



FOREST GROVE WATER SYSTEM 2024 ANNUAL REPORT

Operating Permit # 002903 CRD Utilities Department

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File: 5600-20-06-01

January 14, 2025

Christine Sweezey
Environmental Health Officer
Interior Health
540 Borland Street, 3rd Floor
Williams Lake, BC V2G 2G8

Dear Christine Sweezey:

Re: Transmittal of the 2024 Annual Report for the Forest Grove Water System

We are pleased to submit the 2024 Annual Report for the Forest Grove 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 Forest Grove community, as represented by Electoral Area H Director and CRD Board Chair Margo Wagner.

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

Sincerely,

Kelly McDonald
Manager of Utilities

KM/cm

building communities together

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1. Executive Summary

The Forest Grove Water System serves approximately 250 residents through 106 connections and continues to provide safe, clean drinking water. The system, constructed in 1984 with expansions in 1996, relies on a single source well and primarily consists of asbestos cement (AC) and polyvinyl chloride (PVC) pipes. Despite staffing challenges in 2024, daily system checks, sampling, and maintenance ensured uninterrupted and efficient operation throughout the year.

Water quality remains excellent, with no issues detected in over 70 bacteriological samples, though the system's hard water may cause minor inconveniences. Currently untreated, options for maintaining a disinfectant residual will be explored to align with best practices.

Key 2024 achievements include an upgrade to the SCADA monitoring system and staff certifications through the Environmental Operator's Certification Program (EOCP), ensuring robust system management. Looking ahead, 2025 plans include full hydrant maintenance, leak detection surveys, and main valve exercising to maintain optimal performance.

Efforts to address source risks include exploring a Source Protection Area or a new well location and implementing a cross-connection control program. Additionally, a comprehensive Emergency Response and Contingency Plan (ERCP) has been developed to enhance preparedness for potential emergencies.

The Forest Grove Water System remains a reliable and well-maintained asset, with the Cariboo Regional District committed to transparency, proactive planning, and continuous improvement to serve the community effectively.

1.1. **Key Information:**

System key facts:

- 3.7 km of pipe including 1.5 km AC and 2.2 km of PVC
- single well and pumphouse
- single reservoir
- 106 service connections
- untreated

2. Introduction

The Forest Grove Water System serves approximately 250 residents through 106 individual connections. Originally constructed in 1984, the system underwent expansions in 1996 to accommodate growing needs. The original infrastructure primarily consists of asbestos cement (AC) pipes, a material with a relatively low lifespan, while the 1996 additions utilize more durable polyvinyl chloride (PVC) pipes. The system relies on a single source well, which currently provides sufficient capacity to meet the community's water demand.

3. Maintenance

Cariboo Regional District Operators conduct daily system checks to ensure the water system functions properly and remains well-maintained. These checks involve mechanical maintenance of pumps, valves, hydrants, and electronic components. Operators also perform scheduled sampling to monitor bacteriological and chemical parameters, ensuring the system complies with all regulatory standards.

4. Projects and Planned Activities

In 2024, the Forest Grove Water System saw the completion of an upgrade to its remote computer monitoring system (SCADA), enhancing operational oversight. Additional SCADA upgrades are planned to further improve system efficiency. Currently, the system is undergoing a comprehensive inventory as part of the Cariboo Regional District's efforts to implement a standardized asset management program across all its systems.

Looking ahead to 2025, planned activities include full hydrant maintenance, a leak detection survey, and main valve exercising to ensure the system remains in optimal condition and operates reliably. These initiatives reflect ongoing efforts to maintain and improve system performance and longevity.

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 southern region water systems now have three certified Operators, including one who has achieved their Level 3 (EOCP) certification in water distribution (*table 1*).

These three Operators are responsible for operating the Forest Grove system, along with six other water systems and one wastewater system in the South Cariboo.

Table 1: Environmental Operator Certification Levels

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

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

The Forest Grove Water System relies on a single source well located in a developed area at the center of the community, which poses a higher risk of contamination due to nearby human activities. To mitigate these risks, options such as establishing a Source Protection Area or drilling a new, more securely located well will be assessed.

6.1. Cross-Connection Control

A cross-connection control program is planned to prevent potential backflow of contaminants into the water system, enhancing overall protection and reliability and meeting permit requirements.

7. Water Sampling

Bacteriological sampling is performed twice each month at three designated locations. Additionally, a comprehensive chemical and mineral analysis is carried out once a year to detect any changes in the source water. Our operators continuously monitor residual chlorine levels and turbidity in real time to ensure water quality.

None of the 70 plus samples taken in 2024 showed positive results for coliforms or E. coli.

** Sample results attached*

8. Water Quality

The water quality in the Forest Grove Water System is excellent, providing safe and clean drinking water to residents. The only notable characteristic is its hardness, which, while not a health concern, may cause minor inconveniences such as mineral buildup. Currently, the water is not treated, but the Cariboo Regional District recognizes the importance of maintaining a disinfectant residual as a best practice for long-term water quality protection. Options for implementing treatment to maintain a residual will be explored in the future to enhance system safety and reliability further.

9. Events

The year 2024 was uneventful for the Forest Grove Water System, which is a positive outcome. No significant issues or disruptions occurred, indicating that the system operated reliably and efficiently throughout the year. This stability reflects the ongoing effectiveness of maintenance and monitoring practices.

9.1. Water Demand

In 2024, consumers of the Forest Grove Water System used an estimated average of 288 litres per person per day. This estimate is based on service data and highlights a commendable level of water use, particularly given the rural nature of the community and the presence of large properties.

Water consumption varied throughout the year, with the highest demand occurring in July at 544 litres per person per day, while November saw the lowest usage at 212 litres per person per day.

Table 2: Litres per Capita by Month (Forest Grove)

Month	Forest Grove
January	225
February	267
March	245
April	228
May	301
June	332
July	544
August	379
September	219
October	267
November	212
December	239
Average	288

For comparison, the national average residential water consumption in Canada stands at 223 litres per person per day, while the total per capita average water use, including all sectors, is 401 litres per person per day, according to Statistics Canada (2021).

The Forest Grove community's water usage remains within a reasonable range given its unique characteristics, reflecting responsible consumption practices and effective water management efforts. Additionally, the fluctuation between peak and off-peak seasons suggests that system leakage is likely not a concern.

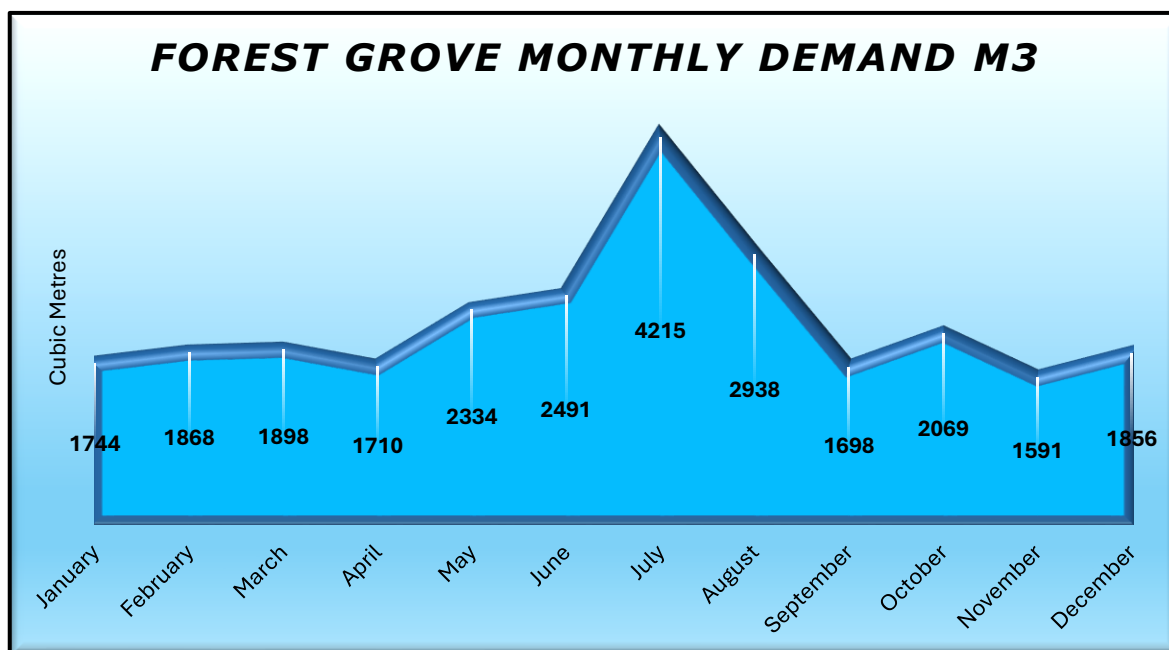


Figure 1: Monthly Demand in Cubic Metres

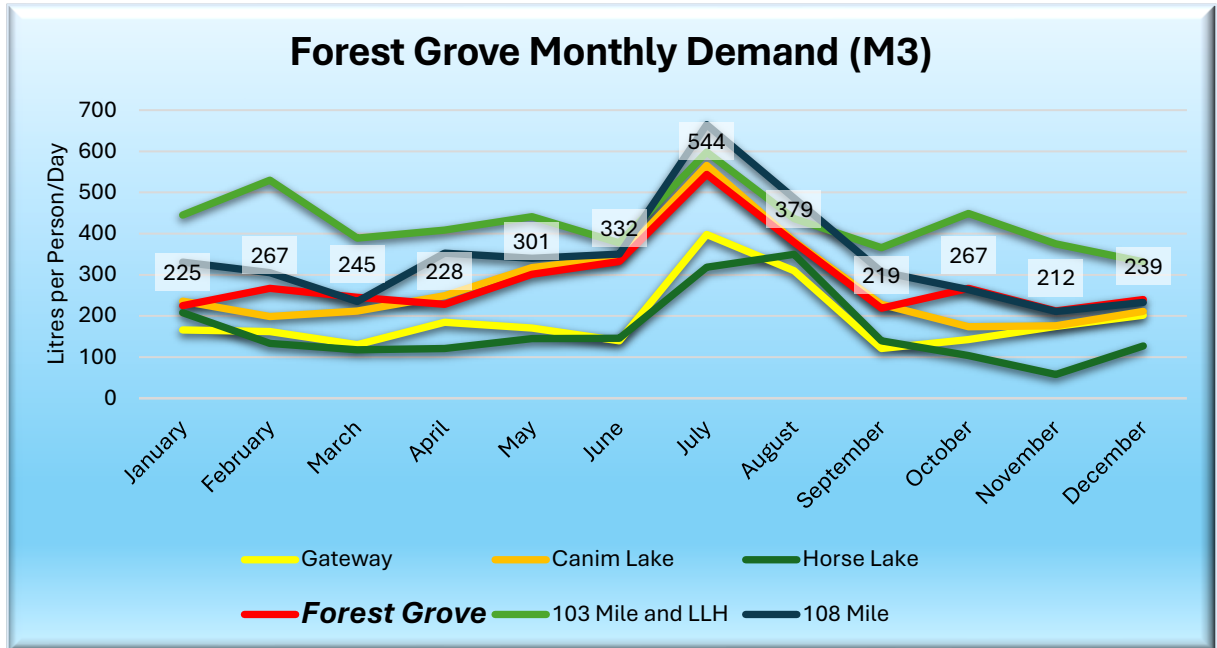


Figure 2: Litres per Capita Daily Average by Month

10. Emergency Planning

A new Emergency Response and Contingency Plan (ERCP) for the Forest Grove Water System was developed to enhance preparedness and ensure quick, coordinated responses to potential emergencies affecting the water supply.

The process began with a risk assessment to identify potential hazards, such as equipment failures, natural disasters, contamination events, and power outages. Stakeholder input, including feedback from Operators, community members, and regulatory bodies, helped shape the plan to address specific vulnerabilities and local conditions.

10.1. Key Elements of the ERCP

The key elements of the ERCP include:

- Clear Response Protocols: Step-by-step actions for various emergency scenarios.
- Roles and Responsibilities: Defined roles for Operators, management, and external agencies.
- Communication Strategies: Procedures for notifying residents, government agencies, and media.

- Resource Allocation: Identification of equipment, backup systems, and personnel required during emergencies.
- Training and Drills: Regular exercises to ensure staff are familiar with the plan and can respond efficiently.

The plan will be reviewed and approved by local health authorities to ensure compliance with provincial regulations. Updating the ERCP ensures that emergency procedures align with the current operational capacity.

In addition, a drought management plan is also currently being developed in line with best practice.

** Plans attached.*

11. Conclusion

The Forest Grove Water System demonstrated reliable performance in 2024, providing safe and high-quality water to the community. Ongoing maintenance, monitoring, and system upgrades reflect the Cariboo Regional District's commitment to ensuring long-term functionality and public health protection. Future initiatives, including risk mitigation measures and planned maintenance activities, will further enhance the system's resilience and service reliability. The CRD remains dedicated to transparency, continuous improvement, and meeting the needs of Forest Grove residents.

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/>
- Sample results, Interior Health. Retrieved from <https://services.interiorhealth.ca/publichealthprotection/watersamples.aspx>

- Statistics Canada (2021). *Survey of Drinking Water Plants – The Daily*.
<https://www150.statcan.gc.ca/n1/daily-quotidien/231114/dq231114d-eng.htm>

Thank you to:

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

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

2024 Forest Grove Water System Annual Report

Facility and Sample Site: Forest Grove Water System (CRD) Canim Lake Rd., Forest Grove, BC	Test Type: Drinking Water – Bacteriological Unit of Measure: CFU per 100 ml	Value	Date Collected	Results
Sample Station	Sample Parameter: E. coli	<1	03 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Jan 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	03 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Jan 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	09 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	09 Jan 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	09 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	09 Jan 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	17 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 Jan 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	17 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 Jan 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	30 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Jan 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	30 Jan 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Jan 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	06 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Feb 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	06 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Feb 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	14 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	14 Feb 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	14 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	14 Feb 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	21 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	21 Feb 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	21 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	21 Feb 2024	Acceptable
No sample site given	Sample Parameter: E. coli	<1	21 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	21 Feb 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	28 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	28 Feb 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	28 Feb 2024	Acceptable
	Sample Parameter: Total Coliform	<1	28 Feb 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	06 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Mar 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	06 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Mar 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	12 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	12 Mar 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	12 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	12 Mar 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	26 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Mar 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	26 Mar 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Mar 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	03 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Apr 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	03 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Apr 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	10 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Apr 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	10 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Apr 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	17 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 Apr 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	17 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 Apr 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	23 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	23 Apr 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	23 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	23 Apr 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	30 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Apr 2024	Acceptable

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Facility and Sample Site: Forest Grove Water System (CRD) Canim Lake Rd., Forest Grove, BC	Test Type: Drinking Water – Bacteriological Unit of Measure: CFU per 100 ml	Value	Date Collected	Results
Pumphouse	Sample Parameter: E. coli	<1	30 Apr 2024	Acceptable
	Sample Parameter: Total Coliform	<1	30 Apr 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	08 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	08 May 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	08 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	08 May 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	15 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 May 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	15 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	15 May 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	22 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	22 May 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	22 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	22 May 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	28 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	28 May 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	28 May 2024	Acceptable
	Sample Parameter: Total Coliform	<1	28 May 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	04 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	04 Jun 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	04 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	04 Jun 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	10 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Jun 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	10 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Jun 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	19 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	19 Jun 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	19 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	19 Jun 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	26 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Jun 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	26 Jun 2024	Acceptable
	Sample Parameter: Total Coliform	<1	26 Jun 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	03 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Jul 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	03 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Jul 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	10 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Jul 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	10 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Jul 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	17 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 Jul 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	17 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	17 Jul 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	24 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Jul 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	24 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Jul 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	31 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	31 Jul 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	31 Jul 2024	Acceptable
	Sample Parameter: Total Coliform	<1	31 Jul 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	06 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Aug 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	06 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Aug 2024	Acceptable
No sample site given	Sample Parameter: E. coli	<1	13 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Aug 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	13 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Aug 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	20 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	20 Aug 2024	Acceptable

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Facility and Sample Site: Forest Grove Water System (CRD) Canim Lake Rd., Forest Grove, BC	Test Type: Drinking Water – Bacteriological Unit of Measure: CFU per 100 ml	Value	Date Collected	Results
Pumphouse	Sample Parameter: E. coli	<1	20 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	20 Aug 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	27 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	27 Aug 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	27 Aug 2024	Acceptable
	Sample Parameter: Total Coliform	<1	27 Aug 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	16 Sep 2024	Acceptable
	Sample Parameter: Total Coliform	<1	16 Sep 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	16 Sep 2024	Acceptable
	Sample Parameter: Total Coliform	<1	16 Sep 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	24 Sep 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Sep 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	24 Sep 2024	Acceptable
	Sample Parameter: Total Coliform	<1	24 Sep 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	08 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	08 Oct 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	08 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	08 Oct 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	16 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	16 Oct 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	16 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	16 Oct 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	23 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	23 Oct 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	29 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 Oct 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	29 Oct 2024	Acceptable
	Sample Parameter: Total Coliform	<1	29 Oct 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	06 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Nov 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	06 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	06 Nov 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	13 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Nov 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	13 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	13 Nov 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	19 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	19 Nov 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	19 Nov 2024	Acceptable
	Sample Parameter: Total Coliform	<1	19 Nov 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	03 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Dec 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	03 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	03 Dec 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	10 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Dec 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	10 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	10 Dec 2024	Acceptable
Sample Station	Sample Parameter: E. coli	<1	16 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	16 Dec 2024	Acceptable
Pumphouse	Sample Parameter: E. coli	<1	16 Dec 2024	Acceptable
	Sample Parameter: Total Coliform	<1	16 Dec 2024	Acceptable

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Page : 4 of 7
 Work Order : KS2400951
 Client : Cariboo Regional District
 Project : Drinking Water



Analytical Results Evaluation

				Client sample ID						
Matrix: Water				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
Analyte	CAS Number	Method/Lab	Unit	KS2400951-001	KS2400951-002	KS2400951-003	KS2400951-004	KS2400951-005	KS2400951-006	KS2400951-007
Physical Tests										
Alkalinity, total (as CaCO ₃)	----	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 CaCO ₃), from total Ca/Mg	----	EC100A/VA	mg/L	568	628	524	343	464	422	322
Anions and Nutrients										
Chloride	16887-00-6	E235.CI/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 SO ₄)	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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Analytical Results Evaluation

				Client sample ID	108 Treated	103 Mile Well #3	103 Mile Well #4	Forest Grove Pumphouse	Gateway Pumphouse	Canim Lake Pumphouse	Horse Lake Pumphouse
Matrix: Water				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
Analyte	CAS Number	Method/Lab	Unit		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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Summary of Guideline Limits

Analyte	CAS Number	Unit	BCDWQG AO	BCDWQG MAC	BCDWQG OG				
Physical Tests									
Alkalinity, total (as CaCO ₃)	----	mg/L	--	--	--				
Colour, true	----	CU	15 CU	--	--				
Conductivity	----	µS/cm	--	--	--				
Hardness (as CaCO ₃), 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 SO ₄)	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	%	--	--	--				

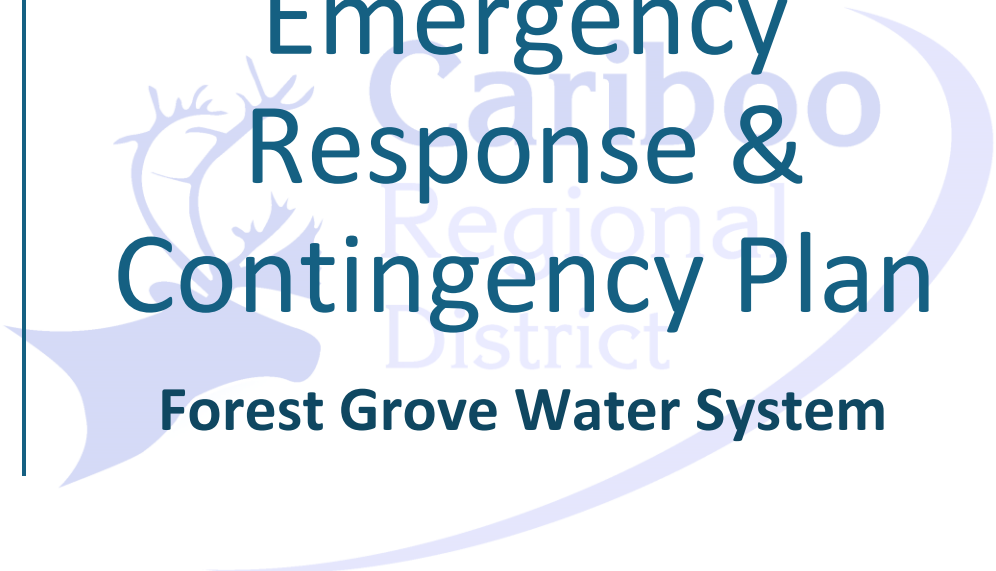
Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

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

Appendix C: Emergency Plans

2025 Cariboo Regional District



Emergency Response & Contingency Plan

Forest Grove Water System

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

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

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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 Forest Grove 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 is a nearby utility 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 Forest Grove Water System can operate on gravity-fed supply. A standard battery pack is on hand to maintain disinfection if the power grid fails.
- 1.1.5. **Ability to Meet Water Demands:** While the water system meets current demands, the reservoir is small, and there are no fire hydrants in the service area.
- 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 station 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.

Forest Grove Water System – 2025 Emergency Response and Contingency Plan

- 5) If cause is identified as a main break, see section 6.2.
- 6) Well Site Investigation: Generally, this problem is caused by high flows and overheating VFD's.
- 7) Check in the pumphouse for mechanical issues such as 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.
- 9) Check on alarms.
- 10) Note status of chlorine disinfection, reservoir level, source pump status, chemical dosing status, and raw water flows.
- 11) Check all necessary equipment to confirm proper functionality.
- 12) Check inventory for parts that may be available to aid in necessary repairs. If necessary, contact 100 Mile Public Works for assistance.
- 13) If the issue stems from the VFD's, allow to cool and contract electrician if necessary.
- 14) If issue is due to drawdown in Supply Well, consult Drought Management Plan (Appendix C) and proceed to next step.
- 15) If problem persists:
 - ✓ Communicate with Interior Health, issue an advisory as recommended (see Section 1).
 - ✓ Implement emergency water restrictions (Communications Department).
 - ✓ Contact Forest Grove and 100 Mile Fire Departments and CRD Protective Services Department to inform them of the situation.
- 16) 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 (see 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 contacts).
- 12) Contact the Provincial Agency responsible (see Appendix) for large discharges of chlorinated water including;
- 13) If there is significant sediment or unchlorinated 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. With no power, a full reservoir has approximately 48 hours of water available.

Indicators: SCADA alarms

Actions:

- 1) Source a generator.
- 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 Forest Grove and 100 Mile Fire Departments and CRD Protective Services Department to inform them of the 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 Forest Grove 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 or other Regional Operators 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.

SECTION 7: Cyber Incident

(Omitted for security reasons.)

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 Forest Grove 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

(Omitted for security reasons.)

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

[illegible]

Forest Grove Water System – 2025 Emergency Response and Contingency Plan

[illegible]

Appendix C: Drought Management Plan

DROUGHT MANAGEMENT PLAN

Priority Users

The area served by the Forest Grove Water System is comprised of an estimated 250 residents, as well as a fire hall, community school, café, legion and community centre. 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 Forest Grove Water System for basic health and sanitation needs.
2	Forest Grove 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	Community School Café Legion Community Centre	Water is required for sanitation purposes. Washrooms require water for the flushing of toilets and washing of hands.

Water Restrictions and Conservation Measures

The following restrictions will be imposed and conservation measures recommended to Forest Grove 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.

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	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 Forest Grove 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 Forest Grove 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 Forest Grove 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 Forest Grove 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 Forest Grove Water System

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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 Forest Grove 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 Forest Grove Water System
4.	Manager of Utilities, Water Operators and Electoral Area Director hold public meeting to discuss further steps.	All users of the Forest Grove 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	Not specified	Pick up only	\$100 upon opening a/c, plus \$0.15 per litre.

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	Bulk Water Station is just off Exeter Truck Route near Co-Op Cardlock Triple P Sanitation (upon verification of IH permit)	Not specified		
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 Private 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: Name: _____ Position: _____ _____ Phone #: _____ Fax #: _____ E-mail: _____	Report Type: ☐ Initial ☐ Update # _____ ☐ Final Situation Forecast: ☐ Improving ☐ 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)

[illegible]

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.

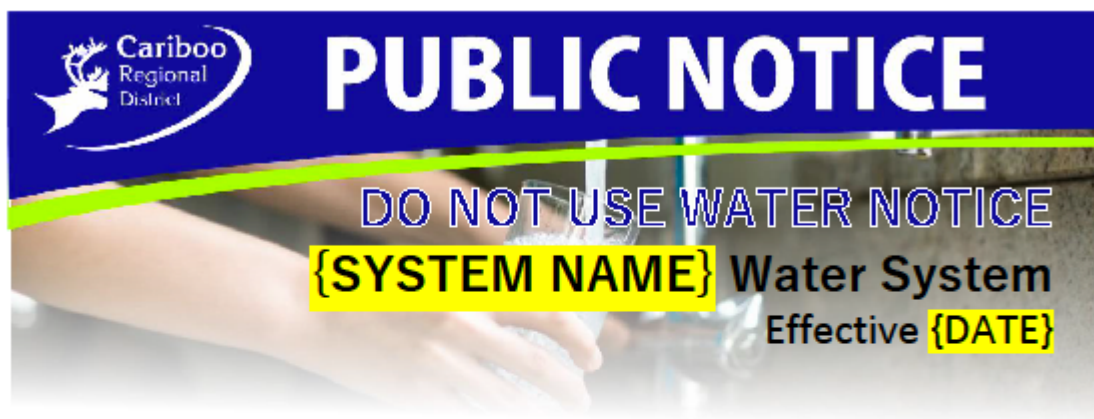
For more information about boil water advisories and service interruptions in the CRD and what to expect, visit cariboord.ca/water-notices-and-advisories. To receive updates on CRD water systems and other relevant information within the CRD, residents are reminded to subscribe to the latest news on our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



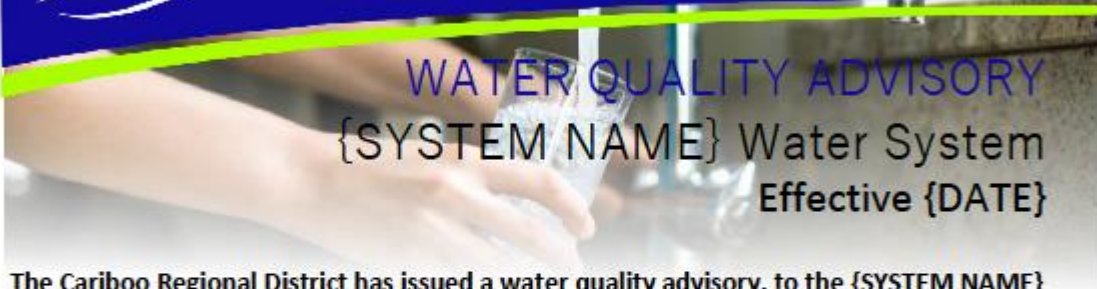
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PUBLIC NOTICE



WATER QUALITY ADVISORY

{SYSTEM NAME} Water System
Effective {DATE}

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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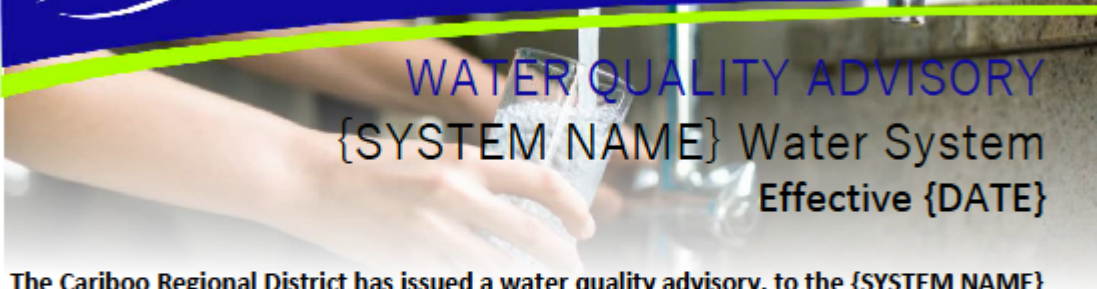
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PUBLIC NOTICE



WATER QUALITY ADVISORY

{SYSTEM NAME} Water System
Effective {DATE}

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 rolling 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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