Annual Report of Monitoring

Erickson 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:	12-098-00381
EOCP Classification:	WD-II (Erickson) / WT-II (Arrow Creek)
IHA Permit:	Drinking Water System 301 - 10,0000 Connections
Location of Water Supply System:	Erickson, BC

Contact Information:
Regional District of Central Kootenay
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PH: (250) 352-8171
Email: WaterContact@rdck.bc.ca

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1. Introduction

The Erickson water system is located in Erickson just outside the eastern border of Creston, crossing the boundary of RDCK Electoral Areas B and C. The system services approximately 700 active connections and is the largest of the water systems managed by the RDCK. The Erickson Water System consists of two older systems: Erickson Irrigation District with source water from Sullivan Creek, and the East Creston Irrigation District established in 1929 with source water from Arrow Creek. The two Irrigation Districts combined in 1980 to become the Erickson Improvement District. In 2003, the Ministry of Municipal Affairs dissolved the system's Board of Trustees and the system was converted to a RDCK service with a new treatment plant constructed on Arrow Creek in 2005.

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 Erickson/Arrow Creek 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 Erickson Water System derives source water from Arrow Creek, which is classified as a Community Watershed. In 2005 a new water treatment plant was commissioned on Arrow Creek. This plant now serves the Erickson community as well as the Town of Creston. The treatment process begins with coarse screening, settling, and fine screening to reduce turbidity. Following this is membrane filtration for further turbidity reduction and physical removal of some microbiological components. Ultraviolet (UV) disinfection and chemical disinfection by chlorination are final treatments for microbiological components prior to water being released into the distribution system. A System Control and Data Acquisition (SCADA) unit allows for remote plant monitoring and operation.

4. Monitoring

The Erickson/Arrow Creek 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 from various locations within the distribution system. In addition to the certified lab sample testing, RDCK staff also conducts weekly in-house Coliform Presence/Absence testing. 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 Arrow Creek raw source water 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 exceeded this target amount on 4 days within the reporting period on September 5th and 15th and on October 3rd and 20th. Chlorine residuals post reservoir and in the distribution system were above 0.70 mg/l on those dates. Figure 1 outlines raw water turbidity levels, and Figure 2 outlines permeate (treated) water turbidity levels. Comparing these two figures demonstrates the effectiveness of membrane filtration to reduce turbidity in source water.

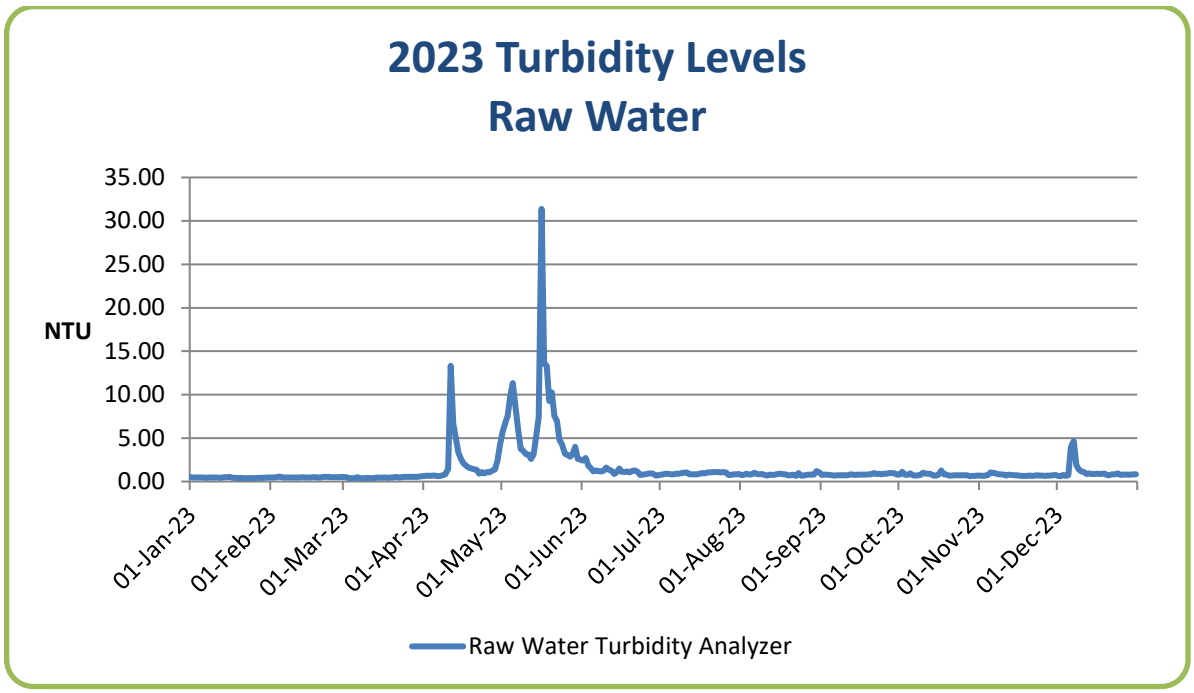

Figure 1 – Raw Water Turbidity Levels for Reporting Period

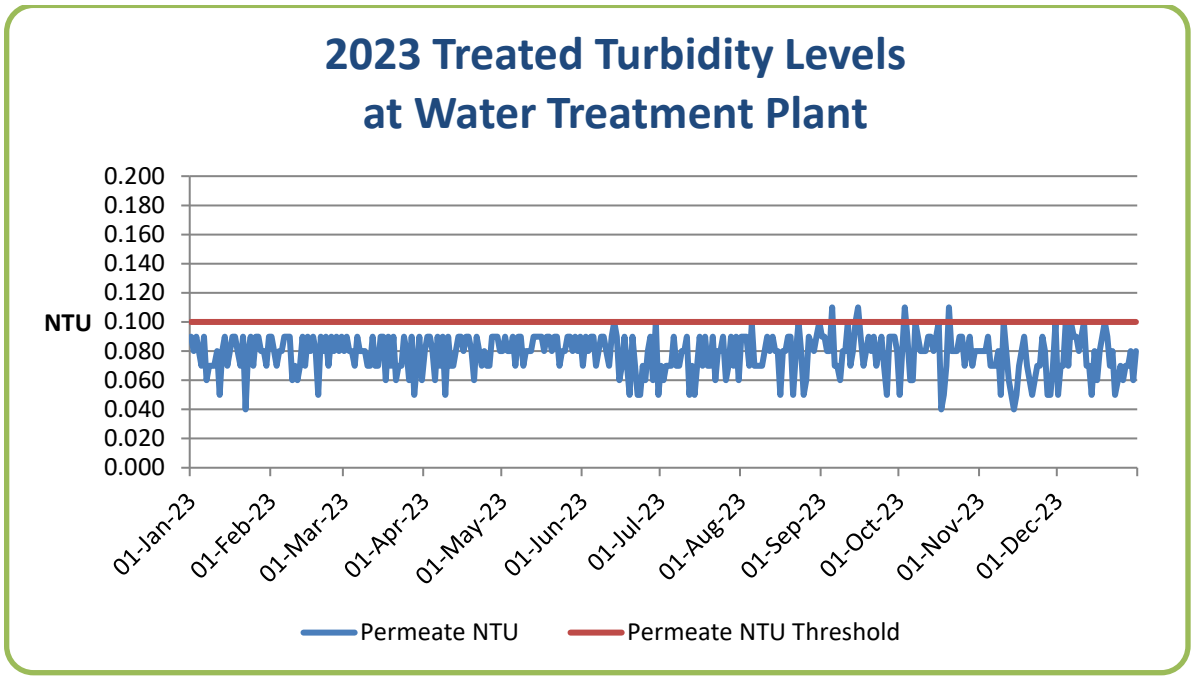

Figure 2 – Permeate (Treated) Water Turbidity Levels for Reporting Period

4.3 Chlorine Residual

Chlorine residual levels are measured post reservoir and within the distribution system throughout the year. The Regional District targets a minimum chlorine residual of 0.70 mg/l leaving the reservoir to maintain 0.2 mg/L in all areas of the distribution system as complete loss of residual would result in a water quality concern. There were 17 events of chlorine residual below the target of 0.70 mg/l leaving the treated water storage reservoir. With each instance of below-target residual, operators immediately responded to return residual levels above target. A Water Quality Advisory was issued from December 7 to 11 due to low Chlorine residual levels in the reservoir. Low residual Chlorine in this case was due to an increase in dissolved organics from heavy rains. Distribution flushing on line ends was also performed to help resolve the issue. Figure 3 shows chlorine residual levels post reservoir.

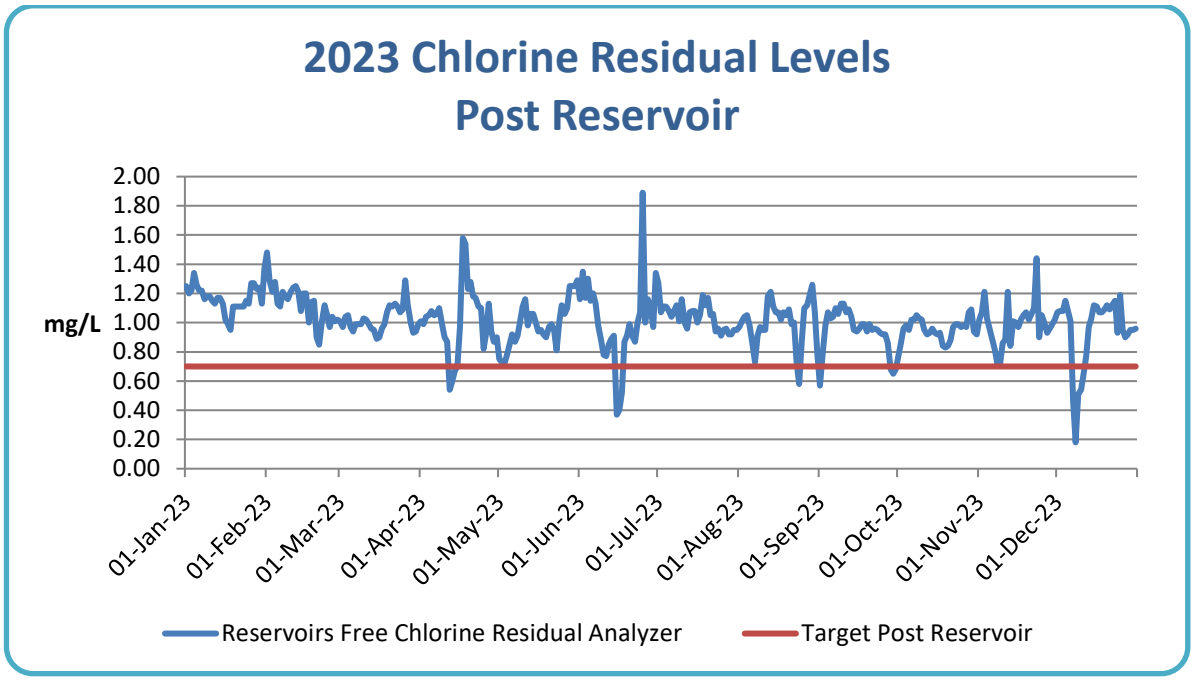

Figure 3 – Free Chlorine Residual Levels for Reporting Period

4.4 Consumption

Flow rates are measured for both the Arrow Creek water treatment plant and the Town of Creston. The consumption rate for the Erickson water system is determined from subtracting the two totals. The total recorded volume of treated water for the Arrow Creek water treatment plant in 2023 was 2,676,400 m^3. The total calculated consumption volume for the Erickson water system in 2023 was 1,217,100 m^3. Figure 4 shows the volumes per month of both the Arrow Creek water treatment plant and the Erickson water system for the reporting period.

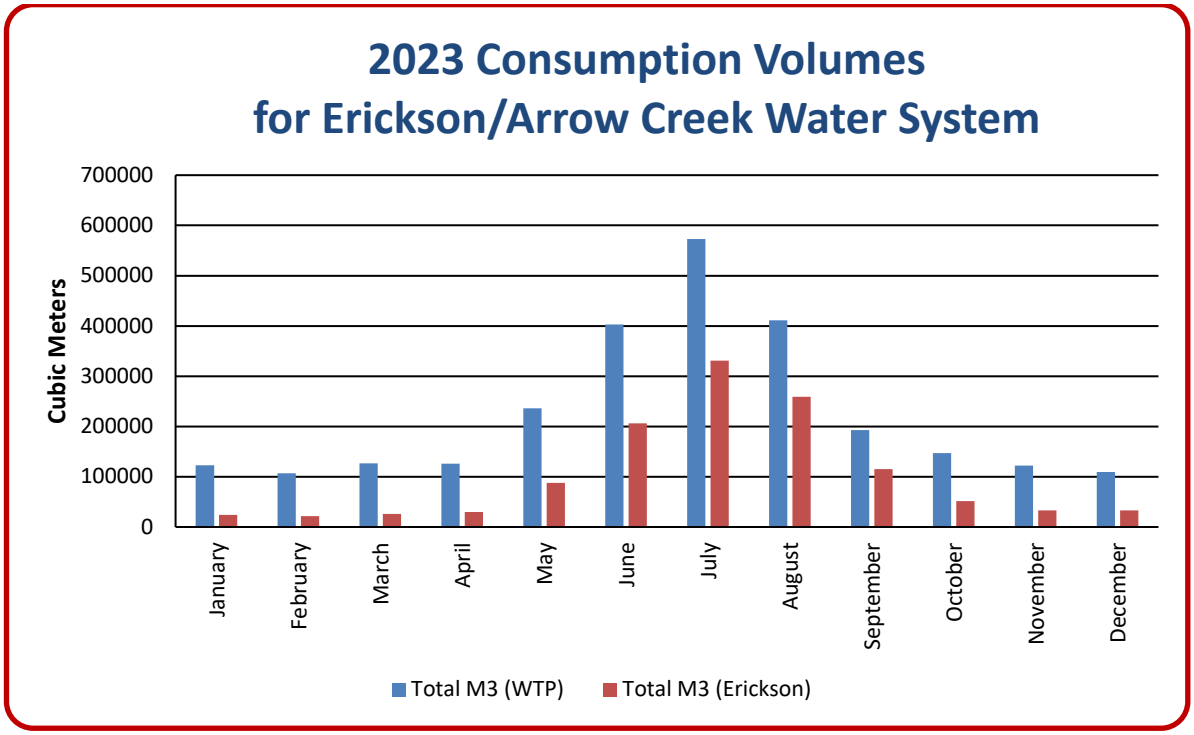

Figure 4 – Treated Water Volumes for Reporting Period

4.5 Chemistry

Comprehensive chemical analysis of water constituents was completed in January 2023 (including the assay for haloeacetic acids, a chemical disinfection by-product). 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 and Volatile Organic Compounds in January, 2023. These results are presented in Appendix A. 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	May 3 – 9, 2023	Water main repair
Boil Water Notice - Localized	Sept 19 – 29,2023	Installation of a pressure reducing valve
Boil Water Notice - Localized	Oct 5 – 16, 2023	Water main shut down
Water Quality Advisory	Dec 7 – 15, 2023	Low Chlorine residuals due to heavy rains

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

The following capital projects were completed in 2023:

- Determined number and size of meters required for Phase 1 metering
- Located and marked all service valves for Phase 1 metering
- Ceramic filter concept study initiated
- Heating and Energy upgrades initiated

The following operations and maintenance items were completed in 2023:

- Over 500 ft. of old water lines and a wooden valve/pit were replaced
- Repaired several service valve leaks
- 4 new properties serviced
- Repaired and replaced service valves to 2 properties
- Abandoned an old leaking standpipe on 25th Ave S as it is no longer used
- Membrane filter train repairs
- Intake pond and Johnson screen cleaning

7. Water Conservation

Mandatory Stage 1 water conservation measures are in place from June 1st to September 30th every year. In Stage 1 measures, watering lawns, gardens, trees and shrubs is permitted 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 the Erickson water system on July 19th, 2023. These measures remained in place until October 5, 2023 when all conservations measures were rescinded. 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. The RDCK did not implement Stage 3 Water Conservation Measures in the Erickson water system in 2023.

8. Planned Improvements

8.1 Improvements Required by Operating Permit or Drinking Water Officer

The Regional District and Interior Health are in the process of updating Operating Permit Conditions (OPC).

8.2 Future Improvements

The following future improvements are planned for the system:

- Ceramic filtration feasibility study
- Water main replacement on Erickson Road
- Intake erosion protection
- UV replacement
- Heating and energy upgrades to Water Treatment Plant
- Phase 1 of metering project

The universal metering plan will continue into 2024. Meters will be installed on properties with 5 or more acres of irrigation privileges. All commercial, industrial and, institutional properties will also have a meter installed.

To improve treatment plant operations and better manage Arrow Creek diversion rates, a water treatment plant bypass improvement and water intake diversion improvements are planned over the next several years.

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

The Emergency Response and Contingency Plan (ERCP) for the Erickson and Arrow Creek systems is updated annually. The ERCP 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;
- UV 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 Erickson Water System.

Appendix A: Comprehensive Chemistry Analysis Results

CERTIFICATE OF ANALYSIS

REPORTED TO	Regional District of Central Kootenay - Nelson Box 590 - 202 Lakeside Drive Nelson, BC V1L 5R4		
ATTENTION	RDCK- Nelson	**WORK ORDER**	23A2525
PO NUMBER	RDCK- Nelson	**RECEIVED / TEMP**	2023-01-25 16:30 / 5.6°C
PROJECT	General Potability	**REPORTED**	2023-02-02 10:38
PROJECT INFO	Erickson Water Source	**COC NUMBER**	B37921

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

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Kootenay - Nelson	**WORK ORDER**	23A2525
PROJECT	General Potability	**REPORTED**	2023-02-02 10:38

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Erickson Reservoir (23A2525-01) | Matrix: Water | Sampled: 2023-01-24 08:15						
Calculated Parameters						
Total Trihalomethanes	**0.0140**	MAC = 0.1	0.00400	mg/L	N/A	
Haloacetic Acids						
Monochloroacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-02-02	
Monobromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-02-02	
Dichloroacetic Acid	**0.0037**	N/A	0.0020	mg/L	2023-02-02	
Trichloroacetic Acid	**0.0046**	N/A	0.0020	mg/L	2023-02-02	
Dibromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2023-02-02	
Total Haloacetic Acids (HAA5)	**0.00834**	MAC = 0.08	0.00200	mg/L	N/A	
Surrogate: 2-Bromopropionic Acid	*104*		*70-130*	%	*2023-02-02*	
Volatile Organic Compounds (VOC)						
Bromodichloromethane	< 0.0010	N/A	0.0010	mg/L	2023-01-31	
Bromoform	< 0.0010	N/A	0.0010	mg/L	2023-01-31	
Chloroform	**0.0140**	N/A	0.0010	mg/L	2023-01-31	
Dibromochloromethane	< 0.0010	N/A	0.0010	mg/L	2023-01-31	
Surrogate: Toluene-d8	*91*		*70-130*	%	*2023-01-31*	
Surrogate: 4-Bromofluorobenzene	*82*		*70-130*	%	*2023-01-31*	
Arrow Creek Raw Water (23A2525-02) | Matrix: Water | Sampled: 2023-01-24 08:30						
Anions						
Chloride	**0.13**	AO ≤ 250	0.10	mg/L	2023-01-26	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2023-01-26	
Nitrate (as N)	**0.013**	MAC = 10	0.010	mg/L	2023-01-26	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-01-26	
Sulfate	**6.5**	AO ≤ 500	1.0	mg/L	2023-01-26	
Calculated Parameters						
Hardness, Total (as CaCO3)	**40.0**	None Required	0.500	mg/L	N/A	
Solids, Total Dissolved	**50.5**	AO ≤ 500	1.00	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	**45.6**	N/A	1.0	mg/L	2023-01-28	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-01-28	
Alkalinity, Bicarbonate (as CaCO3)	**45.6**	N/A	1.0	mg/L	2023-01-28	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-01-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-01-28	
Conductivity (EC)	**86.5**	N/A	2.0	µS/cm	2023-01-28	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2023-01-31	
pH	**6.59**	7.0-10.5	0.10	pH units	2023-01-28	HT2
Turbidity	< 0.10	OG < 1	0.10	NTU	2023-01-27	
Microbiological Parameters						

TEST RESULTS

REPORTED TO	Regional District of Central Kootenay - Nelson	**WORK ORDER**	23A2525
PROJECT	General Potability	**REPORTED**	2023-02-02 10:38

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Arrow Creek Raw Water (23A2525-02) | Matrix: Water | Sampled: 2023-01-24 08:30, Continued						
Microbiological Parameters, Continued						
Coliforms, Total (Q-Tray)	10	MAC = 0	1	MPN/100 mL	2023-01-25	
E. coli (Q-Tray)	< 1	MAC = 0	1	MPN/100 mL	2023-01-25	
Total Metals						
Aluminum, total	**0.0050**	OG < 0.1	0.0050	mg/L	2023-01-29	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-01-29	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2023-01-29	
Barium, total	**0.0183**	MAC = 2	0.0050	mg/L	2023-01-29	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-01-29	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010	mg/L	2023-01-29	
Calcium, total	**11.1**	None Required	0.20	mg/L	2023-01-29	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-01-29	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2023-01-29	
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2023-01-29	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2023-01-29	
Magnesium, total	**2.98**	None Required	0.010	mg/L	2023-01-29	
Manganese, total	**0.00050**	MAC = 0.12	0.00020	mg/L	2023-01-29	
Potassium, total	**0.43**	N/A	0.10	mg/L	2023-01-29	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-01-29	
Sodium, total	**1.37**	AO ≤ 200	0.10	mg/L	2023-01-29	
Strontium, total	**0.0354**	MAC = 7	0.0010	mg/L	2023-01-29	
Uranium, total	**0.000136**	MAC = 0.02	0.000020	mg/L	2023-01-29	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2023-01-29	

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	Regional District of Central Kootenay - Nelson	**WORK ORDER**	23A2525
PROJECT	General Potability	**REPORTED**	2023-02-02 10:38

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2016)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Conductivity in Water	SM 2510 B (2021)	Conductivity Meter	✓	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	✓	Kelowna
E. coli in Water	NA / SM 9223 (2016)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	✓	Richmond
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
pH in Water	SM 4500-H+ B (2021)	Electrometry	✓	Kelowna
Solids, Total Dissolved in Water	SM 1030 E (2021)	SM 1030 E		N/A
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond
Turbidity in Water	SM 2130 B (2020)	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
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
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

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PROJECT	General Potability	**REPORTED**	2023-02-02 10:38

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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. 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

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