Cariboo Regional District

108 MILE WATER SYSTEM 2024 ANNUAL REPORT

Operating Permit # 002908 CRD Utilities Department

building communities together

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File: 5600-20-06-01

January 14, 2025

Diana Tesic-Nagalingam
Environmental Health Officer
Interior Health
Kamloops Health Centre
519 Columbia Street
Kamloops, BC V2C 2T8

Dear Diana Tesic-Nagalingam:

Re: Transmittal of the 2024 Annual Report for the 108 Mile Water System

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We are pleased to submit the 2024 Annual Report for the 108 Mile Water System. This report is prepared to provide a comprehensive summary of the key developments, activities, and achievements of 2024, as well as to outline plans for the water system.

The report has been developed with consideration for public engagement and transparency, ensuring it meets the information needs of Interior Health, the Cariboo Regional District Board of Directors, and particularly the 108 Mile community, as represented by Electoral Area G Director Al Richmond.

We trust this report will serve as a valuable resource in understanding the progress and direction of the 108 Mile Water System.

Sincerely,

Kelly McDonald
Manager of Utilities

KM/cm

Contents

Tables and Figures

1. Executive Summary

The 108 Mile Water System faces a range of significant challenges, many of which are common across water utilities globally. However, through strategic planning, ongoing investment, and collaboration, we are making meaningful progress in addressing these issues. Our efforts focus on enhancing the utility's ability to meet both current and future demands while ensuring the long-term sustainability and reliability of water services. By drawing on best practices and learning from the broader industry, we are positioning the 108 Mile Water System to effectively navigate evolving challenges and continue to provide safe, reliable water services to our community. This report outlines the current state of the utility, the steps being taken to address these challenges, and the path forward to ensure future success.

1.1. Key Information:

System key facts:

- Serves an estimated 2,800 residents with 1,340 active service connections.
- Serves the community of 108 Mile Ranch and has been operated by the Cariboo Regional District (CRD) for thirty-five (35) years.
- Construction was completed in the early 1970s by a private developer.

The 108 "Waterwork's" assets consist of:

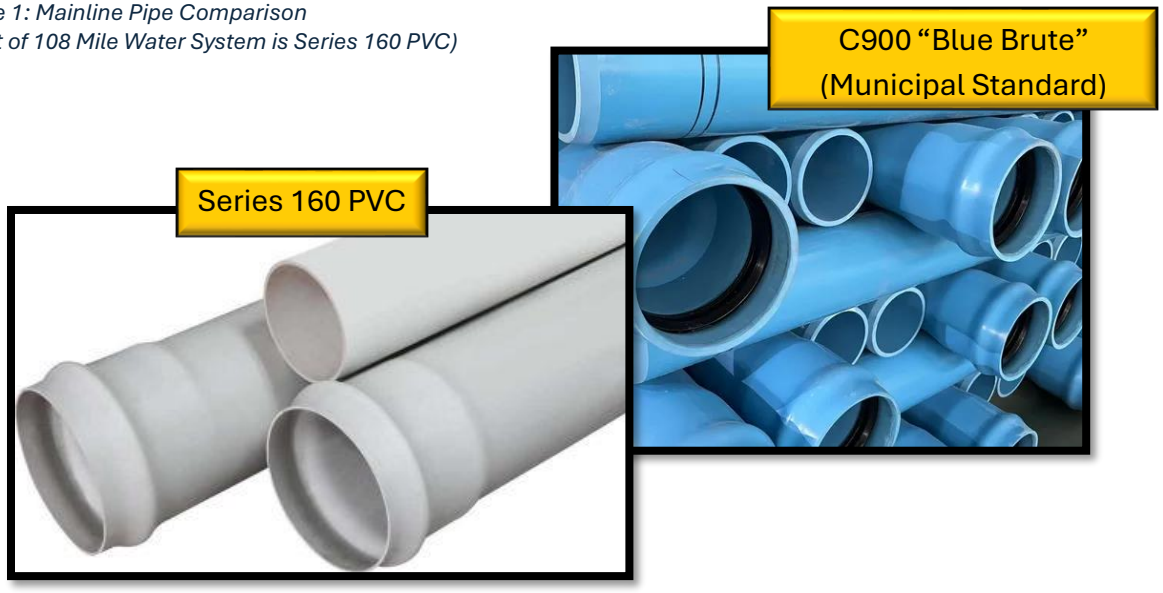
- 50.2 km of distribution pipe
- 2 pressure boosting stations
- 3 source wells
- A manganese removal treatment plant (2017)

2. Introduction

The 108 Mile Water Distribution System was established in the early 1970s and run by 108 Water Works Co. Ltd. (A subsidiary of First National Properties Ltd.). The system was handed over to the Cariboo Regional District in 1989 at the request of the 108 Mile Property Association.

As a result of a construction for profit model, the pipe used was Series 160 PVC. This type of pipe is much more susceptible to breaks than standard municipal grade C900 pipe.

Figure 1: Mainline Pipe Comparison
(most of 108 Mile Water System is Series 160 PVC)



2.1. Source Water

The source water originates from three wells 267 feet, 275 feet and 254 feet deep on the West side of Sepa Lake. These wells are each capable of extracting over 1000 USgpm. Two of the wells are over the Maximum Acceptable Concentration level (MAC) issued by Health Canada for manganese. One well is only used when demand is extreme because of the exceptionally high manganese level in the water it provides *(firefighting or summer demand)*.

Figure 2: Well Locations (Blue Dots)

From the BC Provincial Database Groundwater Wells and Aquifers - Province of British Columbia

2.2. Treatment

A treatment facility was brought online in 2017 to remove the manganese from the raw water provided by the source wells. This is accomplished through a bacteriological filter technology under the proprietary name Mangazur. This facility is located on Kallum Drive, near Sepa Lake. A Sodium Hypochlorite (Chlorine) residual is also maintained throughout the distribution system.

2.3. Distribution

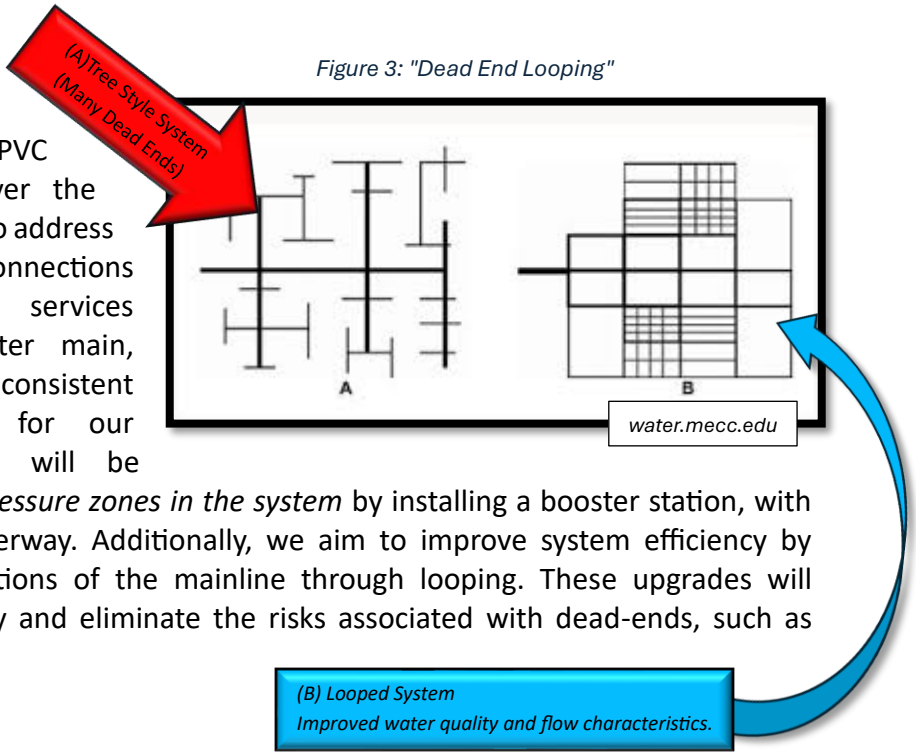


Figure 3: "Dead End Looping"

One of our key objectives is to replace the low-grade PVC distribution pipes over the long term. This will also address the galvanized connections where individual services connect to the water main, which have been a consistent source of trouble for our operators. We also will be eliminating the *low-pressure zones in the system* by installing a booster station, with planning already underway. Additionally, we aim to improve system efficiency by closing dead-end sections of the mainline through looping. These upgrades will enhance water quality and eliminate the risks associated with dead-ends, such as bacterial growth.

3. Maintenance

To improve system reliability, the Cariboo Regional District (CRD) has allocated funds for hydrant maintenance and valve exercising equipment. Regular maintenance will help extend asset lifespan and ensure assets operate effectively when needed. The budget also includes leak detection equipment, enabling a proactive approach to prevent issues before they arise.

In 2024, the CRD implemented real-time data sharing across all systems alongside the upgrade of our control systems (SCADA). As our capabilities expand, we are transitioning from reactive to proactive maintenance. This shift will enhance system reliability and maximize the lifespan of our infrastructure.

4. Projects and Planned Activities

The CRD has made progress in 2024 toward achieving our goal of a comprehensive asset management program (AMP). This program will allow us to use data to predict asset lifespan and trends when preparing future budgets. Asset management will also assist the CRD by improving efficiency in operations. An added benefit to having a working asset management is improved ability to pursue provincial and federal grants as many of these grants require it.

Geographic Information System (GIS) mapping has been ongoing through 2024 to build a database for both operations and the AMP. This mapping is also being used to proceed with a feasibility study on solutions for the low water pressure zones in the 108 system. This study was initiated in 2024 and is currently active. We are hoping to proceed with a solution by the third quarter of 2025.

Figure 4: GIS Map (108 Mile)

2024 GIS by TRUE Engineering

Maps by Esri

PSD Citywide, our asset management consultants, are currently supporting the Cariboo Regional District (CRD) in implementing the Asset Management Strategic Plan (ASP). This initiative is funded by a grant from the Union of BC Municipalities (UBCM).

5. Environmental Operator's Certification Program (EOCP)

The CRD has been active in 2024, with staff completing numerous training courses and achieving certification levels in the Environmental Operator's Certification Program (EOCP). The 108 Mile Water System now has three certified Operators, including one who has achieved their Level 3 (EOCP) certification in water distribution.

These three certified Operators are responsible for operating the 108 Mile Water System, along with six other small water systems and one wastewater system.

Table 1: Environmental Operator Certification Levels

Operator	***Region***	***Water Distribution***	***Water Treatment***	***Operator in Training***
Jourdy Ouellette	*South*	3	1	
Larry Perry	*South*	1	0	
Colin Brusic	*South*			☑
Ken/Chuck	*Central*	Backup		
Manager	*Central*	4	1	

The 108 Mile Water System is currently rated as a Level Three Distribution and Level Two Treatment System. Ongoing training will continue into 2025 and beyond to ensure compliance with our permit. In addition, Operators are responsible for maintaining EOCP wastewater certifications for the other systems they oversee.

Staffing was a challenge in 2024, with multiple vacant positions. Despite this, Operators have worked diligently to maintain the level of service our residents expect while safeguarding public health. We anticipate improvements in 2025 through additional staff and continued training.

6. Source to Tap Risks and Mitigation

6.1. Source to Tap Risks

A primary concern for the 108 Mile Water System is the potential for cross-connections in areas with lower pressure, which can allow contaminants to enter the system. Additional risks include leaks that may draw in contaminants or disrupt service. However, the source wells are generally considered to have a low risk of contamination due to their location and the surrounding land use.

6.2. Risk Mitigation

To address pressure-related risks, a Cross Connection Control Plan was initiated in 2024 and is being implemented with the assistance of MTS Vernon. This plan, along

with solutions to address low-pressure zones, will help mitigate health risks and ensure the system meets modern standards.

6.3. Cross-Connection Control

In 2024, the Cariboo Regional District (CRD) initiated a Cross Connection Control Program by contracting the services of *MTS* (Vernon). Currently, an assessment and inventory of the system are underway. This initiative aims to ensure compliance with the operating permit and enhance the safety and reliability of the water system for residents of 108 Mile.

7. Water Sampling

The Cariboo Regional District (CRD) follows an annual sampling schedule approved by Interior Health. This schedule monitors for bacteria in the water, helping identify potential issues within the system and safeguarding residents from contamination.

In addition to bacterial testing, sampling provides a water chemistry profile to detect changes in source water. This allows us to adjust treatment techniques as needed to maintain water quality. Sample results are submitted to Interior Health and kept for CRD records.

* *Sample results attached.*

Table 2: Sampling Schedule

Sample Type	Minimum Sampling Frequency	Laboratory	Inspection Frequency
Bacteriological	Twice Monthly (four locations)	ALS Laboratories	Inspection and Residual bi-weekly or as needed.
Chlorine Byproducts	Annually	ALS Laboratories	Watch for changes in source water.
Full Chemical	Annually	ALS Laboratories	Add samples as needed.
Disinfectant Residuals	Twice weekly	CRD Operators	Bi-weekly, more as needed.

8. Water Quality

Table 3: Source Well Water Quality Analysis

Analytical Results Evaluation

Matrix: Drinking Water

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: P103	Client sample ID: P102
Sampling date/time				07-May-2024 10:15	07-May-2024 10:25
Sub-Matrix				Drinking Water	Drinking Water
				KS2401637-001	KS2401637-002
Physical Tests					
Alkalinity, total (as CaCO3)	-----	E290/VA	mg/L	549	562
Colour, true	-----	E329/VA	CU	<5.0	<5.0
Conductivity	-----	E100/VA	µS/cm	1400	1400
pH	-----	E108/VA	pH units	8.53	8.54
Solids, total dissolved [TDS]	-----	E162/VA	mg/L	770	756
Turbidity	-----	E121/VA	NTU	<0.10	<0.10
Hardness (as CaCO3), from total Ca/Mg	-----	EC100A/VA	mg/L	561	576
Anions and Nutrients					
Chloride	16887-00-6	E235.Cl/VA	mg/L	100	102
Fluoride	16984-48-8	E235.F/VA	mg/L	0.516	0.524
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	mg/L	0.803	0.810
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	mg/L	0.0124	0.0142
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	mg/L	78.0	79.2
Cyanides					
Cyanide, strong acid dissociable (Total)	-----	E333/VA	mg/L	<0.0050	<0.0050
Organic / Inorganic Carbon					
Carbon, total organic [TOC]	-----	E355-L/VA	mg/L	4.94	4.53
Microbiological Tests					
Coliforms, total	-----	E010/VA	MPN/100 mL	<1	<1
Coliforms, Escherichia coli [E. coli]	-----	E010/VA	MPN/10 0mL	<1	<1
Total Metals					
Aluminum, total	7429-90-5	E420/VA	mg/L	<0.0100	<0.0100
Antimony, total	7440-36-0	E420/VA	mg/L	<0.00050	<0.00050
Arsenic, total	7440-38-2	E420/VA	mg/L	0.00169	0.00174
Barium, total	7440-39-3	E420/VA	mg/L	<0.0200	<0.0200
Boron, total	7440-42-8	E420/VA	mg/L	<0.100	<0.100

Sample Results by *ALS Environmental* (Kamloops Lab)

Analytical Results Evaluation

Matrix: Drinking Water

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: P103	Client sample ID: P102
Sampling date/time				07-May-2024 10:15	07-May-2024 10:25
Sub-Matrix				Drinking Water	Drinking Water
				KS2401637-001	KS2401637-002
Total Metals					
Cadmium, total	7440-43-9	E420/VA	mg/L	<0.000200	<0.000200
Calcium, total	7440-70-2	E420/VA	mg/L	71.2	71.4
Chromium, total	7440-47-3	E420/VA	mg/L	<0.00200	<0.00200
Copper, total	7440-50-8	E420/VA	mg/L	0.00123	0.00124
Iron, total	7439-89-6	E420/VA	mg/L	<0.030	<0.030
Lead, total	7439-92-1	E420/VA	mg/L	<0.000500	<0.000500
Magnesium, total	7439-95-4	E420/VA	mg/L	93.0	96.6
Manganese, total	7439-96-5	E420/VA	mg/L	0.294	0.319
Mercury, total	7439-97-6	E508/VA	mg/L	0.0000094	0.0000090
Potassium, total	7440-09-7	E420/VA	mg/L	8.50	8.91
Selenium, total	7782-49-2	E420/VA	mg/L	<0.00100	<0.00100
Sodium, total	7440-23-5	E420/VA	mg/L	99.6	99.9
Uranium, total	7440-61-1	E420/VA	mg/L	0.00499	0.00507
Zinc, total	7440-66-6	E420/VA	mg/L	<0.0500	<0.0500
Volatile Organic Compounds [THMs]					
Bromodichloromethane	75-27-4	E611B/VA	µg/L	<1.0	<1.0
Bromoform	75-25-2	E611B/VA	µg/L	<1.0	<1.0
Chloroform	67-66-3	E611B/VA	µg/L	<1.0	<1.0
Dibromochloromethane	124-48-1	E611B/VA	µg/L	<1.0	<1.0
Trihalomethanes [THMs], total	-----	E611B/VA	µg/L	<2.0	<2.0
Volatile Organic Compounds [THMs] Surrogates					
Bromofluorobenzene, 4-	460-00-4	E611B/VA	%	82.3	83.4
Difluorobenzene, 1,4-	540-36-3	E611B/VA	%	95.1	95.4

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Raw water manganese levels before treatment

Manganese

Table 4: Distribution System Water Quality Analysis

Analytical Results Evaluation

Matrix: Water

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: 108 Treated Sampling date/time: 19-Mar-2024 08:00 Sub-Matrix: Water KS2400951-001
Physical Tests				
Alkalinity, total (as CaCO3)	----	E290/VA	mg/L	554
Colour, true	----	E329/VA	CU	<5.0
Conductivity	----	E100/VA	µS/cm	1330
pH	----	E108/VA	pH units	8.21
Solids, total dissolved [TDS]	----	E162/VA	mg/L	944
Turbidity	----	E121/VA	NTU	<0.10
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	mg/L	568
Anions and Nutrients				
Chloride	16887-00-6	E235.Cl/VA	mg/L	97.7
Fluoride	16984-48-8	E235.F/VA	mg/L	0.503
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	mg/L	0.769
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	mg/L	<0.0050 DLDS
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	mg/L	81.5
Total Metals				
Aluminum, total	7429-90-5	E420/VA	mg/L	<0.0100
Antimony, total	7440-36-0	E420/VA	mg/L	<0.00050
Arsenic, total	7440-38-2	E420/VA	mg/L	0.00122
Barium, total	7440-39-3	E420/VA	mg/L	<0.0200
Boron, total	7440-42-8	E420/VA	mg/L	<0.100
Cadmium, total	7440-43-9	E420/VA	mg/L	<0.000200
Calcium, total	7440-70-2	E420/VA	mg/L	68.8
Chromium, total	7440-47-3	E420/VA	mg/L	<0.00200
Copper, total	7440-50-8	E420/VA	mg/L	1.40
Iron, total	7439-89-6	E420/VA	mg/L	<0.030
Lead, total	7439-92-1	E420/VA	mg/L	<0.000500
Magnesium, total	7439-95-4	E420/VA	mg/L	96.1
Manganese, total	7439-96-5	E420/VA	mg/L	<0.00200

Elevated Copper is most likely a result of sampling location

Manganese has been removed by the treatment facility before entering the distribution system

Table 5: Chlorine By-Products Well Below the Maximum Acceptable Concentration Levels

Analytical Results Evaluation

Matrix: Water

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: 108 Treated Sampling date/time: 19-Mar-2024 08:00 Sub-Matrix: Water KS2400951-001
Total Metals				
Mercury, total	7439-97-6	E508/VA	mg/L	0.0000064
Potassium, total	7440-09-7	E420/VA	mg/L	8.57
Selenium, total	7782-49-2	E420/VA	mg/L	<0.00100
Sodium, total	7440-23-5	E420/VA	mg/L	99.3
Uranium, total	7440-61-1	E420/VA	mg/L	0.00557
Zinc, total	7440-66-6	E420/VA	mg/L	<0.0500
Volatile Organic Compounds [THMs]				
Bromodichloromethane	75-27-4	E611B/VA	µg/L	9.6
Bromoform	75-25-2	E611B/VA	µg/L	1.6
Chloroform	67-66-3	E611B/VA	µg/L	10.6
Dibromochloromethane	124-48-1	E611B/VA	µg/L	8.0
Trihalomethanes [THMs], total	----	E611B/VA	µg/L	29.8
Volatile Organic Compounds [THMs] Surrogates				
Bromofluorobenzene, 4-	460-00-4	E611B/VA	%	98.2
Difluorobenzene, 1,4-	540-36-3	E611B/VA	%	101

* *Full 2024 sample results attached.*

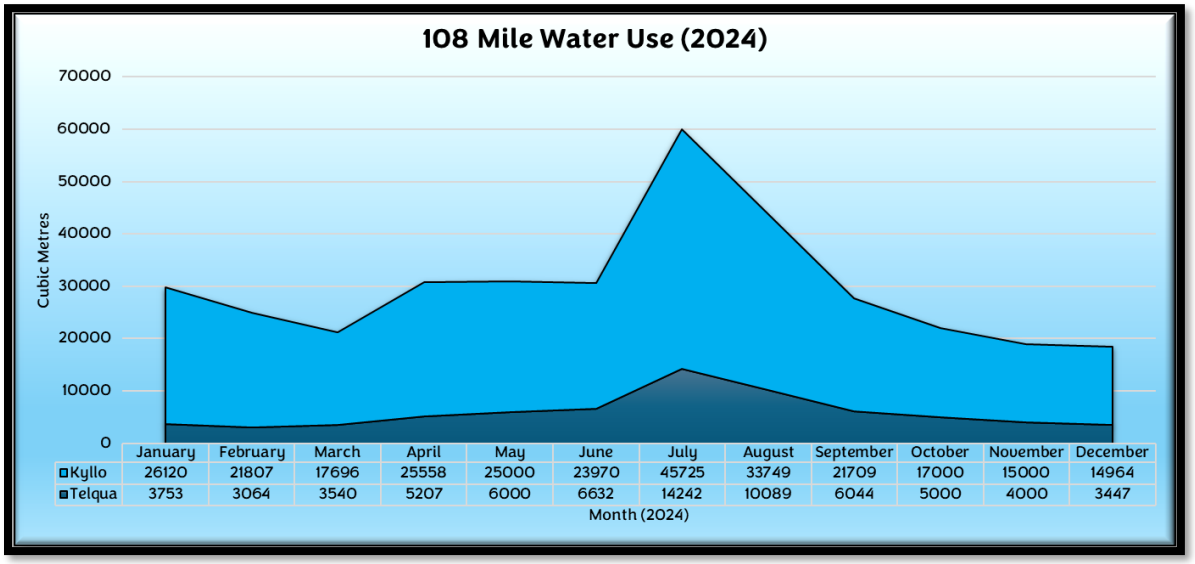
9. Events

No advisories occurred in 2024 for the 108 Mile Water System. Three service leaks were repaired without incident.

9.1. Water Demand

Summer demand for water in 108 Mile is double that of winter. This is not out of the ordinary but does warrant a careful consideration of our current bylaws and water restrictions.

Figure 5: 108 Mile 2024 Monthly Demand in Cubic Metres



	January	February	March	April	May	June	July	August	September	October	November	December
Kyllo	26120	21807	17696	25558	25000	23970	45725	33749	21709	17000	15000	14964
Telqua	3753	3064	3540	5207	6000	6632	14242	10089	6044	5000	4000	3447

Currently, restrictions are voluntary with most residents respecting the rules. Staged restrictions may be implemented in 2025. Usage in 2024 is estimated at 352 litres per person per day.

10. Emergency Planning

In 2024, we developed a comprehensive Emergency Response and Contingency Plan (ERCP) to address current potential emergencies and improve overall preparedness. The ERCP is a living document, regularly updated to reflect evolving risks, response strategies, and resource needs.

In response to provincial guidelines, we also began developing a drought contingency plan, which is currently a work in progress. This plan aims to manage water scarcity risks and support sustainable resource management as conditions change.

* *ERCP with Drought Plan attached.*

11. Conclusion

The 108 Mile Water System continues to face significant challenges, but we are making steady progress toward addressing them. Through careful planning, investment, and collaboration, we are strengthening our ability to manage current and future demands. While these challenges may seem unique at times, they reflect broader trends and issues that water utilities across the region – and around the world – are also navigating. By learning from shared experiences and implementing best practices, we are positioning the utility to provide safe, reliable, and sustainable water services for the community, both now and in the future.

12. References

- *Health Canada (2019, May 21). Guidance on Natural Organic Matter in Drinking Water. Retrieved from https://www.canada.ca/en/health-canada/programs/consultation-organic-matter-drinking-water/document.html#es*
- *Environmental Operators Certification Program (2024). Retrieved from https://eocp.ca/*
- Statistics Canada (2021). *Survey of Drinking Water Plants – The Daily.* https://www150.statcan.gc.ca/n1/daily-quotidien/231114/dq231114d-eng.htm

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Thank you to:

- *Cheryl McMullen*
- *Jourdy Ouellette*
- *Colin Brusic*
- *Ken Heidema*
- *Chuck Howes*
- *Phil Wilkins*
- *Tyler Olsen*

for their contribution.

Appendix A: Links

Interior Health:

- *Interior Health Water Advisories*
- *Drinking Water | Environmental & Seasonal Health | IH*

Cariboo Regional District:

- *Water Notices and Advisories - Cariboo Regional District*
- *Sewer and Water Services - Cariboo Regional District*

Notification App (VoyentAlert!):

- *Emergency Notification System - Cariboo Regional District*

Environmental Operators Certification Program (EOCP):

- *EOCP Homepage | EOCP*
- *Backflow Prevention, Cross Connection Control, and the Environmental Operators Certification Program | EOCP*

Appendix B: Sample Results

Facility and Sample Site: **108 Mile Water System** **108 Mile Ranch, BC**	**Test Type:** **Drinking Water – Bacteriological** **Unit of Measure: CFU per 100 ml**	**Value**	**Date Collected**	**Results**
Sepa Well 3	Sample Parameter: E. coli	<1	07 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	07 Feb 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	07 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	07 Feb 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	07 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	07 Feb 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	07 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	07 Feb 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	27 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	27 Feb 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	27 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	27 Feb 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	27 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	27 Feb 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	27 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	27 Feb 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	13 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Mar 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	13 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Mar 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	13 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Mar 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	13 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Mar 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	26 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Mar 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	26 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Mar 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	26 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Mar 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	26 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Mar 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	10 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Apr 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	10 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Apr 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	10 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Apr 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	10 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Apr 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	24 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Apr 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	24 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Apr 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	24 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Apr 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	24 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Apr 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	30 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Apr 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	30 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Apr 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	30 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Apr 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	30 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Apr 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	15 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 May 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	15 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 May 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	15 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 May 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	15 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 May 2024	Acceptable

Facility and Sample Site: **108 Mile Water System** **108 Mile Ranch, BC**	**Test Type:** **Drinking Water – Bacteriological** **Unit of Measure: CFU per 100 ml**	**Value**	**Date Collected**	**Results**
Sepa Well 3	Sample Parameter: E. coli	<1	29 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 May 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	29 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 May 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	29 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 May 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	29 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 May 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	05 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	05 June 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	05 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	05 June 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	05 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	05 June 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	05 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	05 June 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	26 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 June 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	26 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 June 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	26 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 June 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	26 June 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 June 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	17 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 July 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	17 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 July 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	17 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 July 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	17 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 July 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	30 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 July 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	30 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 July 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	30 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 July 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	30 July 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 July 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	09 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	09 Sept 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	09 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	09 Sept 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	09 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	09 Sept 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	09 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	09 Sept 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	25 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	25 Sept 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	25 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	25 Sept 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	25 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	25 Sept 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	25 Sept 2024	Acceptable
	Sample Parameter: Total Coliform	<1	25 Sept 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	15 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 Oct 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	15 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 Oct 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	15 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 Oct 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	15 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 Oct 2024	Acceptable

Facility and Sample Site: **108 Mile Water System** **108 Mile Ranch, BC**	**Test Type:** **Drinking Water – Bacteriological** **Unit of Measure: CFU per 100 ml**	**Value**	**Date Collected**	**Results**
Sepa Well 3	Sample Parameter: E. coli	<1	29 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 Oct 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	29 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 Oct 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	29 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 Oct 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	29 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 Oct 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	26 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Nov 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	26 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Nov 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	26 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Nov 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	26 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Nov 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	10 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Dec 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	10 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Dec 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	10 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Dec 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	10 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Dec 2024	Acceptable
Sepa Well 3	Sample Parameter: E. coli	<1	18 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	18 Dec 2024	Acceptable
108 Mall Sample Station	Sample Parameter: E. coli	<1	18 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	18 Dec 2024	Acceptable
108 Water Treatment Plant	Sample Parameter: E. coli	<1	18 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	18 Dec 2024	Acceptable
Kyllo Road Sample Station	Sample Parameter: E. coli	<1	18 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	18 Dec 2024	Acceptable

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Work Order	:	KS2400951
Client	:	Cariboo Regional District
Project	:	Drinking Water

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	108 Treated	103 Mile Well #3	103 Mile Well #4	Forest Grove Pumphouse	Gateway Pumphouse	Canim Lake Pumphouse	Horse Lake Pumphouse
				Sampling date/time	19-Mar-2024 08:00	19-Mar-2024 09:00	19-Mar-2024 09:00	19-Mar-2024 10:05	19-Mar-2024 10:25	19-Mar-2024 10:50	19-Mar-2024 11:35
				Sub-Matrix	Water	Water	Water	Water	Water	Water	Water
					KS2400951-001	KS2400951-002	KS2400951-003	KS2400951-004	KS2400951-005	KS2400951-006	KS2400951-007
Physical Tests											
Alkalinity, total (as CaCO3)	----	E290/VA	mg/L		554	676	635	360	460	485	406
Colour, true	----	E329/VA	CU		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	----	E100/VA	µS/cm		1330	1520	1300	658	928	932	882
pH	----	E108/VA	pH units		8.21	8.26	8.34	8.09	8.31	8.27	8.19
Solids, total dissolved [TDS]	----	E162/VA	mg/L		944	825	742	395	514	555	527
Turbidity	----	E121/VA	NTU		<0.10	1.70	0.34	<0.10	3.35	<0.10	0.58
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	mg/L		568	628	524	343	464	422	322
Anions and Nutrients											
Chloride	16887-00-6	E235.Cl/VA	mg/L		97.7	138	82.0	13.2	42.1	17.0	57.9
Fluoride	16984-48-8	E235.F/VA	mg/L		0.503	0.145	0.144	0.160	0.248	0.332	0.160
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	mg/L		0.769	<0.0250 DLDS	<0.0250 DLDS	1.10	<0.0250 DLDS	0.296	0.409
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	0.0101	0.0061
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	mg/L		81.5	27.8	34.2	4.73	36.3	51.2	7.82
Total Metals											
Aluminum, total	7429-90-5	E420/VA	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Antimony, total	7440-36-0	E420/VA	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic, total	7440-38-2	E420/VA	mg/L		0.00122	0.00554	0.00867	0.00061	0.00324	0.00091	0.00218
Barium, total	7440-39-3	E420/VA	mg/L		<0.0200	0.0541	0.0319	0.0208	0.0301	0.0340	<0.0200
Boron, total	7440-42-8	E420/VA	mg/L		<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Cadmium, total	7440-43-9	E420/VA	mg/L		<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200
Calcium, total	7440-70-2	E420/VA	mg/L		68.8	50.5	38.4	64.5	46.2	53.3	62.6
Chromium, total	7440-47-3	E420/VA	mg/L		<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200
Copper, total	7440-50-8	E420/VA	mg/L		1.40	0.00796	0.00345	0.0333	0.00995	0.00900	0.00255
Iron, total	7439-89-6	E420/VA	mg/L		<0.030	0.286	0.184	<0.030	0.777	<0.030	0.219
Lead, total	7439-92-1	E420/VA	mg/L		<0.000500	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Magnesium, total	7439-95-4	E420/VA	mg/L		96.1	122	104	44.2	84.6	70.1	40.2
Manganese, total	7439-96-5	E420/VA	mg/L		<0.00200	0.122	0.0561	<0.00200	0.173	0.00448	0.234

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Client	:	Cariboo Regional District
Project	:	Drinking Water

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: 108 Treated	103 Mile Well #3	103 Mile Well #4	Forest Grove Pumphouse	Gateway Pumphouse	Canim Lake Pumphouse	Horse Lake Pumphouse
				Sampling date/time: 19-Mar-2024 08:00	19-Mar-2024 09:00	19-Mar-2024 09:00	19-Mar-2024 10:05	19-Mar-2024 10:25	19-Mar-2024 10:50	19-Mar-2024 11:35
				Sub-Matrix: Water	Water	Water	Water	Water	Water	Water
				KS2400951-001	KS2400951-002	KS2400951-003	KS2400951-004	KS2400951-005	KS2400951-006	KS2400951-007
Total Metals										
Mercury, total	7439-97-6	E508/VA	mg/L	0.0000064	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Potassium, total	7440-09-7	E420/VA	mg/L	8.57	9.50	9.57	3.01	6.01	13.5	2.78
Selenium, total	7782-49-2	E420/VA	mg/L	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
Sodium, total	7440-23-5	E420/VA	mg/L	99.3	114	120	15.0	42.2	62.0	88.2
Uranium, total	7440-61-1	E420/VA	mg/L	0.00557	0.00486	0.00433	0.00337	0.0104	0.0144	0.00250
Zinc, total	7440-66-6	E420/VA	mg/L	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Volatile Organic Compounds [THMs]										
Bromodichloromethane	75-27-4	E611B/VA	µg/L	9.6	----	<1.0	----	<1.0	<1.0	5.8
Bromoform	75-25-2	E611B/VA	µg/L	1.6	----	<1.0	----	<1.0	<1.0	<1.0
Chloroform	67-66-3	E611B/VA	µg/L	10.6	----	1.5	----	<1.0	<1.0	17.8
Dibromochloromethane	124-48-1	E611B/VA	µg/L	8.0	----	<1.0	----	<1.0	<1.0	2.5
Trihalomethanes [THMs], total	----	E611B/VA	µg/L	29.8	----	<2.0	----	<2.0	<2.0	26.1
Volatile Organic Compounds [THMs] Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611B/VA	%	98.2	----	97.0	----	95.7	92.2	95.2
Difluorobenzene, 1,4-	540-36-3	E611B/VA	%	101	----	102	----	101	102	100

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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Client	:	Cariboo Regional District
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Summary of Guideline Limits

Analyte	*CAS Number*	*Unit*	BCDWQG AO	BCDWQG MAC	BCDWQG OG
Physical Tests					
Alkalinity, total (as CaCO3)	----	mg/L	--	--	--
Colour, true	----	CU	15 CU	--	--
Conductivity	----	µS/cm	--	--	--
Hardness (as CaCO3), from total Ca/Mg	----	mg/L	--	--	--
pH	----	pH units	--	--	7 - 10.5 pH units
Solids, total dissolved [TDS]	----	mg/L	500 mg/L	--	--
Turbidity	----	NTU	--	1 NTU	--
Anions and Nutrients					
Chloride	16887-00-6	mg/L	250 mg/L	--	--
Fluoride	16984-48-8	mg/L	--	1.5 mg/L	--
Nitrate (as N)	14797-55-8	mg/L	--	10 mg/L	--
Nitrite (as N)	14797-65-0	mg/L	--	1 mg/L	--
Sulfate (as SO4)	14808-79-8	mg/L	500 mg/L	--	--
Total Metals					
Aluminum, total	7429-90-5	mg/L	--	2.9 mg/L	--
Antimony, total	7440-36-0	mg/L	--	0.006 mg/L	--
Arsenic, total	7440-38-2	mg/L	--	0.01 mg/L	--
Barium, total	7440-39-3	mg/L	--	2 mg/L	--
Boron, total	7440-42-8	mg/L	--	5 mg/L	--
Cadmium, total	7440-43-9	mg/L	--	0.007 mg/L	--
Calcium, total	7440-70-2	mg/L	--	--	--
Chromium, total	7440-47-3	mg/L	--	0.05 mg/L	--
Copper, total	7440-50-8	mg/L	1 mg/L	2 mg/L	--
Iron, total	7439-89-6	mg/L	0.3 mg/L	--	--
Lead, total	7439-92-1	mg/L	--	0.005 mg/L	--
Magnesium, total	7439-95-4	mg/L	--	--	--
Manganese, total	7439-96-5	mg/L	0.02 mg/L	0.12 mg/L	--
Mercury, total	7439-97-6	mg/L	--	0.001 mg/L	--
Potassium, total	7440-09-7	mg/L	--	--	--
Selenium, total	7782-49-2	mg/L	--	0.05 mg/L	--
Sodium, total	7440-23-5	mg/L	200 mg/L	--	--
Uranium, total	7440-61-1	mg/L	--	0.02 mg/L	--
Zinc, total	7440-66-6	mg/L	5 mg/L	--	--
Volatile Organic Compounds [THMs]					
Bromodichloromethane	75-27-4	µg/L	--	--	--
Bromoform	75-25-2	µg/L	--	--	--

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Analyte	CAS Number	Unit	BCDWQG AO	BCDWQG MAC	BCDWQG OG				
Volatile Organic Compounds [THMs] - Continued									
Chloroform	67-66-3	µg/L	--	--	--				
Dibromochloromethane	124-48-1	µg/L	--	--	--				
Trihalomethanes [THMs], total	----	µg/L	--	**100 µg/L**	--				
Bromofluorobenzene, 4-	460-00-4	%	--	--	--				
Difluorobenzene, 1,4-	540-36-3	%	--	--	--				

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

BCDWQG	British Columbia Drinking Water Quality Guidelines (JAN, 2023)
AO	Aesthetic Objective/Other Value
MAC	Maximium Acceptable Concentrations
OG	Operational Guidance

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Work Order	:	KS2400951
Client	:	Cariboo Regional District
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Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	108 Treated	103 Mile Well #3	103 Mile Well #4	Forest Grove Pumphouse	Gateway Pumphouse
					Client sampling date / time	19-Mar-2024 08:00	19-Mar-2024 09:00	19-Mar-2024 09:00	19-Mar-2024 10:05	19-Mar-2024 10:25
						KS2400951-001	KS2400951-002	KS2400951-003	KS2400951-004	KS2400951-005
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		554	676	635	360	460
Colour, true	----	E329/VA	5.0	CU		<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	----	E100/VA	2.0	µS/cm		1330	1520	1300	658	928
pH	----	E108/VA	0.10	pH units		8.21	8.26	8.34	8.09	8.31
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		944	825	742	395	514
Turbidity	----	E121/VA	0.10	NTU		<0.10	1.70	0.34	<0.10	3.35
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.60	mg/L		568	628	524	343	464
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		97.7	138	82.0	13.2	42.1
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.503	0.145	0.144	0.160	0.248
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		0.769	<0.0250 DLDS	<0.0250 DLDS	1.10	<0.0250 DLDS
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		81.5	27.8	34.2	4.73	36.3
Total Metals										
Aluminum, total	7429-90-5	E420/VA	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Antimony, total	7440-36-0	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L		0.00122	0.00554	0.00867	0.00061	0.00324
Barium, total	7440-39-3	E420/VA	0.0200	mg/L		<0.0200	0.0541	0.0319	0.0208	0.0301
Boron, total	7440-42-8	E420/VA	0.100	mg/L		<0.100	<0.100	<0.100	<0.100	<0.100
Cadmium, total	7440-43-9	E420/VA	0.000200	mg/L		<0.000200	<0.000200	<0.000200	<0.000200	<0.000200
Calcium, total	7440-70-2	E420/VA	0.100	mg/L		68.8	50.5	38.4	64.5	46.2
Chromium, total	7440-47-3	E420/VA	0.00200	mg/L		<0.00200	<0.00200	<0.00200	<0.00200	<0.00200
Copper, total	7440-50-8	E420/VA	0.00100	mg/L		1.40	0.00796	0.00345	0.0333	0.00995
Iron, total	7439-89-6	E420/VA	0.030	mg/L		<0.030	0.286	0.184	<0.030	0.777
Lead, total	7439-92-1	E420/VA	0.000500	mg/L		<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Magnesium, total	7439-95-4	E420/VA	0.100	mg/L		96.1	122	104	44.2	84.6
Manganese, total	7439-96-5	E420/VA	0.00200	mg/L		<0.00200	0.122	0.0561	<0.00200	0.173
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L		0.0000064	<0.0000050	<0.0000050	<0.0000050	<0.0000050

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Client	:	Cariboo Regional District
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Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	108 Treated	103 Mile Well #3	103 Mile Well #4	Forest Grove Pumphouse	Gateway Pumphouse
					Client sampling date / time	19-Mar-2024 08:00	19-Mar-2024 09:00	19-Mar-2024 09:00	19-Mar-2024 10:05	19-Mar-2024 10:25
						KS2400951-001	KS2400951-002	KS2400951-003	KS2400951-004	KS2400951-005
						Result	Result	Result	Result	Result
Total Metals										
Potassium, total	7440-09-7	E420/VA	0.100	mg/L		8.57	9.50	9.57	3.01	6.01
Selenium, total	7782-49-2	E420/VA	0.00100	mg/L		<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
Sodium, total	7440-23-5	E420/VA	2.00	mg/L		99.3	114	120	15.0	42.2
Uranium, total	7440-61-1	E420/VA	0.000100	mg/L		0.00557	0.00486	0.00433	0.00337	0.0104
Zinc, total	7440-66-6	E420/VA	0.0500	mg/L		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Volatile Organic Compounds [THMs]										
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L		9.6	----	<1.0	----	<1.0
Bromoform	75-25-2	E611B/VA	1.0	µg/L		1.6	----	<1.0	----	<1.0
Chloroform	67-66-3	E611B/VA	1.0	µg/L		10.6	----	1.5	----	<1.0
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L		8.0	----	<1.0	----	<1.0
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L		29.8	----	<2.0	----	<2.0
Volatile Organic Compounds [THMs] Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%		98.2	----	97.0	----	95.7
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%		101	----	102	----	101

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Appendix C: Emergency Plans

2025 Cariboo Regional District

Emergency Response & Contingency Plan

108 Mile Water System

Utilities, Communications, and Emergency Operations Departments
1-1-2025

By Kelly McDonald, Cheryl McMullen, Gerald Pinchbeck and Jourdy Ouellette

Table of Contents

SECTION 1: Emergency Plan Goals

The Objective of the Cariboo Regional District (CRD) Emergency Response and Contingency Plan (ERCP) is to provide staff and regulatory agencies with a guideline for potential water utility related emergencies.

This Emergency Response and Contingency Plan (ERCP) serves as a guideline to address various emergency situations, recognizing that no two emergencies are exactly alike. Each emergency is described with a general sequence of steps to follow, providing both a structured approach to response and a consistent method for documenting actions taken. Task lists within each emergency section also function as checklists to remind staff of critical items to consider and complete during an emergency. This ERCP includes specific protocols and considerations for the CRD water supply system.

This plan has been prepared to guide the Cariboo Regional District to respond to an emergency arising in the operation of the 108 Mile Water System. The purpose of the ERCP is to:

- ✓ Ensure staff and the public's safety in carrying out emergency tasks.
- ✓ Provide the earliest and safest response to an emergency condition.
- ✓ Ensure that water quality and public health are not compromised.
- ✓ Ensure that water for firefighting is available.
- ✓ Restore normal water system operation.
- ✓ Protect the natural environment from impacts associated with the system operation in the event of an emergency.
- ✓ Contain property damage.

1.1 Resiliency in Operations

Operational resiliency refers to the capability of an operation to adjust, adapt, and maintain service delivery under emergency conditions. The objective for the CRD Water Utility is to achieve high operational resiliency. Indicators of operational resiliency include the following:

1.1.1. **Emergency Response Plan:** A comprehensive ERP is essential in building resilience within operations, providing structured guidance for handling emergencies effectively. This document is an integral part of that resiliency framework.

1.1.2. **Regional Agency Coordination:** The ERCP must be shared with regional emergency response agencies, ensuring cohesive support. The CRD Emergency Operations Department serves as the local staging agency for the Provincial Emergency Program.

1.1.3. **Mutual Aid Agreements:** In certain emergencies, the CRD may need support from neighboring water utilities. 100 Mile House and Williams Lake are two nearby utilities

from which the CRD may seek assistance in the future. The CRD is working toward a formal mutual aid agreement based on community protection principles.

1.1.4. **Emergency Power:** The 108 Mile Water System can operate on gravity-fed supply and has backup power generation to maintain disinfection if the power grid fails.

1.1.5. **Ability to Meet Water Demands**: With substantial capacity, this CRD water system could, in extreme emergencies, extend its services beyond its current area to assist other communities.

1.1.6. **Critical Parts Inventory**: Appendix B provides a list of critical parts and their availability. Appendix A includes contact names for Cariboo support agencies offering specialized parts or services.

1.1.7. **Critical Staff Resiliency**: Staff's ability to respond and remain calm during extreme events is only evident when tested. Training and reinforcement of sound decision-making at all levels will support preparedness for emergency situations.

SECTION 2: How to Use This Plan

The Water System Emergency Response and Contingency Plan (ERCP) is a guide for handling water system emergencies. The “Actions” section outlines various potential emergencies and provides steps to help minimize further damage.

After an emergency, the CRD will complete a Post Incident Report (see Appendix D). Regular review exercises and updates will strengthen our emergency response capabilities. We ask all plan holders to participate and offer recommendations to continually improve the ERCP.

Remember, the ERCP is only effective if everyone reviews, understands, and contributes to its ongoing development.

SECTION 3: Emergency Planning Definitions

This section provides emergency planning definitions used in this document, following *AWWA Manual 19: Emergency Planning for Water Utilities*.

Emergency: An unexpected event that may compromise water quality or reduce the availability of domestic, irrigation, or fire flow water for the community.

Minor Emergency: A localized, routine incident impacting a small number of customers, such as a small pipe break, vehicle collision with a hydrant, brief power outage, or minor service repair. Minor emergencies should be manageable without special resources and, if effectively handled, can be prevented from escalating into major emergencies.

Major Emergency: A significant event affecting a large portion of the water system, posing risks to water quality or quantity and potentially endangering community health and safety. Major emergencies are rare but impactful.

Natural Disaster: Events caused by natural forces beyond human control, including wildfires, earthquakes, floods, tornadoes, heat domes, freezing, and other severe weather-related incidents.

Human-Caused Disaster: Disasters resulting from human actions, whether accidental or intentional. These may include human error, accidents, labor disputes, negligence, vandalism, sabotage, terrorism, biological contamination, or chemical spills.

Hazard: A source of potential harm or danger linked to a disaster, such as unstable slopes from a creek wash-out or ground shaking from an earthquake.

Lifeline Supply: Essential community services that support health, safety, and sustenance. Lifeline utilities include water, wastewater, electricity, and natural gas, as well as critical transportation, communication, healthcare, and emergency operations centres.

SECTION 4: Emergency Scenarios

4.1. Introduction

Sections 5 and 6 list potential water system emergencies related to the physical components of the water supply. Section 7 describes the steps for a cyber threat or vandalism.

4.2. Emergency Scenario Format

Each emergency scenario in this ERCP follows a consistent format:

4.2.1. **Description of Emergency:** Describes each potential emergency for easy reference. Sections 5 and 6 cover physical water service issues, while Section 7 addresses cyber incidents and vandalism.

4.2.2. **Indicators:** Outlines how each emergency can be recognized, either by CRD staff or external contacts.

4.2.3. **Actions:** Lists response steps for CRD staff, generally in recommended order. This list serves as a guideline, and the lead Water Operator can use the provided checklist to verify all necessary actions are taken.

4.2.4. **Contacts:** Lists relevant contact agencies; specific contacts are found in the ERCP's Communications Section.

4.2.5. **Event Record:** A checklist at the page bottom summarizes the event, records whether photos were taken, and tracks emergency reporting.

All events, including minor repairs and leaks, should be documented and sent to the CRD Office for electronic filing. Each event should be recorded by date. Large events should have dedicated folders containing photos and data, following a standardized naming protocol.

SECTION 5: Water Supply Contamination

Description of Emergency: Contamination has been detected or possible contamination is present.

Indicators: Public notification (taste, odour or colour observations), poor water sample results, visible observations made by Water Operators, cross connection with potential contamination.

5.1. Potential Causes

5.1.1. Chemical Spill (e.g. transport truck, industry)
5.1.2. Flood Event
5.1.3. Confirmed Cross Connection
5.1.4. System Breach (e.g. water main break) *see 6.2.
5.1.5. Positive Sample Result (e.g. E. coli or other immediate threat to public health contaminant)
5.1.6. Vandalism

Actions:

1) Notify Water Operator.
2) Notify Drinking Water Officer (DWO).
3) Assess threat level (see Appendix B).
4) Notify Communications Department.
5) Water Operators to investigate site and inform Manager of Utilities of possible situation. Manager to contact Interior Health.
6) Confirm that the source of contaminant is mitigated.
7) If chemical contamination confirmed or highly suspected to be present:
    a) Attempt to isolate.
    b) Discuss with Engineer, Biologist/Chemist (Lab) and DWO to develop a reasonable and representative sampling program.
    c) Contact Lab and arrange bottles if required and collect samples for rush analysis.

8) Report any spills to the Provincial Agency responsible (see Appendix A).

9) In an extreme situation of contamination, consider shutting down all supply pumps.

    a) Pump stations would shut off and “Do Not Use” notices would be provided to the public. CRD senior management would make this call.

10) Communication: Begin public notification if required and follow Water Quality Notification Procedures.

11) Continue discussion with appropriate experts for moving forward.

12) Discussions to consider alternate water source if needed. Involve Emergency Operations Department and Notify Fire Department.

13) Continue monitoring until water quality is back to normal and IH gives approval to lift advisory or notice.

14) Complete documentation:

    a) Record of events, include times and dates.
    b) Complete a comprehensive damage assessment.
    c) Investigate potential causes.
    d) After action report.

SECTION 6: Supply Disruption

6.1. Equipment Failure

Description of Emergency: This type of emergency is typically caused by extreme weather events that place a very high demand on the Water Treatment Plant, or any other situation where water demands are high, and equipment or infrastructure reduces the ability to maintain maximum output.

Indicators: Visual observations by Water Operators. Failure of equipment as identified by SCADA and alarms.

Actions:

1) Document Situation: Note date, time, location and means of event recognition.

2) Notify Water Operator.

3) Notify Manager.

4) Notify Communications Department.

5) If cause is identified as a main break, see section 6.2.

6) WTP Site Investigation: Generally, this problem is caused by high flows and overheating VFD's.

7) Check control room raw water pump temperatures on variable frequency drive (VFD) displays.

8) Check all SCADA pages and trends to determine what is operational, what has failed, or what is at risk of failure in the WTP.

9) Check on alarms.

10) Note status of chlorine disinfection, reservoir levels, source pump status, chemical dosing status, and raw water flows.

11) Check all necessary WTP equipment to confirm proper functionality.

12) Switch – Adjust Equipment: The WTP has built in redundancy on certain critical pieces of equipment such as mixers, dosing pumps, raw water pumps, chlorine supply pumps, and has a spare parts inventory for other critical pieces of equipment.

13) Check WTP shelving and inventory lists for parts that may be available to aid in necessary repairs. If necessary, contact 100 Mile House Public Works for assistance (same Treatment Plant).

14) If the issue stems from the VFD's, alternate pumps. Call contract electrician if necessary.

15) If issue is due to drawdown in Supply Wells, consult **Drought Management Plan (Appendix C)** and proceed to next step.

16) If problem persists:

- ✓ Communicate with Interior Health, issue an advisory as recommended (see Section 1).
- ✓ Implement emergency water restrictions (Communications Department).
- ✓ Contact 108 Volunteer Fire Department and inform them of situation.

17) Complete documentation:

a) Record of events, include times and dates.
b) Complete a comprehensive damage assessment.
c) Investigate potential causes.

6.2. Supply Main Break

Description of Emergency: Failure or damage to a water supply main causing loss of water and/or pressure.

Indicators: SCADA alarms indicating pressure loss, calls from residents or staff observations.

Actions: Steps to be taken by CRD staff:

1) Contact Manager of Utilities.
2) Contact Water Operator.
3) Determine location.
4) Stop the flow of water by closing valves and isolating the break, depending on the scale of the break (see chart in Appendix B); attempt to maintain positive pressure.
5) Contact Manager and describe the emergency.
6) Determine what section of the system has been affected by the depressurization.
7) If there is a potential that the system has been contaminated, the Manager of Utilities will contact Interior Health for recommendations on issuing a Water Advisory. See Appendix E (follow Communications procedures).
8) Make the site safe by implementing traffic control: block road, if necessary, contact traffic control contractor (Appendix A).
9) If possible, mitigate danger to the public and further damage of infrastructure or property. If necessary and feasible, set up sediment control measures and de-chlorinated water released.
10) Assess immediate damage.
11) Coordinate repair plans with appropriate contractors (see Appendix A).
12) Contact the Provincial Agency responsible (see Appendix A) for large discharges of chlorinated water including;
13) If there is significant sediment or chlorinated water in streams.
14) Call Fire Department to inform them when hydrants are in or out of service.
15) Complete documentation:
    a) Record of events, include times and dates.
    b) Complete a comprehensive damage assessment.
    c) Investigate potential causes.
    d) After action report.

6.3. Extended Loss of BC Hydro Power Supply

Description of Emergency: The loss of power will stop the pumping systems to supply water to the distribution system and from filling the reservoir if back up power generator fails.

Indicators: SCADA alarms

Actions:

1) Maintain fuel supply to generators.
2) Change system settings if necessary to keep reservoirs topped up.
3) If sudden phase loss or total power loss causes equipment failure see Section 6.
4) If issues with power supply persist:
   - ✓ Contact BC Hydro for information on the timelines for power restoration.
   - ✓ Communicate with Interior Health, issue an advisory as recommended (see Section 1).
   - ✓ Implement emergency water restrictions (Communications Department).
   - ✓ Potentially throttle down the pressure within the distribution to reduce water loss (always above 20 psi).
   - ✓ Contact 108 Volunteer Fire Department and inform them of situation.

6.4. Operator Transportation Routes Compromised

6.4.1. Potential Causes

- Forest fire
- Accident
- Mechanical issues with vehicle
- Construction

Description of Emergency: The usual transportation route to the 108 Mile area is blocked (e.g., by a forest fire or accident), and no operator can be onsite to perform duties.

Actions:

1) Contact Manager of Utilities.
2) Manager will inform Interior Health Officer of situation.
3) Continue to monitor system using SCADA.

4) If issue persists:

   - ✓ Contact 100 Mile House Public Works for assistance.
   - ✓ Reach out to local contact if physical checks are needed. Preferably local contractor with system experience (see Appendix A).
   - ✓ Contact the Communications Department to issue applicable advisories (at the recommendation of Interior Health).

5) Complete documentation:

   a) Record of events, include times and dates.
   b) Complete a comprehensive damage assessment.
   c) Investigate potential causes.

7. SECTION 7: Cyber Incident

7.1. Introduction

Cyberspace and its underlying infrastructure are vulnerable to a wide range of hazards from both physical attacks as well as cyberthreats. Sophisticated cyber actors and nation-states exploit vulnerabilities to steal information and money and are developing capabilities to disrupt, destroy or threaten the delivery of essential services such as drinking water and wastewater. As with any critical enterprise or corporation, drinking water and wastewater utilities must evaluate and mitigate their vulnerability to a cyber incident and minimize impacts in the event of a successful attack.

Cyber incidents can compromise the ability of water and wastewater utilities to provide clean and safe water to customers, erode customer confidence and result in financial and legal liabilities. The following sections outline actions drinking water and wastewater utilities can take to prepare for, and respond to, cyber incidents.

Indicators: Can include:

a) Loss of ability to access or use SCADA system.
b) Visible signs of SCADA network tampering.

Actions:

1) If possible, disconnect compromised computers from the network to isolate breached components and prevent further damage, such as the spreading of malware. Do not turn off or reboot systems – this preserves evidence and allows for an assessment to be performed.

2) Assess any damage to utility systems and equipment, along with disruptions to utility operations.

3) Notify utility personnel, take action to restore operations of mission critical processes (e.g., switch to manual operation if necessary), and public notification (if required).

4) Report the cyber incident as required to law enforcement and regulatory agencies.

7.2. IT and/or IT Contractor Steps

1) Notify any external entities (e.g., vendors, other government offices) that may have remote connections to the affected network(s).

2) Document key information on the incident, including any suspicious calls, emails, or messages before or during the incident, damage to utility systems, and steps taken in response to the incident (including dates and times).

3) Review system and network logs and use virus and malware scans to identify affected equipment, systems, accounts and networks.

4) Document which user accounts were or are logged on, which programs and processes were or are running, any remote connections to the affected IT systems or network(s) and all open ports and their associated applications. If possible, take a “forensic image” of the affected IT systems to preserve evidence. Tools to take forensic images include Forensic Tool Kit (FTK) and EnCase.

5) If possible, identify any malware used in the incident, any remote servers to which data may have been sent during the incident, and the origin of the incident. Canadian Centre for Cyber Security can assist. contact@cyber.gc.ca or 1-833-CYBER-88.

6) Research and identify if any employee or customer personally identifiable information (PII) was compromised.

7) Check the system back-up time stamp to determine if the back-up was compromised during the incident.

8) Document all findings and avoid modifying or deleting any data that might be attributable to the incident.

8. SECTION 8: Drought

8.1 Introduction

Drought is often caused by a long duration of inadequate rainfall or snowmelt to replenish the level of the water source. It can also be the result of a breakdown in a crucial piece of a water system's infrastructure; or a prolonged issue with water quality that prevents the supply of potable water for an extended period. All of these circumstances can result in a significant depletion in the source capacity or even a complete loss of source. The Cariboo Regional District's Drought Management Plan for the 108 Mile Water System serves as a guide to monitoring, managing and conserving water use in the event of an impending drought. The objectives of this Plan are to:

1) Identify the priority users of the water supply.
2) Provide direction on water conservation before and during the drought period.
3) Establish a guideline for communicating issues and instructions to users and other key contacts.
4) List supplemental or alternate sources of potable water in the event of a prolonged drought.

Appendix C outlines the Cariboo Regional District's Drought Management Plan.

Appendix A: Contacts

Cariboo Regional District Administrative Staff Emergency Contact Numbers

Title	Contact Name	Work #	Cell #
Manager of Utilities	Kelly McDonald	(250) 305-2179	(250) 855-8340
Manager of Communications	Gerald Pinchbeck	(250) 392-3351 Ext. 213	(250) 305-7576
Manager of Emergency Programs	Irene Israel	(250) 392-3351 Ext. 274	
Chief Administrative Officer	Murray Daly	(250) 392-3351 Ext. 214	
Manager of Fire Administration	Cody Braaten	(250) 392-3351 Ext. 265	
Regional Fire Chief	Roger Hollander	(250) 392-3351 Ext. 204	
Environmental Services Assistant	Cheryl McMullen	(250) 392-3351 Ext. 250	

Cariboo Regional District Water Operators

Region	Operator Name	Work #	Cell #
South (100 Mile)	Jourdy Ouellette	1-800-665-3456 (press 5 when prompted)	(250) 945-5661
South (100 Mile)	Larry Perry		(250) 945-4756
South (100 Mile)	Colin Brusic		(250) 945-4312
Central (WL)	Ken Heidema		(250) 855-4097
Central (WL)	Chuck Howes		(250) 855-8563
North (Quesnel)	Tyler Olsen		(250) 255-7697
North (Quesnel)	Phil Wilkins		(250) 255-0910

Provincial and Federal Contacts

Organization	Contact	Work #	Emergency #
Interior Health	Diana Tesic-Nagalingam Environmental Health Officer	(250) 851-7340	(250) 320 0501
Interior Health	MHO (after hours on-call)		1-866-457-5648
100 Mile RCMP	Office	(250) 395-2456	911
108 Mile VFD	Chief	(250) 791-5715	911
BC Environmental Emergency Branch	(Report a Spill)	(250) 398 4530	1-800-663-3456
BC Hydro (Electrical)	Office	1-888-769-3766	1-800-224-9376
Canadian Centre for Cyber Security		1-833-CYBER-88	
FortisBC (Gas)	Office	1-888-224-2710	1-800-663-9911
School District No. 27	Maria Telford Principal	(250) 791-5221	

Contractors

Company	Contact	Work #	Cell #
Electrical and Instrumentation: Garth's Electric	 Terry Wiebe	 (250) 395-2545	 (250) 395-6521
Excavating: Carwen Dirtworks AK Burfoot Excavating & Plumbing	 Edward Dalziel Arlyn Burfoot	 (250) 395-8882 (250) 706-9205	 (250) 808-3002
Instrumentation and SCADA: Exceed Electrical Engineering	 Adam Cook	 (250) 434-9489	 (250) 267-2895
Laboratory: ALS Environmental	 Caitlin Fountain	 (250) 372-3588	 (250) 572-1458
Plumbing: Burgess Plumbing & Heating	 Office	 (250) 392-3301	 (250) 395-4800
Well Pump Installation: AK Burfoot Excavating & Plumbing Big Country Pumps Hillside Pumps Northlands Water & Sewer Precision Service and Pumps	 Arlyn Burfoot Rob Dan Gauthier 	 (250) 706-9205 (250) 296-3521 (250) 392-7876 (250) 561-1884 (604) 850-7010	

Municipalities

Municipality	Contact	Work #	Cell #
100 Mile House	100 Mile House Public Works	(250) 395-2434	
100 Mile House	Todd Conway (Director)	(250) 395-2434	
Williams Lake	Patrick Mahood (Manager of Public Works)	(250) 392-2311	(250) 392-0867
Williams Lake	Matt Sutherland	(250) 392-2311	(250) 392-0864

Media (Communications Department Leads)

Name	Type	Contact	Work #
CFFM The Goat	Radio/Digital		(250) 392-6551
CBC Kamloops	Radio/Digital		(250) 374-6802
100 Mile Free Press	Newspaper/Digital		(250) 395-2219
Global News	Television		(778) 945-9399

Appendix B: Charts

Water Main Break

Water Main Break Severity Chart				
Class 1	*Class 2*	*Class 3*	*Class 4*	*Class 5*
Routine	*Minor*	*Substantial*	*Major*	*Catastrophic*
Small enough to leave until repairs are convenient	Water Pooling	Isolation Needed	Large area needs to be isolated	Complete Distribution System Shut down
Positive Pressure Maintained	Positive Pressure Maintained	Positive Pressure may not be possible	Loss of Pressure in large area of distribution system	Complete system pressure loss (e.g. drained reservoir)
Consult with DWO if any concerns.	Advisory may be required, consult with DWO.	Advisory Needed, contact Interior Health. Assess damage.	Advisory needed, contact interior health. Assess damage	Advisory needed, contact interior Health. initiate EOC.
Flush line (localized)	sample for bacteriological contamination after flushing lines as per C651-14 (localized)	Sample for bacteriological contamination after flushing lines as per AWWA C651-14	Chemical and bacteriological sampling may be needed. Possible unidirectional flushing and super chlorination needed as per AWWA C651-14	Chemical and bacteriological sampling needed at various points in the system. System wide flushing needed. Super chlorination required as per AWWA C651-14

Critical Parts Inventory

Critical Parts Inventory							
Part	Use	Location Stored	Vendor	Part	Use	Location Stored	Vendor

Appendix C: Drought Management Plan

DROUGHT MANAGEMENT PLAN

Priority Users

The area served by the 108 Mile Water System is comprised mainly of residents, and also includes a gas station, small shopping mall, fire hall, golf resort, church, community hall, elementary school, park, an airport and 3 restaurants/coffee shops. In a drought situation, the provision of water will be prioritized as follows:

Priority Level	User	Comments
1	Residents	The CRD is obligated to provide water to the residents served by the 108 Mile Water System for basic health and sanitation needs. The Water Sustainability Act states that the maximum requirement per household per day for those purposes is 250 litres.
2	108 Mile Volunteer Fire Dept.	The risk of fire greatly increases during a drought and a supply of water must be maintained for fire protection purposes.
3	Elementary School	Water is required for sanitation purposes. The washrooms in the school require water for the flushing of toilets and washing of hands by children and staff.
4	All Other Businesses and Organizations (these may need to be further prioritized following public meeting discussions)	Businesses that rely on the provision of water may be required to reduce hours of operation or close down temporarily during a drought in order to conserve water. However, a prolonged drought may result in a significant loss of revenue, which would need to be addressed.
5	Public Park	Outdoor taps would need to be shut down during a drought.

Water Restrictions and Conservation Measures

The following restrictions will be imposed and conservation measures recommended to 108 Mile Water System users at various stages prior to and during a drought:

STAGE 1: PREPAREDNESS	
Permitted Uses	**Restrictions**
Drinking water Bathing Handwashing dishes or using dishwasher Washing machine Watering plants with a hose or watering can Bathing pets. Washing vehicles.	May 1 to Oct. 1: Lawn watering on reduced days for reduced hours, per bylaws. **Conservation Measures** Install water-saving devices.
STAGE 2: IMPENDING DROUGHT – CONSERVATION	
Permitted Uses	**Restrictions**
Drinking water Bathing Handwashing dishes or using dishwasher Washing machine Watering plants with a hose or watering can	Lawn watering days and hours restricted further. Wash vehicles only if absolutely necessary. **Conservation Measures** Bathe pets only as needed. Use washing machine for full loads only. Use dishwasher for full loads only.

STAGE 3: DROUGHT – RESTRICTIONS	
Permitted Uses	**Restrictions**
Drinking water (all users) Bathing Handwashing dishes or using dishwasher Washing machine	No watering of lawns or watering of plants, per bylaws. No bathing of pets unless absolutely necessary. No washing of vehicles. No filling of swimming pools. No power-washing.
	Conservation Measures
	Bathe only as needed and/or reduce time in shower. Use washing machine for full loads only. Use dishwasher for full loads only.

Communication Plan

Communication between the CRD and users of the 108 Mile Water System, as well as with key operational contacts, is imperative during an emergency situation. Providing timely and clear information and instructions greatly reduces confusion, frustration and anxiety, and enables outside agencies to provide assistance more effectively if needed.

STAGE 1: PREPAREDNESS	
Water use is routinely higher from mid-Spring to the end of Summer each year due to less rainfall, increased lawn and garden maintenance, swimming pools, more frequent car-washing and showers, etc. Water levels are constantly monitored, and watering restrictions are put in place annually from May 1 to October 1 as a preventative measure to minimize depletion of the water supply during these months.	
Procedures (Concurrent)	Target
Finance Dept. mails notice of water restrictions and water conservation recommendations with annual utility bills in April of each year.	Residents
Communications Dept. posts notice of water restrictions and water conservation recommendations on website and social media.	All users of the 108 Mile Water System
Communications Dept. sends notice of water restrictions and water conservation recommendations by email.	Subscribed users.
Water Operators post notice of water restrictions and water conservation recommendations on bulletin boards at 108 Mall, gas station, mailboxes	Users of the 108 Mile Water System who don't have access to a computer.

STAGE 2: POTENTIAL THREAT – DIMINISHED WATER SUPPLY		
If there is little snowmelt in the Spring and rainfall in the Spring/Summer is not enough to bring the source of the water supply to an adequate level, further restrictions on water use may be required. Prolonged water quality issues may result in having to obtain water from an alternate source until rectified. Any significant or ongoing issues would indicate that action is required to prevent the possibility of a water supply crisis.		
Procedures		**Target**
1.	Inform key contacts of possible threat to water source: Water Operators notify Manager of Utilities Manager of Utilities informs other key contacts	Manager of Utilities Drinking Water Officer Electoral Area Director Manager of Fire Administration

2.	At Interior Health's direction, Manager of Utilities and Communications Dept. have public notice mailed to users, posted on website, social media, and on local bulletin boards.	All users of the 108 Mile Water System
	Communications Dept. sends public notice by email.	Subscribed users
3.	Manager of Utilities notifies CRD Managers involved in Emergency Planning as a precautionary measure.	Chief Administrative Officer Manager of Communications Manager of Emergency Programs
4.	Manager of Utilities, Water Operators and Electoral Area Director hold public meeting to discuss potential drought, further restrictions required and recommended conservation measures.	All users of the 108 Mile Water System
5.	Manager of Utilities notifies other agencies as a precautionary measure that assistance may be required if situation can't be rectified.	District of 100 Mile Ministry of Water, Land and Resource Stewardship Ministry of Emergency Management and Climate Readiness

STAGE 3: EMERGENCY – SIGNIFICANT DEPLETION OR LACK OF SOURCE

The following situations are considered critical:

- An inability to keep the water supply at a level that will provide enough water to meet the basic health and sanitation needs of the users.
- A prolonged issue with the water system infrastructure that results in the inability to provide water to the users.
- A severe or prolonged water quality issue that cannot be easily rectified.
- The inability to provide an adequate water supply for fire protection.
- An ongoing water supply issue that results in significant losses for businesses in the service area.

Procedures		**Target**
1.	Inform key contacts of crisis situation. Discuss further steps: Water Operators inform Manager of Utilities. Manager of Utilities notifies other key contacts.	Manager of Utilities Drinking Water Officer Electoral Area Director Chief Administrative Officer Manager of Fire Administration Manager of Communications Manager of Emergency Programs
2.	At Interior Health's direction, Manager of Utilities and Communications Dept. have public notice mailed to users, and posted on website, social media, and local bulletin boards.	All users of the 108 Mile Water System
	Communications Dept. sends notice of emergency situation by email and via Voyent Alert.	Subscribed users
3.	Manager of Utilities and Communications Dept. post notice in local newspaper; make radio announcements.	All users of the 108 Mile Water System
4.	Manager of Utilities, Water Operators and Electoral Area Director hold public meeting to discuss further steps.	All users of the 108 Mile Water System
5.	Manager of Utilities notifies other agencies. Discuss what assistance may be available.	District of 100 Mile Ministry of Water, Land and Resource Stewardship Ministry of Emergency Management and Climate Readiness

Supplemental or Alternate Sources of Potable Water

Supplemental or Alternate Source	Contact Information	Capacity Available	Estimated Time To Deliver	Estimated Cost
Backup Water Source				
Reservoir Rental Company				
Bulk Haul Water	District of 100 Mile 250-395-2434 Bulk Water Station is just off Exeter Truck Route near Co-Op Cardlock Triple P Sanitation (upon verification of IH permit)	Not specified Not specified	Pick up only	$100 upon opening a/c, plus $0.15 per litre.
Other Water Supplier	Triple P Sanitation (upon verification of IH permit)	Not specified		
Bottled Water	Cariboo Water Purification Centre Cool Clear Water Williams Lake Water Factory	Not specified Not specified Not specified	Tuesdays	$6.50 / 5 Gal $4.00 / 3 Gal

Operational Procedures

Action		Person Responsible
1	Ensure pump is shut off (to protect pump).	Water Operator
2	Notify all users by social media, email distribution, radio and public bulletins. High risk users to be notified by telephone call. Situationally assessed for best means of communication process.	Manager of Utilities Manager of Communications
3	Contact government agencies (see below) for advice and assistance.	Manager of Utilities
4	Arrange alternate source (e.g. bottled water, bulk hauler and storage tank).	Manager of Utilities

Government Agency Contacts:

- Drinking Water Officer
- Local government's Emergency Program Coordinator
- Ministry of Forests, Lands and Natural Resource Operations
- Others as necessary, depending on severity (ie. Fire Department)

Appendix D: Templates

Damage Assessment Summary (EOC 415)

DAMAGE ASSESSMENT SUMMARY				
	Event:	**Time:**		**Date:**
	Operational Period:	**PEP Task #:**		**Position:**
		Number	**Estimated Value**	**Comments**
Public Property	▪ Municipal Facilities Damaged			
	▪ Municipal Facilities Destroyed			
	▪ Public Facilities Damaged			
	▪ Public Facilities Destroyed			
	▪ Provincial Facilities Damaged			
	▪ Provincial Facilities Destroyed			
	▪ Federal Facilities Damaged			
	▪ Federal Facilities Destroyed			
	▪ Roads Damaged			
	▪ Roads Destroyed			
	▪ Bridges Damaged			
	▪ Bridges Destroyed			
	▪ Railroads Damaged			
	▪ Railroads Destroyed			
	▪ Water Supply Damaged			
	▪ Sewers Damaged			
	Total Public Damage:			
Private Property	▪ Residential Buildings Damaged			
	▪ Residential Buildings Destroyed			
	▪ Businesses Damaged			
	▪ Businesses Destroyed			
	▪ Agriculture Damaged			
	▪ Agriculture Destroyed			
	Total Public Damage:			
Priority Repairs/Restoration:				
Prepared By:			**Date and Time:**	

Action Plan (EOC 502)

EOC Action Plan			
Event:		**Date:**	**Time:**
Operational Period:	**PEP Task #:**	**Prepared By:**	

Objectives: (In priority order, for the designated operational period)

Tasks/Action Items:	**Function Assigned**	**Estimated Completion Time**

Attachments: (Check if attached)

☐	Organization Chart	☐	Public Information Plan	☐	Communication Plan
☐	EOC Floor Plan	☐	Transportation Plan	☐	
☐	Situation Map	☐	Evacuation Plan	☐	

Recommended By (Planning Section Chief):	**Approved By** (EOC Director):

Distribution:

- ☐ EOC Director
- ☐ Risk Management Officer
- ☐ Liaison Officer
- ☐ Information Officer
- ☐ Posted for ALL EOC Personnel
- ☐ Operation Section Chief
- ☐ Planning Section Chief
- ☐ Logistics Section Chief
- ☐ Finance/Administration Section Chief
- ☐ Other _____

Situation Report (EOC 501)

EOC Situation Report

Community / Local Authority: _____

Date and Time: _____

PEP Task Number: _____

Prepared By: ☐ Community / Local Authority
☐ PREOC Operational Area Coordinator

Approved By: _____
(Name and Position)

EOC Contact:	**Report Type:**
Name: _____	☐ Initial
Position: _____	☐ Update #_____
_____	☐ Final
Phone #: _____	**Situation Forecast:**
Fax #: _____	☐ Improving
E-mail: _____	☐ Unchanged
	☐ Deteriorating

Highlights (*Situational Overview – Key Points*):

Current Priority Needs: (*Resources / Information / Support*):

Resource Request Attached: ☐ Yes ☐ No

People Impacted (*Estimated / Confirmed*):

# Evacuated	# Injured	# Homeless*	# Missing	# Dead	# Hospitalized

** As a result of the emergency event*

Event Log (EOC 414)

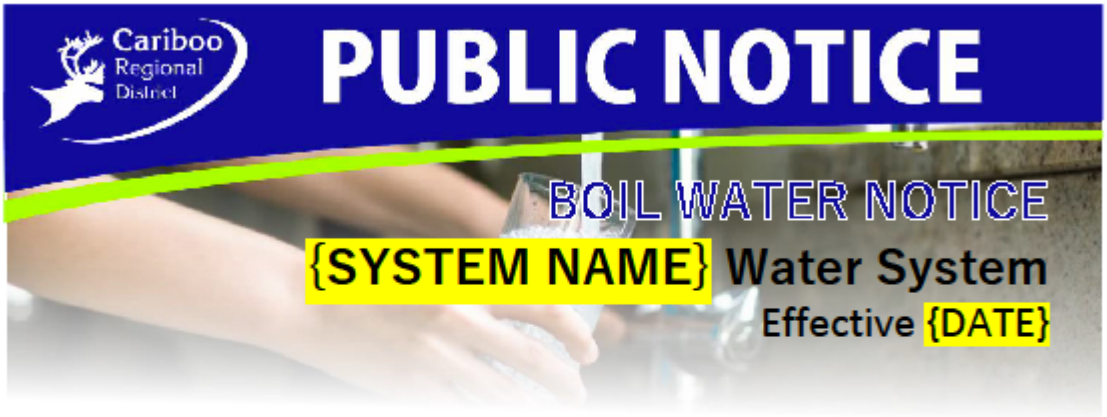
POSITION LOG

Event:	Section:	Position:
Operational Period:	PEP Task #:	Date:

LOG

Time (24 Hr.)	To	From	Action	Follow-Up	Closed

Appendix E: Communications Templates



The Cariboo Regional District has issued a Boil Water Notice to users of the {SYSTEM NAME} Water System, pursuant to a request of a Drinking Water Officer under Section 14 of the *Drinking Water Protection Act*. This Notice remains in effect until further notice.

The Cariboo Regional District's water systems are tested regularly to ensure they meet public health regulations. This boil water notice is being issued because {REASON}. This notice is being issued {CHOOSE: as a precautionary measure to protect public health. OR in order to protect public health and safety from significant health risks presented by pathogens in the water supply.}

All users of the {WATER SYSTEM NAME} Water System are asked to bring water to a rolling boil for a minimum of one minute before using water from the system for:

Drinking (or use an alternate, safe source of water)
Cooking (if not boiled)
Brushing teeth
Washing Dishes
Washing fruits or vegetables to be eaten raw
Watering animals

Also, please use hand sanitizer after washing hands.

If you have further questions, please call Environmental Services at 1-800-665-1636 during regular office hours.

For more information about boil water advisories and service interruptions in the CRD and what to expect, visit cariboord.ca/water-notices-and-advisories. To receive updates on CRD water systems and other relevant information within the CRD, residents are reminded to subscribe to the latest news on our website at cariboord.ca/subscribe. Residents can also sign up the Cariboo Chilcotin Emergency Notification System to be notified directly of emergency orders and alerts or utility service interruptions at cariboord.ca/EmergencyNotifications.

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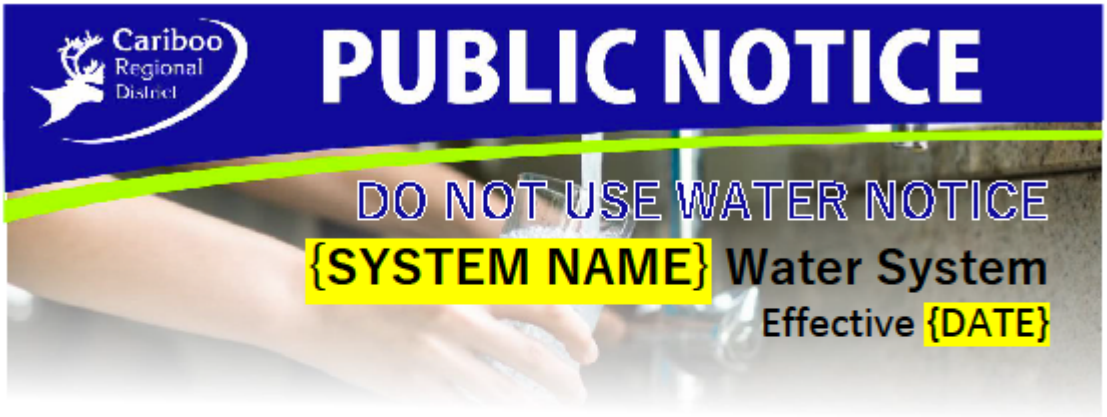

The Cariboo Regional District has issued a Do Not Use Notice to users of the {SYSTEM NAME} Water System, pursuant to a request of a Drinking Water Officer under Section 14 of the *Drinking Water Protection Act*. This Notice remains in effect until further notice.

The Cariboo Regional District's water systems are tested regularly to ensure they meet public health regulations. Due to the presence of {if known, be specific, or if unknown say "contaminants in the water supply posing an immediate threat to resident's safety}, the Cariboo Regional District is implementing this until further notice. Follow all instructions below:

All users of the {WATER SYSTEM NAME} Water System are asked to immediately stop using water from the system for any purpose. This includes: drinking, making beverages or ice, brushing teeth, preparing or washing food, bathing, water for animals, washing anything (including vehicles), and watering plants.

Do not turn your taps on for any reason. Boiling water will NOT make it safe! Water from your hot water tank may also be unsafe, and you are advised to consult a qualified plumber before draining the tank.

The Cariboo Regional District has contacted Interior Health and the Ministry of Environment to request their cooperation in investigating this matter. In addition, the Cariboo Regional District is taking immediate acton to find another source of water supply for residents of {WATER SYSTEM NAME}.

During this time, an alternate water source will be available at {ADDRESS AND OPERATING HOURS}.

If you have further questions, please call Environmental Services at 1-800-665-1636 during regular office hours.

For more information about boil water advisories and service interruptions in the CRD and what to expect, visit cariboord.ca/water-notices-and-advisories. To receive updates on CRD water systems and other relevant information within the CRD, residents are reminded to subscribe to the latest news on our website at cariboord.ca/subscribe. Residents can also sign up the Cariboo Chilcotin Emergency Notification System to be notified directly of emergency orders and alerts or utility service interruptions at cariboord.ca/EmergencyNotifications.

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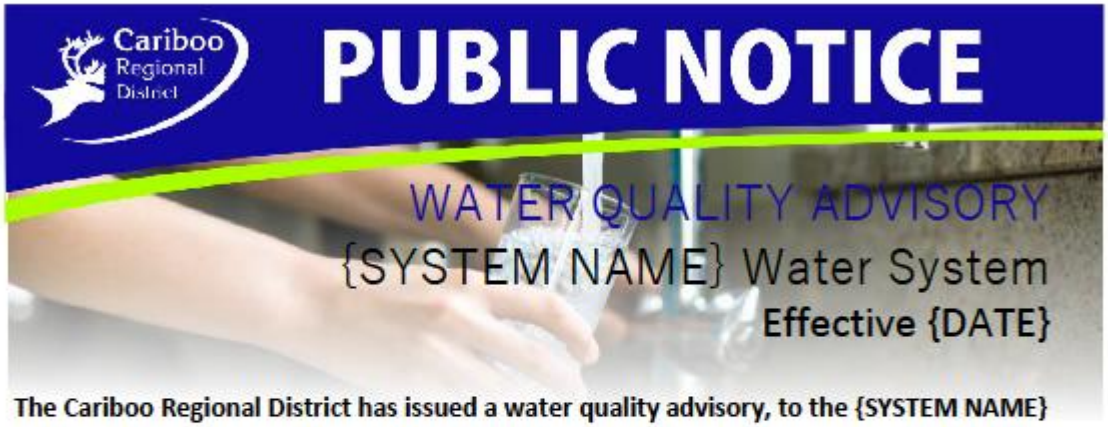

The Cariboo Regional District has issued a water quality advisory, to the {SYSTEM NAME} Water System users because of {issue} levels exceeding the *Guidelines for Canadian Drinking Water Quality*. This Advisory remains in effect until further notice.

The Cariboo Regional District's water systems are tested regularly to ensure they meet public health regulations. Health Canada's Guidelines for Drinking Water has established a maximum acceptable concentration (MAC) for {issue} in drinking water of {standard}. Recent water samples submitted show {issue} concentrations that exceed the MAC.

Add information provided by Health Canada or Interior Health about the nature of the water quality advisory. This section requires approval from a Drinking Water Officer.

{Other safety instructions or advisories. I.e. is the water safe for other non-consumption purposes, how does boiling water impact it, etc.}

If you have further questions, please call the Environmental Services department at 1-800-665-1636 during regular office hours.

*For more information about boil water advisories and service interruptions in the CRD and what to expect, visit **cariboord.ca/water-notices-and-advisories**. To receive updates on CRD water systems and other relevant*

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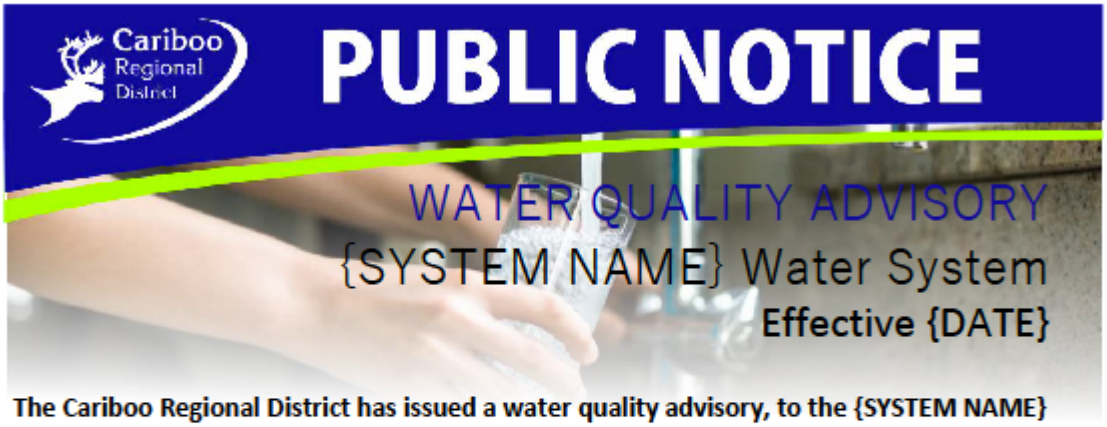

The Cariboo Regional District has issued a water quality advisory, to the {SYSTEM NAME} Water System users because of manganese (Mn) levels exceeding the *Guidelines for Canadian Drinking Water Quality*. This Advisory remains in effect until further notice.

The Cariboo Regional District's water systems are tested regularly to ensure they meet public health regulations. Health Canada has established a maximum acceptable concentration (MAC) for manganese in drinking water of 0.12 mg/L. Recent water samples submitted show manganese concentrations that exceed the MAC.

Manganese (Mn) is an element found in air, food, soil and drinking water. While a small amount of Mn is essential for human health, new Health Canada research has shown drinking water with too much Mn can be a risk to health for infants and young children.

Infants and young children are the most sensitive and vulnerable population, as their bodies absorb more manganese and cannot regulate or remove the chemical as readily as adults and older children. As a result, the **drinking water from this system must not be used to prepare formula for bottle-fed infants**. An alternate source of safe drinking water, such as bottled water, must be used when preparing formula for infants and young children. **Boiling the water will not lower the manganese level.**

Breastfed infants are generally considered at lower risk to manganese exposure as the transfer of manganese to breast milk is limited. Pregnant or breastfeeding women who have concerns may wish to use a safe, alternate source of drinking water or consult with a healthcare professional.

Water exceeding the MAC for manganese can be used for cooking and drinking by non-vulnerable groups and is still considered safe for hand washing, bathing and showering. If you have further questions, please call the Environmental Services department at 1-800-665-1636 during regular office hours.

*For more information about boil water advisories and service interruptions in the CRD and what to expect, visit **cariboord.ca/water-notices-and-advisories**. To receive updates on CRD water systems and other relevant information within the CRD, residents are reminded to subscribe to the latest news on our website at **cariboord.ca/subscribe**.*

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The Cariboo Regional District has issued a water quality advisory for users of the Forest Grove Water System because of a positive test result for low coliform found in the system.

For this reason, as precautionary measure, any high-risk users, including those with weakened immune systems, young children and those on dialysis are advised to:

- **use purchased bottled water or boiled water for drinking, brushing teeth, dishwashing, preparing food, and making ice, or**
- **bring water to a roiling boil for one minute, then cool to an appropriate temperature before using.**

The CRD regularly tests the water system as part of its Water Quality Monitoring Program. The advisory will remain in effect until further notice. We apologize in advance for any inconvenience this may cause.

When satisfactory results are reported from the required testing, customers will be notified that the advisory has been lifted. If you have questions, please call the Environmental Services department at 1-800-665-1636. If calling outside of regular business hours (8:30 a.m. to 4:30 p.m. Monday to Friday), please dial "5" when prompted to reach our emergency after hours contact.

For more information about boil water advisories and service interruptions in the CRD and what to expect, visit cariboord.ca/water-notices-and-advisories.

To receive updates on CRD water systems and other relevant information within the CRD, residents are reminded to subscribe to the latest news on our website at cariboord.ca/subscribe.

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