total recorded volume of treated water for the reporting period was 108,905 m3. Figure 4 shows the consumption volume per month for the reporting period.

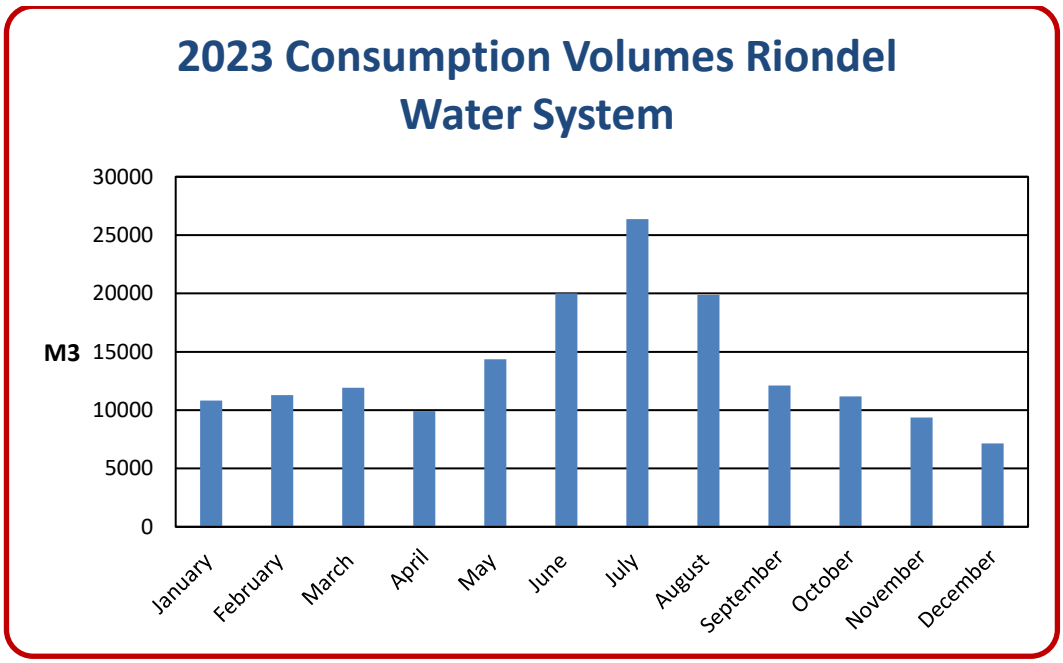

Figure 4 – Treated Water Volumes for Reporting Period

4.5 Chemistry

Comprehensive chemical analysis of water constituents was completed in December 2019. The results in Appendix A show that chemical parameters are below the Maximum Acceptable Concentration (MAC) as detailed in Health Canada's *Guidelines for Canadian Drinking Water Quality – Summary Table (2024)*.

The RDCK also tested for the chemical disinfection by-products Trihalomethanes/Haloacetic Acids, and Volatile Organic Compounds in June and October. These results are presented in Appendix B. The results show that levels are below the MAC as outlined in the *Guidelines*.

5. Advisories Issued

The following table describes the Notices and Advisories issued for the reporting period.

Table 1 – Notices and Advisories Issued

Notice/Advisory Type	Dates in Effect	Reason
Boil Water Notice - Localized	October 26 – November 2, 2023	Water main shut down for service work

*Each Notice/Advisory was issued a Rescind Notice to notify the public once action was completed and water quality sampling results demonstrated good water quality.

6. Capital Projects and Operations & Maintenance

There were no completed capital projects in 2023. In 2023, a water main break was repaired between the curling rink and outdoor rink. The creek intake box and dam were cleaned. One service valve was located and brought to the surface and one broken curb stop was repaired. All regular distribution flushing and valve exercising was completed.

7. Water Conservation

Mandatory Stage 1 water conservation measures are in place from June 1 to September 30 every year. Stage 1 measures permit the watering of lawns, gardens, trees and shrubs only from 7pm to 10am daily. Watering using drip irrigation, a watering can or a hand held hose is permitted anytime.

The RDCK implemented Stage 2 Water Conservation Measures on July 19th, 2023. Stage 2 measures permit watering of lawns, gardens, trees and shrubs ONLY between 6:00am-10:00am and 8:00pm-10:00pm. Watering using drip irrigation, a watering can or a hand held hose is permitted anytime. These measures remained in place until October 5, 2023 when all conservation measures were rescinded.

8. Planned Improvements

8.1 Improvements Required by Operating Permit or Drinking Water Officer

Interior Health has identified the following Water Treatment Plant deficiencies: cross connection control, and membrane flux monitoring and flow rate automation (flux is allowable flow rate through the filter membranes and varies with changes in water temperature). Membrane flux is currently being monitored manually, this is a process that should be automated by adjusting for water temperature.

8.2 Future Improvements

Future planned capital upgrades and actions include the following:

- Reservoir valve chamber replacement
- Installation of post-reservoir flow meter
- Procurement and installation of back-up generator

9. Training and Certification

Table 2 – Operator Certification

OPERATOR	ACTIVE EOCP LEVELS
Allan K. Richardson	WD-II, WT-II, WWC-II, MWWT-I, CH
Cody Peck	WT-II, WD-II, CH
Evan Bjarnason	WT-II, WD-II, CH
Evan Salmon	WT-I
James Croft	SWS
Kalen Luck	WT-I

10. Emergency Response and Contingency Plan

An Emergency Response and Contingency Plan (ERCP) for the Riondel Water System is updated annually. This document includes emergency contact information, a communications plan, and detailed procedures for the following types of incidents:

- broken water main;
- source contamination;
- elevated turbidity levels in treated water;
- fire in a building;
- flood conditions;
- loss of source;

- presence of coliforms or E. coli;
- pump failure;
- power failure; and
- low chlorine residuals.

The *Drinking Water Protection Regulation (2003)*, under Section 13, requires that water suppliers provide an ERCP to address any potential emergencies that may impact the delivery of water and health of those being supplied by the water system. The ERCP must be made accessible to the staff of the water supplier and a copy submitted to the local Environmental Health Officer. The RDCK has fulfilled these requirements for the Riondel Water System.

Appendix A: Comprehensive Chemistry Analysis Results

CERTIFICATE OF ANALYSIS

REPORTED TO	Interior Health Authority - Vernon 1440-14th Avenue Vernon, BC V1B 2T1		
ATTENTION	Chris Russell	**WORK ORDER**	9120863
PO NUMBER		**RECEIVED / TEMP**	2019-12-10 09:30 / 6°C
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35
PROJECT INFO	Riondel Water RDCK	**COC NUMBER**	No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at sgulenchyn@caro.ca

Authorized By:

Sara Gulenchyn, B.Sc, P.Chem.
Client Service Manager

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Interior Health Authority - Vernon	**WORK ORDER**	9120863
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
2344; Riondel Water RDCK - Reseevoir Tank (9120863-01) | Matrix: Water | Sampled: 2019-12-09 09:00						
Anions						
Chloride	**1.32**	AO ≤ 250	0.10	mg/L	2019-12-11	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2019-12-11	
Nitrate (as N)	**0.064**	MAC = 10	0.010	mg/L	2019-12-11	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2019-12-11	
Sulfate	**15.8**	AO ≤ 500	1.0	mg/L	2019-12-11	
Calculated Parameters						
Hardness, Total (as CaCO3)	**95.1**	None Required	0.500	mg/L	N/A	
Langelier Index	**-0.07**	N/A	-5.0		2019-12-18	
Solids, Total Dissolved	**114**	AO ≤ 500	1.00	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	**91.1**	N/A	1.0	mg/L	2019-12-12	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2019-12-12	
Alkalinity, Bicarbonate (as CaCO3)	**91.1**	N/A	1.0	mg/L	2019-12-12	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2019-12-12	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2019-12-12	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2019-12-11	
Conductivity (EC)	**201**	N/A	2.0	µS/cm	2019-12-12	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2019-12-12	
pH	**7.91**	7.0-10.5	0.10	pH units	2019-12-12	HT2
Temperature, at pH	**22.5**	N/A		°C	2019-12-12	HT2
Turbidity	< 0.10	OG < 1	0.10	NTU	2019-12-11	
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2019-12-18	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2019-12-18	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2019-12-18	
Barium, total	**0.0433**	MAC = 1	0.0050	mg/L	2019-12-18	
Boron, total	< 0.0050	MAC = 5	0.0050	mg/L	2019-12-18	
Cadmium, total	< 0.000010	MAC = 0.005	0.000010	mg/L	2019-12-18	
Calcium, total	**31.2**	None Required	0.20	mg/L	2019-12-18	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2019-12-18	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2019-12-18	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2019-12-18	
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2019-12-18	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2019-12-18	
Magnesium, total	**4.14**	None Required	0.010	mg/L	2019-12-18	
Manganese, total	< 0.00020	MAC = 0.12	0.00020	mg/L	2019-12-18	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2019-12-12	
Molybdenum, total	**0.00179**	N/A	0.00010	mg/L	2019-12-18	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2019-12-18	
Potassium, total	**3.63**	N/A	0.10	mg/L	2019-12-18	

TEST RESULTS

REPORTED TO	Interior Health Authority - Vernon	**WORK ORDER**	9120863
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
2344; Riondel Water RDCK - Reseevoir Tank (9120863-01) | Matrix: Water | Sampled: 2019-12-09 09:00, Continued						
Total Metals, Continued						
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2019-12-18	
Sodium, total	**2.17**	AO ≤ 200	0.10	mg/L	2019-12-18	
Strontium, total	**0.0966**	7	0.0010	mg/L	2019-12-18	
Uranium, total	**0.00190**	MAC = 0.02	0.000020	mg/L	2019-12-18	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2019-12-18	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Interior Health Authority - Vernon	**WORK ORDER**	9120863
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35

Analysis Description	Method Ref.	Technique	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	Kelowna
Colour, True in Water	SM 2120 C (2017)	Spectrophotometry (456 nm)	Kelowna
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	N/A
Langelier Index in Water	SM 2330 B (2017)	Calculation	N/A
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	Kelowna
Solids, Total Dissolved in Water	SM 1030 E (2017)	SM 1030 E (2011)	N/A
Total Metals in Water	EPA 200.2* / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	Richmond
Turbidity in Water	SM 2130 B (2017)	Nephelometry	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
°C	Degrees Celcius
AO	Aesthetic Objective
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, ph > 7 = basic
µS/cm	Microsiemens per centimetre
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:sgulenchyn@caro.ca

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Interior Health Authority - Vernon	**WORK ORDER**	9120863
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B9L0892										
Blank (B9L0892-BLK1)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9L0892-BLK2)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B9L0892-BS1)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Fluoride	4.10	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.11	0.010	mg/L	4.00		103	90-110			
Nitrite (as N)	2.02	0.010	mg/L	2.00		101	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
LCS (B9L0892-BS2)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	3.95	0.10	mg/L	4.00		99	88-108			
Nitrate (as N)	4.11	0.010	mg/L	4.00		103	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		101	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
General Parameters, Batch B9L0873										
Blank (B9L0873-BLK1)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Turbidity	< 0.10	0.10	NTU							
LCS (B9L0873-BS1)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Turbidity	38.8	0.10	NTU	40.0		97	90-110			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Interior Health Authority - Vernon	**WORK ORDER**	9120863
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B9L0873, Continued										
General Parameters, Batch B9L0876										
Blank (B9L0876-BLK1)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Colour, True	< 5.0	5.0	CU							
Blank (B9L0876-BLK2)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Colour, True	< 5.0	5.0	CU							
LCS (B9L0876-BS1)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Colour, True	21	5.0	CU	20.0		103	85-115			
LCS (B9L0876-BS2)				Prepared: 2019-12-11, Analyzed: 2019-12-11						
Colour, True	21	5.0	CU	20.0		105	85-115			
General Parameters, Batch B9L0919										
Blank (B9L0919-BLK1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Cyanide, Total	< 0.0020	0.0020	mg/L							
Blank (B9L0919-BLK2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Cyanide, Total	< 0.0020	0.0020	mg/L							
LCS (B9L0919-BS1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Cyanide, Total	0.0196	0.0020	mg/L	0.0200		98	82-120			
LCS (B9L0919-BS2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Cyanide, Total	0.0189	0.0020	mg/L	0.0200		95	82-120			
LCS Dup (B9L0919-BSD1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Cyanide, Total	0.0202	0.0020	mg/L	0.0200		101	82-120	3	10	
LCS Dup (B9L0919-BSD2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Cyanide, Total	0.0183	0.0020	mg/L	0.0200		92	82-120	3	10	
General Parameters, Batch B9L0980										
Blank (B9L0980-BLK1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B9L0980-BLK2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B9L0980-BS1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Alkalinity, Total (as CaCO3)	95.8	1.0	mg/L	100		96	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Interior Health Authority - Vernon	**WORK ORDER**	9120863
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B9L0980, Continued										
LCS (B9L0980-BS2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Alkalinity, Total (as CaCO3)	95.4	1.0	mg/L	100		95	80-120			
LCS (B9L0980-BS3)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Conductivity (EC)	1370	2.0	µS/cm	1410		97	95-104			
LCS (B9L0980-BS4)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Conductivity (EC)	1360	2.0	µS/cm	1410		97	95-104			
Reference (B9L0980-SRM1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
pH	6.99	0.10	pH units	7.01		100	98-102			
Reference (B9L0980-SRM2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
pH	7.02	0.10	pH units	7.01		100	98-102			
Total Metals, Batch B9L1006										
Blank (B9L1006-BLK1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Mercury, total	< 0.000010	0.000010	mg/L							
Blank (B9L1006-BLK2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Mercury, total	< 0.000010	0.000010	mg/L							
Reference (B9L1006-SRM1)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Mercury, total	0.00480	0.000010	mg/L	0.00489		98	80-120			
Reference (B9L1006-SRM2)				Prepared: 2019-12-12, Analyzed: 2019-12-12						
Mercury, total	0.00463	0.000010	mg/L	0.00489		95	80-120			
Total Metals, Batch B9L1125										
Blank (B9L1125-BLK1)				Prepared: 2019-12-13, Analyzed: 2019-12-18						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Boron, total	< 0.0050	0.0050	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Interior Health Authority - Vernon	**WORK ORDER**	9120863
PROJECT	Comprehensive Testing 2019 (Chris Russell)	**REPORTED**	2019-12-18 18:35

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B9L1125, Continued										
LCS (B9L1125-BS1)				Prepared: 2019-12-13, Analyzed: 2019-12-18						
Aluminum, total	0.0199	0.0050	mg/L	0.0199		100	80-120			
Antimony, total	0.0189	0.00020	mg/L	0.0200		94	80-120			
Arsenic, total	0.0197	0.00050	mg/L	0.0200		98	80-120			
Barium, total	0.0180	0.0050	mg/L	0.0198		91	80-120			
Boron, total	0.0184	0.0050	mg/L	0.0200		92	80-120			
Cadmium, total	0.0193	0.000010	mg/L	0.0199		97	80-120			
Calcium, total	1.84	0.20	mg/L	2.02		91	80-120			
Chromium, total	0.0196	0.00050	mg/L	0.0198		99	80-120			
Cobalt, total	0.0201	0.00010	mg/L	0.0199		101	80-120			
Copper, total	0.0201	0.00040	mg/L	0.0200		100	80-120			
Iron, total	1.85	0.010	mg/L	2.02		91	80-120			
Lead, total	0.0196	0.00020	mg/L	0.0199		99	80-120			
Magnesium, total	1.86	0.010	mg/L	2.02		92	80-120			
Manganese, total	0.0187	0.00020	mg/L	0.0199		94	80-120			
Molybdenum, total	0.0186	0.00010	mg/L	0.0200		93	80-120			
Nickel, total	0.0200	0.00040	mg/L	0.0200		100	80-120			
Potassium, total	1.80	0.10	mg/L	2.02		89	80-120			
Selenium, total	0.0202	0.00050	mg/L	0.0200		101	80-120			
Sodium, total	1.90	0.10	mg/L	2.02		94	80-120			
Strontium, total	0.0181	0.0010	mg/L	0.0200		90	80-120			
Uranium, total	0.0200	0.000020	mg/L	0.0200		100	80-120			
Zinc, total	0.0233	0.0040	mg/L	0.0200		117	80-120			
Reference (B9L1125-SRM1)				Prepared: 2019-12-13, Analyzed: 2019-12-18						
Aluminum, total	0.113	0.0050	mg/L	0.118		96	82-114			
Antimony, total	0.0220	0.00020	mg/L	0.0216		102	88-115			
Arsenic, total	0.227	0.00050	mg/L	0.212		107	88-111			
Barium, total	1.53	0.0050	mg/L	1.65		93	83-110			
Boron, total	0.781	0.0050	mg/L	0.825		95	79-117			
Cadmium, total	0.111	0.000010	mg/L	0.110		100	90-110			
Calcium, total	3.82	0.20	mg/L	3.86		99	85-120			
Chromium, total	0.224	0.00050	mg/L	0.217		103	88-111			
Cobalt, total	0.0663	0.00010	mg/L	0.0620		107	90-114			
Copper, total	0.438	0.00040	mg/L	0.408		107	90-117			
Iron, total	0.633	0.010	mg/L	0.635		100	90-116			
Lead, total	0.0561	0.00020	mg/L	0.0550		102	90-110			
Magnesium, total	3.33	0.010	mg/L	3.30		101	88-116			
Manganese, total	0.169	0.00020	mg/L	0.171		99	88-108			
Molybdenum, total	0.204	0.00010	mg/L	0.202		101	88-110			
Nickel, total	0.437	0.00040	mg/L	0.418		105	90-112			
Potassium, total	1.38	0.10	mg/L	1.44		96	87-116			
Selenium, total	0.0180	0.00050	mg/L	0.0162		111	90-122			
Sodium, total	8.93	0.10	mg/L	9.00		99	81-117			
Strontium, total	0.459	0.0010	mg/L	0.468		98	86-110			
Uranium, total	0.128	0.000020	mg/L	0.129		99	88-112			
Zinc, total	0.461	0.0040	mg/L	0.424		109	90-113			

Appendix B: Trihalomethanes/Haloacetic Acid and Volatile Organic Compounds Monitoring Results

CERTIFICATE OF ANALYSIS

REPORTED TO	Regional District of Central Kootenay - Nelson Box 590 - 202 Lakeside Drive Nelson, BC V1L 5R4		
ATTENTION	Alex Divakovski	**WORK ORDER**	23F1102
PO NUMBER	RDCK- Riondel	**RECEIVED / TEMP**	2023-06-07 09:45 / 14.0°C
PROJECT	Riondel	**REPORTED**	2023-06-16 13:56
PROJECT INFO		**COC NUMBER**	37652

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

TEST RESULTS

REPORTED TO	Regional District of Central Kootenay - Nelson	**WORK ORDER**	23F1102
PROJECT	Riondel	**REPORTED**	2023-06-16 13:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
ROH - control room (23F1102-01) | Matrix: Water | Sampled: 2023-06-05 13:40						
Calculated Parameters						
Total Trihalomethanes	< 0.00400	MAC = 0.1	0.00400	mg/L	N/A	
Haloacetic Acids						
Monochloroacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-06-14	
Monobromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-06-14	
Dichloroacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-06-14	
Trichloroacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-06-14	
Dibromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-06-14	
Total Haloacetic Acids (HAA5)	< 0.00200	MAC = 0.08	0.00200	mg/L	N/A	
Surrogate: 2-Bromopropionic Acid	*108*		*70-130*	%	*2023-06-14*	
Volatile Organic Compounds (VOC)						
Bromodichloromethane	< 0.0010	N/A	0.0010	mg/L	2023-06-14	
Bromoform	< 0.0010	N/A	0.0010	mg/L	2023-06-14	
Chloroform	**0.0014**	N/A	0.0010	mg/L	2023-06-14	
Dibromochloromethane	< 0.0010	N/A	0.0010	mg/L	2023-06-14	
Surrogate: Toluene-d8	*110*		*70-130*	%	*2023-06-14*	
Surrogate: 4-Bromofluorobenzene	*115*		*70-130*	%	*2023-06-14*	

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Regional District of Central Kootenay - Nelson	**WORK ORDER**	23F1102
PROJECT	Riondel	**REPORTED**	2023-06-16 13:56

Analysis Description	Method Ref.	Technique	Accredited	Location
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	✓	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed. The quality control (QC) data is available upon request

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bwhitehead@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

CERTIFICATE OF ANALYSIS

REPORTED TO	Regional District of Central Kootenay - Nelson Box 590 - 202 Lakeside Drive Nelson, BC V1L 5R4		
ATTENTION	Alex Divakovski	**WORK ORDER**	23J3101
PO NUMBER	RDCK- Riondel	**RECEIVED / TEMP**	2023-10-25 09:00 / 9.3°C
PROJECT	Riondel	**REPORTED**	2023-11-01 13:51
PROJECT INFO			

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

TEST RESULTS

REPORTED TO	Regional District of Central Kootenay - Nelson	**WORK ORDER**	23J3101
PROJECT	Riondel	**REPORTED**	2023-11-01 13:51

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
CC (23J3101-01) | Matrix: Water | Sampled: 2023-10-24 08:36						
Calculated Parameters						
Total Trihalomethanes	**0.0259**	MAC = 0.1	0.00400	mg/L	N/A	
Haloacetic Acids						
Monochloroacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-11-01	
Monobromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-11-01	
Dichloroacetic Acid	**0.0090**	N/A	0.0020	mg/L	2023-11-01	
Trichloroacetic Acid	**0.0103**	N/A	0.0020	mg/L	2023-11-01	
Dibromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-11-01	
Total Haloacetic Acids (HAA5)	**0.0193**	MAC = 0.08	0.00200	mg/L	N/A	
Surrogate: 2-Bromopropionic Acid	*104*		*70-130*	%	*2023-11-01*	
Volatile Organic Compounds (VOC)						
Bromodichloromethane	< 0.0010	N/A	0.0010	mg/L	2023-10-28	
Bromoform	< 0.0010	N/A	0.0010	mg/L	2023-10-28	
Chloroform	**0.0259**	N/A	0.0010	mg/L	2023-10-28	
Dibromochloromethane	< 0.0010	N/A	0.0010	mg/L	2023-10-28	
Surrogate: Toluene-d8	*93*		*70-130*	%	*2023-10-28*	
Surrogate: 4-Bromofluorobenzene	*87*		*70-130*	%	*2023-10-28*	

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Regional District of Central Kootenay - Nelson	**WORK ORDER**	23J3101
PROJECT	Riondel	**REPORTED**	2023-11-01 13:51

Analysis Description	Method Ref.	Technique	Accredited	Location
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	✓	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed. The quality control (QC) data is available upon request

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bwhitehead@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.