Canada's Tournament Capital

CITY OF KAMLOOPS DRINKING WATER ANNUAL DRAFT REPORT 2024

Facility Number: 0660340

City of Kamloops
June 2025

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1. Introduction

This report has been prepared in accordance with the British Columbia *Drinking Water Protection Act* (DWPA) and the City of Kamloops' Operating Permit. It provides a comprehensive overview of the City's water treatment and distribution system, including total water consumption and a detailed analysis of water quality. The report also outlines ongoing projects and key operational activities.

The final version has been submitted to Interior Health for review and is publicly available on the City's official website, ensuring transparency and easy access to important information.

2. Kamloops Water System

The City's drinking water system consists of a single treatment plant that serves a vast distribution network, supplying water to the entire community. However, the Rayleigh and Heffley Creek Waterworks Districts operate independent systems, sourcing their water from the North Thompson River.

At the core of the City's water treatment infrastructure is the Kamloops Centre for Water Quality (KCWQ), a state-of-the-art ultra-filtration membrane treatment facility. This facility ensures safe, high-quality water by treating it with chlorination before distribution.

Both the water treatment and distribution/storage systems have been assessed and classified as Level IV under the Environmental Operators Certification Program (EOCP). As a result, their operation requires highly trained and certified personnel.

2.1 EOCP Certified Operators

The City employs a full team of certified professionals to ensure the safe treatment and distribution of potable water throughout Kamloops. Table 1 provides an overview of staffing levels for EOCP-certified water treatment and distribution operators.

Table 1: City of Kamloops Operator Certification Levels in 2024

Certification	Level	Number of Certified Operators
Water Treatment	Operator in Training	1
	I	0
	II	3
	III	1
	IV	4
Water Distribution	I	16
	II	16
	III	0
	IV	2
Total		***43***

2.2 Kamloops Centre for Water Quality

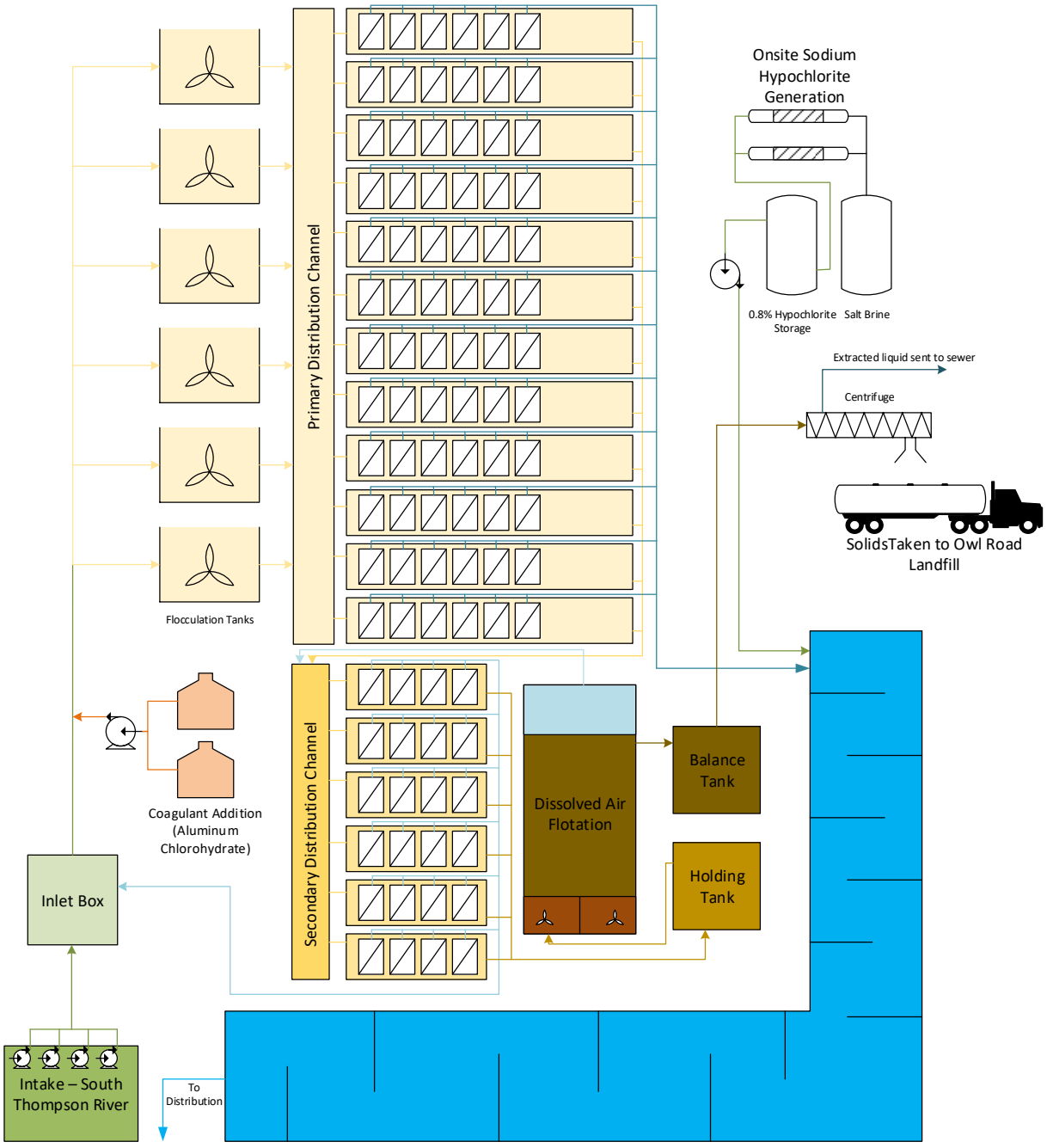
The KCWQ sources water from the South Thompson River, supplying drinking water to most of the city. Using advanced Veolia ZeeWeed 500D ultra-filtration membrane technology, the facility can produce up to 160,000 cubic metres per day (160 million litres per day, MLD).

The KCWQ is recognized for its commitment to environmental sustainability, holding a prestigious Gold certification from Leadership in Energy and Environmental Design (LEED). Notably, 99.99% of the water treated at the facility meets stringent safe drinking water standards.

After filtration, the recovered solids are transferred to the City's Owl Road Resource Recovery Centre, where they are repurposed as clean cover, supporting the City's sustainable resource management efforts.

A layout of the KCWQ and its treatment process is shown in Figure 1.

Figure 1: The KCWQ Plant Processes



2.1.1 KCWQ Water Production Totals

Over the past five years, water production at KCWQ ranged from 17,261,692 m3 to 20,004,839 m3. In 2024, total production remained consistent with the five-year average. Table 2 and Figure 2 illustrate the monthly total water consumption over this period.

Table 2: Monthly KCWQ Water Production Volumes for the Past Five Years

Month	Total Production (m^3)					5-Year Average
	2024	2023	2022	2021	2020	
January	989,091	1,009,243	986,537	926,492	950,257	972,324
February	910,135	869,803	884,952	837,180	878,837	876,181
March	1,004,997	975,044	973,188	942,894	927,506	964,726
April	1,318,903	1,160,966	1,170,347	1,332,908	1,153,487	1,227,322
May	1,888,358	2,182,062	1,752,480	2,153,131	1,856,272	1,966,461
June	2,099,819	2,624,288	1,899,884	2,833,400	1,664,247	2,224,327
July	2,861,322	2,931,566	2,796,810	3,421,547	2,216,542	2,845,557
August	2,544,311	2,135,318	2,946,521	2,654,901	2,625,230	2,581,256
September	1,905,339	1,420,435	2,120,876	1,745,439	2,040,135	1,846,445
October	1,163,332	1,168,232	1,336,219	1,173,299	1,097,265	1,187,669
November	950,070	953,510	998,349	985,269	916,257	960,691
December	960,442	967,591	1,051,439	998,380	935,655	982,701
Total	*18,596,119*	*18,398,058*	*18,917,602*	*20,004,839*	*17,261,692*	*18,635,662*
Daily Average	*50,809*	*50,406*	*51,829*	*54,808*	*47,163*	*51,003*
Daily Peak	117,779	109,161	111,688	138,446	97,460	
Peak Date	21-Jul	08-Jun	28-Jul	30-Jun	04-Aug	

Figure 2: Graphical Representation of the Monthly KCWQ Water Production Volumes for the Past Five Years

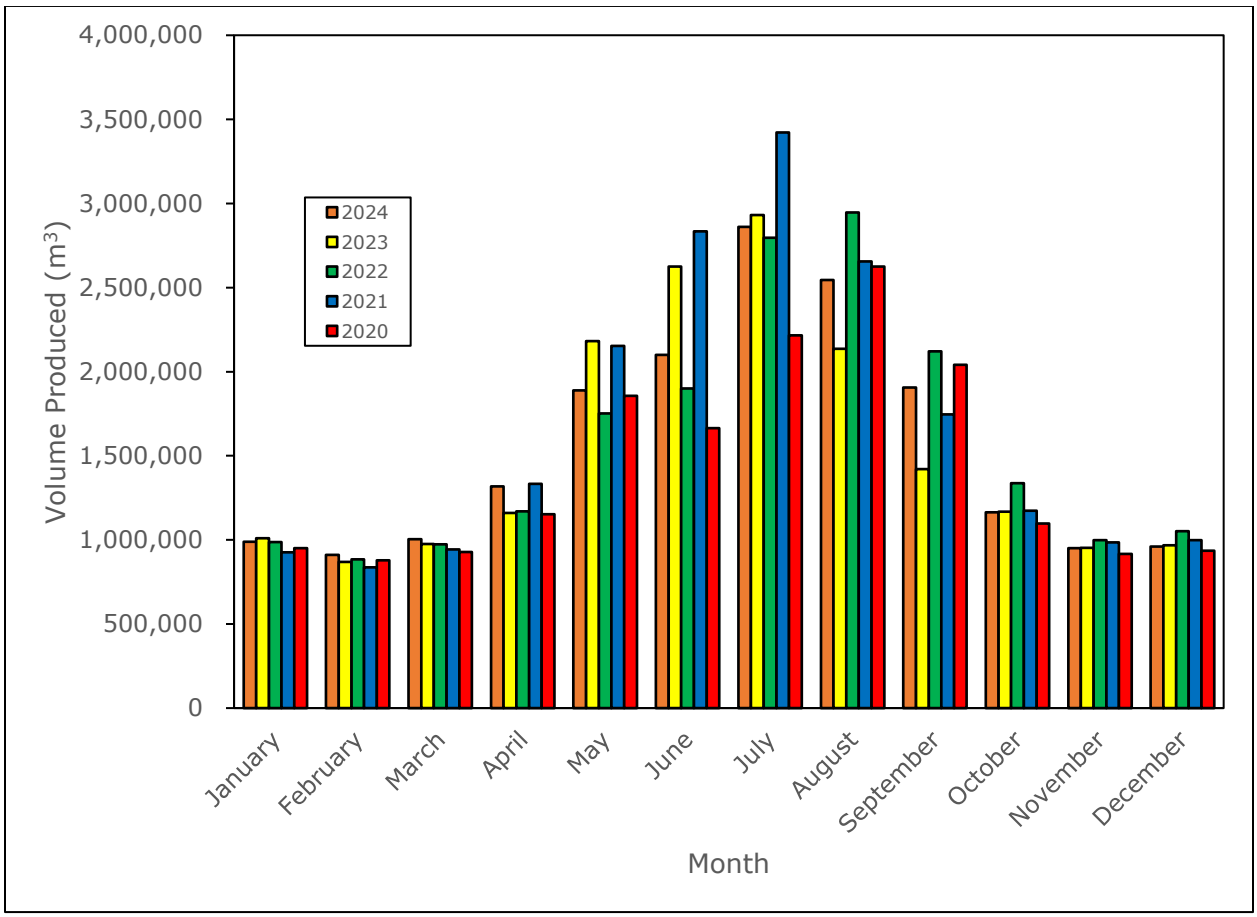
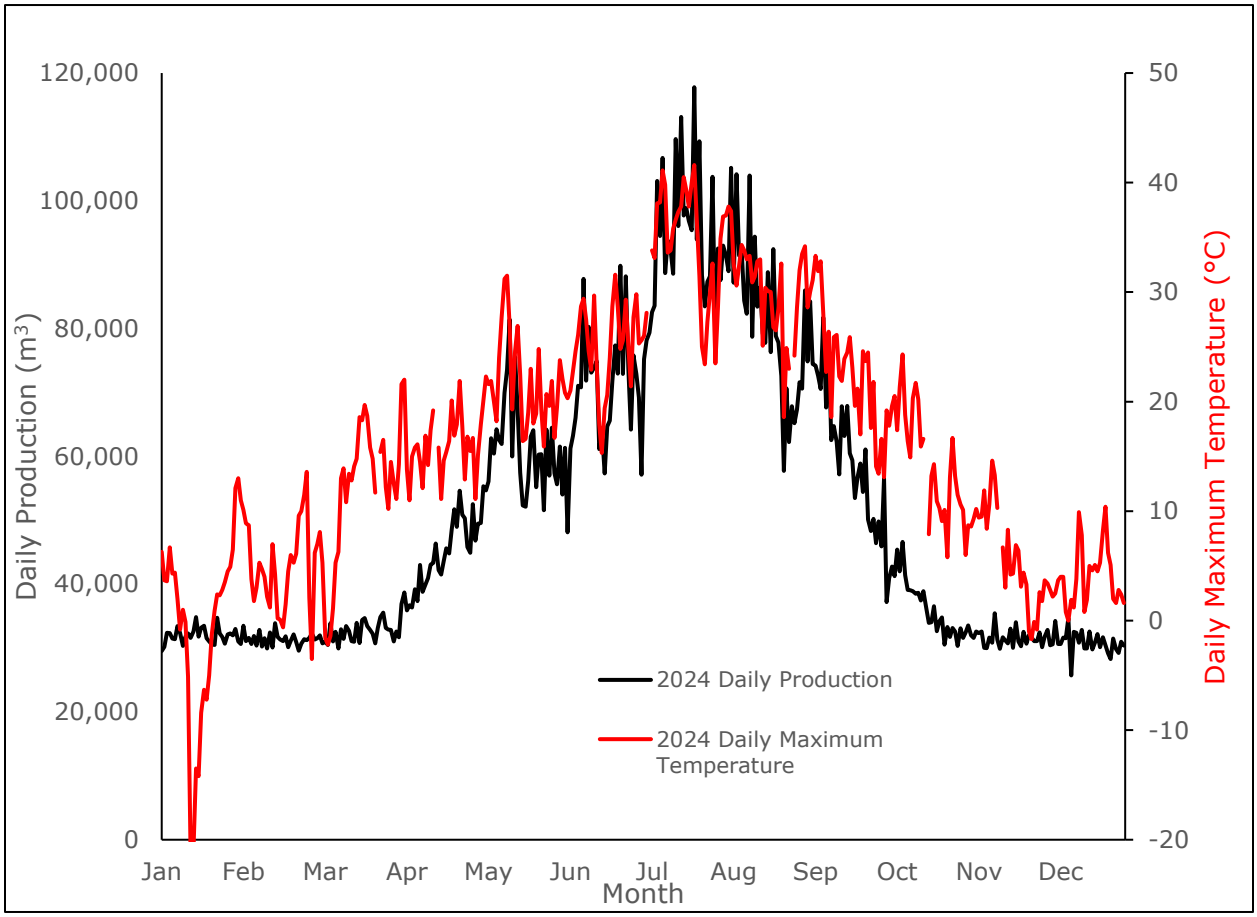


Figure 3 shows the daily water consumption for 2024, overlayed with the year's maximum daily temperatures. The highest daily consumption occurred on July 21, 2024, reaching 117,779 cubic metres. A clear correlation can be seen between water production and temperature trends during this period.

Figure 3: KCWQ Daily Water Flows With Daily Average Temperature Overlay for 2024



2.1 Distribution System Overview

The City of Kamloops operates one of Canada's most complex water distribution systems due to the region's unique topography. The distribution system consists of 639.3 km of water mains, 42 booster stations, 45 reservoirs, 2,439 fire hydrants, and a total of 25,721 connections. Additionally, the City also maintains a trucked-in water system, which supplies potable water to the Tournament Capital Ranch, a sports recreation area north of the City.

The distribution system features a variety of piping materials (Table 3). The City of Kamloops uses asset management practices to strategically plan and prioritize water infrastructure replacement. Water mains are replaced based on factors such as life expectancy, condition, and risk. Typically, new mains are constructed from PVC. Any increases in non-PVC water main materials (Table 3) result from GIS system updates that correct previously unidentified or misclassified mains rather than the installation of new lines.

Table 3: Water Main Pipe Material Summary

Material	Length (km)	% of Total Pipe	% Change from Last Year
PVC - Polyvinyl Chloride	298.9	46.75%	3.6%
AC - Asbestos Cement	169.5	26.51%	-3.2%
DI - Ductile Iron	103.2	16.14%	0.9%
CI - Cast Iron	36.2	5.66%	-0.2%
HYP - High Pressure Concrete	17.3	2.71%	0.0%
STL - Steel	10.8	1.69%	0.0%
PLY - Polyethylene	2.3	0.36%	0.0%
CU - Copper	0.8	0.13%	0.0%
GI - Galvanized Iron	0.3	0.05%	0.0%
Total	***639.3***		

In 2024, the City continued work to improve asset management for the water system. Staff are working to identify future needs based on criticality, life expectancy, condition, and capacity.

3. Water System Highlights in 2024

The following sections will highlight some of the major projects throughout the 2024 operating year as well as summarize the requests for service received for the water distribution system.

3.1 KCWQ Project Summary for 2024

The following is a list of some of the projects started at the KCWQ in 2024:

- Continued to work with consultant for upgrades to source water intake system.
- Distribution channel isolation valves installed.
- New membranes installed into two primary membrane tanks (9 and 10).

3.2 Distribution System Project Summary for 2024

3.2.1 Booster Stations and Reservoirs

- Completed cleaning of the Sadie Mountain reservoir while continuing to keep it online.
- Completed construction and commissioning of the Pemberton Booster/Reservoir upgrade.
- Installed and commissioned new permanent generator at Southwest Sector No. 2 Booster.
- Performed emergency repairs without disrupting service to River Street High Lift, Copperhead Booster, and Aberdeen Booster

3.2.2 Distribution System

Major water main replacement projects included:

- Westsyde Road (Inskip Road to Riverview Road), Ongoing
- McGill Road at Hillside Cemetery, Ongoing
- Clapperton Road (Leigh Road to Cedar Street), Complete
- Springhill Drive (Sedona Drive to Monarch Drive), Complete
- 7th Avenue (Lorne Street to Front Street), Complete

- Pratt Road (Ladner Road to Todd Road), Complete

3.2.3 Requests for Service

In 2024, there were a total of 2,955 requests for service filed with the City's Civic Operations Department related to water distribution and treatment. Table 4 shows a breakdown of the categories to which each of the requests is related.

Table 4: Service Requests in Water Treatment and Distribution in 2024

Request Categories Related to Utilities/ Water	Number of Requests	
	2023	2024
Water - Booster/Pump Stations	6	6
Water - Filling Stations/Cross Connection	52	45
Water - Frozen Services	0	17
Water - General	74	118
Water - Hydrants	28	49
Water - Hydrant Check After Kamloops Fire Rescue Use	15	19
Water - Hydrant out of Service	163	194
Water - Irrigation On/Off	9	23
Water - No Water	30	70
Water - Reservoirs	1	0
Water - Service Boxes	99	71
Water - Service Location	47	70
Water - Turn Service On/Off	537	611
Water - Water Leak	217	240
Water Pressure	59	58
Water - Water Quality	33	56
Water - Water Restrictions	79	44
Water - Noble Creek Irrigation System	61	12
Water Meters - General	58	92
Water Meters - Final Read Request	943	971
Water Meters - Consumption	119	150
Water Meters - Leak Detection	13	6

Request Categories Related to Utilities/ Water	Number of Requests	
	2023	2024
Water Meters - Leaking Meter Sets	31	22
Water Meters - Meter Change Out	35	11
Totals	***2709***	***2955***

4. Water Quality Sampling and Analysis

The City's Water Quality Monitoring Program (WQMP) follows the principles outlined in the *Guidelines for Canadian Drinking Water Quality* (GCDWQ) and British Columbia's DWPA and *Drinking Water Protection Regulation* (DWPR). The program monitors both immediate and long-term water quality trends using a multi-barrier approach to ensure safe drinking water.

The City's primary surface water source is the South Thompson River, which supplies all domestic water needs. The North Thompson River serves as an emergency backup.

EOCP-certified staff conduct regular water quality testing at designated sites within the treatment, distribution, and storage system.

On April 5, 2024, City staff reviewed the WQMP and determined no changes were necessary.

4.1 Quality Assurance and Quality Control Program

The City's Civic Operations staff are dedicated to ensuring accurate data collection under the WQMP. Staff members receive training in proper sampling methods to ensure reliable results and maintain water quality. All samples are collected and shipped in accordance with the 2005 21st Edition Standard Methods for the Examination of Water and Wastewater.

The WQMP includes quality control inspections and equipment calibration to maintain accuracy. Field instruments used to test the distribution system water (chlorine residual, turbidity, and pH) are cleaned and calibrated on a weekly or monthly schedule. Additionally, online chlorine analyzers at the KCWQ are checked nightly.

4.2 KCWQ Water Quality Testing

The KCWQ monitors water quality by measuring various parameters throughout the treatment process. Tables 5, 6, and 7 summarize the results of the nightly testing conducted in-house by certified operators.

4.2.1 True and Apparent Colour

Water can appear colored due to two main factors: dissolved substances and suspended particles. Suspended particles, such as clay, silt, algae, or other undissolved materials, contribute to water's apparent colour. Dissolved substances, including organic compounds like tannins from plants, trees, or roots, as well as dissolved metals like iron, can give water a yellowish or brownish hue.

Filtration effectively removes suspended particles, making them easier to treat, while dissolved substances are more challenging to eliminate. Apparent colour refers to the total colour in water, including both dissolved and suspended materials, whereas true colour accounts only for dissolved substances. Although colour does not pose a health risk, it is an aesthetic concern, as discoloured water is unappealing for consumption.

4.2.2 pH

pH measures the concentration of hydrogen ions in water, indicating its acidity or basicity. The pH scale ranges from 0 to 14, where values below 7 are acidic, values above 7 are basic, and a pH of 7 is neutral. According to the GCDWQ, drinking water should have a pH between 6.5 and 8.5.

4.2.3 Hardness

Water hardness is determined by the concentration of dissolved calcium and magnesium.

Water hardness is classified as follows:

- 0–60 mg/L as Calcium Carbonate - Soft
- 61–120 mg/L - Moderate
- 121–180 mg/L - Hard

- Above 180 mg/L - Very Hard

4.2.4 Alkalinity

Alkalinity measures water's buffering capacity, meaning its ability to resist changes in pH when acids or bases are introduced. Higher alkalinity helps maintain a stable pH and it serves as an important guideline in water treatment processes.

4.2.5 Conductivity and Total Dissolved Solids

Conductivity and total dissolved solids (TDS) are closely related, as the same probe used to measure conductivity provides an estimate of TDS. Conductivity indicates how well water can conduct electricity, which depends on the concentration of dissolved solids. Since pure water is an insulator, increased conductivity signals a higher presence of dissolved minerals and impurities. In water treatment, conductivity is monitored to detect changes in water quality.

4.2.6 Total Suspended Solids

Total suspended solids (TSS) measures the colloidal material present in water. TSS levels in the source water provide insight into the total solids that must be removed during treatment. Higher TSS levels indicate murkier or “dirtier” water. There is no specific guideline limit for TSS levels under the GCDWQ.

4.2.7 Turbidity

Turbidity measures water clarity and is directly influenced by the presence of colloidal particles. It is determined by passing a beam of light through a sample and measuring how much light is scattered at a 90° angle. The measurement is expressed in nephelometric turbidity units (NTU).

According to the GCDWQ, drinking water should have a turbidity of less than 1 NTU. The KCWQ membrane water treatment plant ensures that treated water leaving the facility does not exceed 0.1 NTU.

4.2.8 Aluminum

The KCWQ uses an aluminum-based coagulant in its treatment process. Aluminum levels are monitored in both source and treated water to ensure proper dosing and to prevent excessive aluminum from entering the drinking water. The GCDWQ set an operational guideline of 0.1 mg/L for water treatment plants.

4.2.9 Free and Total Chlorine (Cl2)

Maintaining proper chlorine levels is essential for ensuring water safety throughout the distribution system. The primary disinfectant used at the KCWQ is sodium hypochlorite.

- Free chlorine measures the amount of active hypochlorite available in the water.
- Total chlorine includes both free chlorine and any combined chlorine disinfectants, such as chloramines.

City operations staff aim to maintain a residual free chlorine level of at least 0.2 mg/L at the end of the distribution system. There is no specific GCDWQ guideline limit for free or total chlorine.

Table 5: Monthly Averages for Source Water Analysis in 2024

Month	True Colour (Pt Co Units)	Apparent Colour (Pt Co Units)	pH	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as CaCO3)	TDS (mg/L)	Conductivity (µS/cm)	TSS (mg/L)	Turbidity (NTU)	Aluminum (mg/L)	Temperature (°C)
January	<5	16	7.7	41	40	45.6	70.8	3.7	2.1	0.016	3.9
February	<5	21	7.8	42	40	44.3	71.8	6.6	2.9	0.016	4.6
March	<5	17	7.9	42	41	46.9	76.0	6.4	2.6	0.017	6.3
April	<5	22	7.9	43	42	44.4	74.4	9.3	3.7	0.020	9.8
May	<5	25	7.9	41	40	42.9	76.0	8.9	3.9	0.020	12.3
June	<5	18	7.9	38	38	41.2	76.3	7.0	2.7	0.022	14.7
July	<5	14	7.9	38	38	40.8	79.7	5.5	2.3	0.020	20.0
August	<5	11	7.9	38	37	41.8	83.3	1.4	1.3	0.018	22.6
September	<5	12	8.0	38	38	42.0	80.2	1.6	1.3	0.019	19.7
October	<5	12	7.9	38	38	41.7	71.7	1.4	1.3	0.016	13.8
November	<5	11	7.8	38	37	39.5	66.2	1.4	1.3	0.011	8.9
December	<5	10	7.8	39	39	41.7	67.7	2.0	1.4	0.013	5.7
Daily Min.	***<5***	***<5***	***7.3***	***36***	***36***	***30.9***	***41.7***	***0.1***	***0.2***	***<0.008***	***1.8***
Daily Max.	***24***	***58***	***8.1***	***44***	***46***	***76.7***	***89.7***	***25.6***	***9.1***	***0.042***	***24.0***
Annual Avg.	***<5***	***16***	***7.9***	***40***	***39***	***42.7***	***74.5***	***4.6***	***2.2***	***0.017***	***11.9***

In instances where data fell below the limits of analytical detection, half the detection limit was utilized for calculation purposes.

Table 6: Monthly Averages for Treated Water Analysis in 2024

Month	True Colour (Pt Co Units)	Apparent Colour (Pt Co Units)	pH	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as CaCO3)	TDS (mg/L)	Conductivity (µS/cm)	Turbidity (NTU)	Aluminum (mg/L)	Temperature (°C)	Free Chlorine (mg/L)	Total Chlorine (mg/L)
January	<5	<5	7.8	41	41	52.6	83.0	0.021	0.015	6.6	1.36	1.49
February	<5	<5	7.8	41	41	50.2	83.7	0.023	0.013	6.8	1.37	1.51
March	<5	<5	7.9	42	41	51.9	88.4	0.025	0.013	7.9	1.38	1.50
April	<5	<5	8.0	43	42	51.1	86.4	0.028	0.016	10.9	1.32	1.45
May	<5	<5	8.0	41	41	50.4	89.7	0.026	0.018	13.5	1.36	1.51
June	<5	<5	8.0	38	39	48.6	90.0	0.029	0.019	15.9	1.39	1.50
July	<5	<5	8.0	38	38	49.0	96.3	0.028	0.019	21.1	1.36	1.48
August	<5	<5	8.1	38	38	48.1	96.4	0.019	0.020	22.6	1.39	1.49
September	<5	<5	8.0	38	38	47.0	90.8	0.018	0.020	20.2	1.37	1.50
October	<5	<5	8.0	38	39	46.2	81.9	0.018	0.016	14.3	1.36	1.51
November	<5	<5	7.9	38	38	46.1	78.0	0.018	0.013	9.8	1.36	1.49
December	<5	<5	7.9	39	39	48.7	79.0	0.019	0.012	7.0	1.39	1.49
Daily Min.	***<5***	***<5***	***7.4***	***36***	***34***	***33.6***	***47.3***	***0.017***	***<0.008***	***4.5***	***1.20***	***1.32***
Daily Max.	***<5***	***<5***	***8.3***	***44***	***44***	***56.3***	***106.3***	***0.050***	***0.044***	***23.8***	***1.49***	***1.68***
Annual Avg.	***<5***	***<5***	***7.9***	***40***	***40***	***49.2***	***87.0***	***0.023***	***0.016***	***13.1***	***1.37***	***1.49***
Guidelines for Canadian Drinking Water Quality Objectives	Aesthetic Objective: ≤ 15 mg/L	Aesthetic Objective: ≤ 15 mg/L	6.5 - 8.5	No guideline for drinking water	No guideline for drinking water	Aesthetic Objective : ≤500 mg/L	No guideline for drinking water	Operational Guideline: ≤0.1 NTU	Operational Guideline: <0.1 mg/L	Aesthetic Objective: ≤ 15 °C	No guideline for drinking water	No guideline for drinking water

In instances where data fell below the limits of analytical detection, half the detection limit was utilized for calculation purposes.

Table 7: Monthly Averages for Distribution System Water Analysis in 2024

Distribution System Water Analysis												
	Reservoir	True Colour (Pt Co Units)	Apparent Colour (Pt Co Units)	pH	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as CaCO3)	TDS (mg/L)	Conductivity (µS/cm)	Turbidity (NTU)	Field Temp (°C)	Free Cl_2 (mg/L)	Total Cl_2 (mg/L)
January	Knutsford	<5	<5	7.9	42	42	56.2	99.7	0.205	5.8	0.53	0.61
	CREDS	<5	<5	7.6	41	40	54.0	96.9	0.133	9.3	0.59	0.70
	Juniper #3	<5	<5	7.8	41	41	53.4	86.3	0.119	8.1	0.92	0.99
	418 Booster	<5	<5	8.0	41	41	53.4	87.1	0.094	5.0	1.23	1.30
	Noble Creek	<5	<5	8.1	43	42	56.0	94.4	0.152	8.0	1.10	1.18
	Memorial	<5	<5	7.9	42	41	56.6	97.0	0.158	4.8	0.99	1.07
	Booster #4 SW	<5	<5	7.8	41	41	54.7	94.4	0.260	4.3	0.93	1.08
February	Knutsford	<5	<5	7.9	42	41	52.2	86.6	0.092	8.9	0.81	0.87
	CREDS	<5	<5	7.8	42	41	51.1	86.6	0.098	6.6	0.62	0.65
	Juniper #3	<5	<5	7.8	43	42	51.3	90.2	0.124	6.0	0.96	1.02
	418 Booster	<5	<5	7.9	42	41	52.2	93.5	0.135	4.7	1.11	1.20
	Noble Creek	<5	<5	8.0	41	41	55.3	101.3	0.160	12.5	1.05	1.13
	Memorial	<5	<5	7.9	41	40	51.2	91.3	0.154	7.1	1.16	1.21
	Booster #4 SW	<5	<5	7.8	41	40	50.7	84.5	0.078	4.3	1.15	1.23
March	Knutsford	<5	<5	8.0	42	42	54.6	100.9	0.118	6.5	0.83	0.89
	CREDS	<5	<5	7.9	42	42	54.3	97.4	0.140	7.4	0.71	0.78
	Juniper #3	<5	<5	7.9	41	41	53.9	101.2	0.122	5.9	1.01	1.06
	418 Booster	<5	<5	8.0	41	41	50.3	89.5	0.110	5.3	1.16	1.27
	Noble Creek	<5	<5	8.0	43	42	53.9	94.3	0.104	12.5	0.95	1.10
	Memorial	<5	<5	8.0	43	42	54.1	93.8	0.169	5.7	1.19	1.26
	Booster #4 SW	<5	<5	7.9	43	42	53.2	95.8	0.132	5.7	1.09	1.18
April	Knutsford	<5	<5	8.1	42	42	49.9	88.5	0.141	8.7	0.84	0.89
	CREDS	<5	<5	7.9	43	42	51.0	88.2	0.115	10.0	0.46	0.52
	Juniper #3	<5	<5	8.0	43	42	56.1	98.7	0.160	8.7	0.91	0.97
	418 Booster	<5	<5	8.0	43	42	53.5	97.5	0.112	8.4	1.18	1.25
	Noble Creek	<5	<5	8.1	43	42	54.9	98.1	0.094	10.4	1.22	1.28
	Memorial	<5	<5	8.0	43	42	51.6	85.9	0.186	9.0	0.99	1.07
	Booster #4 SW	<5	<5	8.0	43	42	46.8	78.7	0.118	9.7	1.05	1.10
May	Knutsford	<5	<5	7.9	42	41	51.7	91.1	0.100	10.8	0.72	0.78
	CREDS	<5	<5	7.9	41	41	52.1	96.8	0.178	12.3	0.51	0.58
	Juniper #3	<5	<5	8.0	41	41	52.0	94.1	0.104	12.1	0.73	0.82
	418 Booster	<5	<5	7.9	42	42	52.4	98.6	0.124	11.6	1.21	1.28
	Noble Creek	<5	<5	8.1	43	42	53.5	96.7	0.143	16.8	1.07	1.13
	Memorial	<5	<5	8.0	41	41	51.7	94.6	0.111	11.7	1.03	1.11
	Booster #4 SW	<5	<5	7.9	41	41	50.8	91.7	0.087	10.8	0.94	1.01
June	Knutsford	<5	<5	8.0	39	39	48.6	87.0	0.111	12.1	0.89	0.95
	CREDS	<5	<5	7.9	39	39	49.5	94.2	0.118	16.0	0.45	0.51
	Juniper #3	<5	<5	7.9	39	39	49.2	92.6	0.077	13.4	0.76	0.82
	418 Booster	<5	<5	8.0	39	38	50.3	95.7	0.063	12.8	1.05	1.11
	Noble Creek	<5	<5	8.0	39	39	50.7	92.6	0.087	14.3	0.93	1.00
	Memorial	<5	<5	8.0	39	39	48.9	89.7	0.135	14.7	1.07	1.14
	Booster #4 SW	<5	6	7.9	39	39	48.6	91.1	0.128	16.4	1.04	1.10
July	Knutsford	<5	<5	8.0	39	39	49.1	93.4	0.309	15.0	0.54	0.60
	CREDS	<5	<5	7.9	38	38	48.6	93.1	0.095	16.4	0.28	0.34
	Juniper #3	<5	<5	7.9	39	39	48.8	95.5	0.122	17.4	0.87	0.96
	418 Booster	<5	<5	8.1	38	38	47.4	84.7	0.117	17.7	0.97	1.12
	Noble Creek	<5	<5	8.0	38	38	48.3	87.1	0.130	21.3	0.97	1.04
	Memorial	<5	<5	8.0	39	38	47.1	85.7	0.158	19.3	1.01	1.09
	Booster #4 SW	<5	<5	8.0	39	38	47.6	86.9	0.081	18.5	1.01	1.07
August	Knutsford	<5	<5	8.1	38	38	48.7	88.5	0.092	17.6	0.64	0.71
	CREDS	<5	<5	7.9	38	38	50.5	90.3	0.078	17.6	0.36	0.42
	Juniper #3	<5	<5	8.0	37	38	46.7	87.3	0.113	20.6	0.53	0.61
	418 Booster	<5	<5	8.1	39	39	47.2	88.4	0.100	21.3	0.99	1.07
	Noble Creek	<5	<5	8.2	39	39	49.7	91.7	0.191	18.8	0.75	0.86
	Memorial	<5	<5	8.0	38	38	47.5	89.6	0.164	21.9	0.93	0.97
	Booster #4 SW	<5	<5	8.1	38	38	47.0	85.4	0.062	21.7	0.90	0.97
September	Knutsford	<5	<5	8.1	39	40	47.4	86.7	0.179	18.3	0.43	0.51
	CREDS	<5	<5	7.9	38	39	47.2	92.0	0.134	20.3	0.17	0.24
	Juniper #3	<5	<5	8.0	38	38	46.6	84.8	0.080	20.5	0.73	0.80
	418 Booster	<5	<5	8.1	38	38	46.2	81.4	0.106	19.4	1.23	1.23
	Noble Creek	<5	<5	8.2	38	38	46.8	80.1	0.084	-	0.71	0.79
	Memorial	<5	<5	8.0	38	38	45.3	78.8	0.120	20.7	1.00	1.03
	Booster #4 SW	<5	<5	8.1	39	40	45.6	81.0	0.061	20.6	0.80	0.85
October	Knutsford	<5	<5	8.1	39	39	47.4	82.4	0.192	15.6	0.49	0.56
	CREDS	<5	<5	7.9	37	38	46.5	80.7	0.187	15.6	0.23	0.30
	Juniper #3	<5	<5	8.0	39	39	46.8	84.2	0.102	15.9	0.64	0.71
	418 Booster	<5	<5	8.1	39	39	46.5	80.0	0.076	15.9	0.94	1.03
	Noble Creek	<5	<5	8.3	39	40	49.0	87.5	0.099	16.4	0.94	1.00
	Memorial	<5	<5	7.9	39	39	48.2	81.9	0.187	14.3	1.05	1.12
	Booster #4 SW	<5	<5	8.0	39	39	47.5	85.3	0.153	15.3	0.79	0.83
November	Knutsford	<5	<5	8.1	38	39	47.4	81.0	0.138	11.8	0.43	0.51
	CREDS	<5	<5	7.8	38	38	48.1	87.6	0.153	13.1	0.18	0.25
	Juniper #3	<5	<5	7.9	38	38	48.2	85.7	0.168	12.3	0.74	0.80
	418 Booster	<5	<5	8.0	38	38	49.1	85.1	0.115	12.5	1.08	1.14
	Noble Creek	<5	<5	8.2	38	39	49.3	84.0	0.130	13.3	0.69	0.82
	Memorial	<5	<5	8.0	37	38	46.0	77.1	0.150	11.7	1.06	1.13
	Booster #4 SW	<5	<5	8.0	38	38	46.8	81.3	0.162	10.5	0.95	1.04
December	Knutsford	<5	<5	8.0	39	39	50.6	88.2	0.335	9.5	0.47	0.53
	CREDS	<5	<5	7.8	38	39	48.8	85.7	0.183	9.8	0.27	0.33
	Juniper #3	<5	<5	7.9	39	39	48.3	82.2	0.196	8.6	0.90	0.87
	418 Booster	<5	<5	8.0	38	39	48.8	79.3	0.244	7.9	1.16	1.25
	Noble Creek	<5	<5	8.1	39	40	49.2	79.2	0.145	12.3	0.86	0.94
	Memorial	<5	<5	7.9	39	39	50.7	90.5	0.330	7.1	1.12	1.20
	Booster #4 SW	<5	<5	7.8	39	39	50.2	86.7	0.153	6.5	1.06	1.13
Daily Min.		***<5***	***<5***	***7.3***	***0***	***0***	***0.0***	***0.0***	***0.000***	***2.2***	***0.02***	***0.08***
Daily Max.		***<5***	***16***	***8.5***	***44***	***44***	***68.0***	***113.3***	***0.800***	***23.5***	***1.68***	***1.72***
Annual Avg.		***<5***	***<5***	***8.0***	***40***	***40***	***50.0***	***89.0***	***0.136***	***12.4***	***0.85***	***0.92***

In instances where data fell below the limits of analytical detection, half the detection limit was utilized for calculation purposes.

4.3 Distribution System Bacteriological Monitoring

The City is committed to providing safe and reliable drinking water to its customers. In compliance with the DWPA and the DWPR, water suppliers must have bacteriological testing performed by a certified laboratory approved by the Provincial Health Officer.

To meet this requirement, the City contracts a certified third-party laboratory to analyze weekly bacteriological samples. At least 23 distinct locations within the distribution system are tested each week for background bacterial counts, total coliforms, and *E. coli*.

4.3.1 Background Bacterial Monitoring

Background bacteria are monitored in drinking water using the membrane filtration method. These background colonies are non-target bacteria that grow on the membrane along with the target organisms, such as total coliforms. Their presence can interfere with accurate colony counting by obscuring or inhibiting the growth of the target organisms.

The Guidelines for Canadian Drinking Water Quality (GCDWQ) do not specify a Maximum Acceptable Concentration (MAC) for background colonies. Instead, the presence of background bacteria is used as an indicator of conditions that may support bacterial regrowth or persistence within the water system.

Monitoring background bacteria provides insight into the overall "health" of the distribution system. If any sample tests positive for background bacteria, it is immediately resampled. If bacterial counts exceed 200, the system is flushed and resampled to ensure water quality remains safe.

4.3.2 Coliform Bacterial Monitoring

Coliform bacteria are a broad group of bacteria found in water, soil, vegetation, and the feces of mammals. While most coliforms are not harmful to humans, their presence serves as a useful indicator of contamination due to the ease of testing.

In a distribution system, coliform bacteria are operational indicators. Their presence indicates water quality degradation, possibly via bacterial regrowth or post-treatment contamination. Detection of total coliforms (in the absence of *E. coli*) in more than 10% of samples in a given sampling period, or from consecutive samples from the same site, should be investigated and appropriate corrective actions taken. If a sample tests positive for coliforms, the site is immediately resampled.

A comprehensive list of corrective actions after total coliform detection can be found in Section 3.1.4 of Health Canada's Guidelines for Canadian Drinking Water Quality: Total Coliforms.

4.3.3 *E. coli* Bacterial Monitoring

Escherichia coli (*E. coli*) is a subset of coliform bacteria found almost exclusively in the feces of mammals.

If *E. coli* is detected in a sample of drinking water in a distribution system, the City of Kamloops will immediately notify Interior Health. The City will also:

- immediately resample and test the *E. coli*-positive site(s) and adjacent sites
- conduct an assessment to ensure treatment barriers are operating correctly (this may include gathering information on water treatment performance and other operational monitoring data)
- carry out any corrective actions necessary (See Section 3.1.4 of Health Canada's Guidelines for Canadian Drinking Water Quality: *Escherichia coli*) in order to resume control or normal system operations

If resampling and testing confirm the presence of *E. coli* in drinking water, the City will immediately issue a boil water advisory in consultation with Interior Health and carry out the appropriate corrective actions.

4.3.4 Bacteriological Monitoring Results in 2024

In 2024, bacteriological testing was performed 1,227 times over 24 locations in the distribution system. There were no positive tests for total coliforms or *E. coli* in the system. A total of 11 samples tested positive for background colonies throughout the system

during the year, but they were clear upon resampling. Resampling occurs at the discretion of the distribution system chief operator and when background counts are greater than 200 counts. The 2024 results indicate that the City's drinking water is safe for public consumption.

4.4 Source Water and Distribution System Water Quality Analysis in 2024

The following extensive water quality analysis results were completed by a provincially accredited lab on the source water and the water within the distribution system on two dates (May 28 and October 1) in 2024. The sampling events were completed in compliance with the KCWQ operational certificate. The samples were taken by City staff and sent to CARO Analytical Services (CARO) in Kelowna, BC. The results of these analyses are shown in Tables 8 through 15.

Table 8: CARO Anions Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				May 28	Oct 1	May 28	Oct 1
Bromide	mg/L	0.1	N/A	<0.10	<0.10	<0.10	<0.10
Chloride	mg/L	0.1	AO≤250	1.76	0.99	5.58	4.13
Fluoride	mg/L	0.1	MAC=1.5	<0.10	0.17	<0.10	0.18
Nitrate (as N)	mg/L	0.01	MAC=10	0.032	<0.010	0.034	<0.010
Nitrite (as N)	mg/L	0.01	MAC=1	<0.010	<0.010	<0.010	<0.010
Phosphorus, Dissolved Reactive	mg/L	0.005	N/A		<0.0050		<0.0050
Sulfate	mg/L	1	AO≤500	5.5	6.3	5.6	6.3
MAC = Maximum Acceptable Concentration AO = Aesthetic objective OG = Operational guidance value							

Source water and distribution system water analyses indicated that GCDWQ guidelines were met for anions.

Table 9: CARO General Parameters Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				May 28	Oct 1	May 28	Oct 1
Hardness, Dissolved (as CaCO3)	mg/L	0.5	N/A	41.3	41.2	43.6	43.1
Hardness, Total (as CaCO3)	mg/L	0.5	None Required	54.5	40	44	42.7
Nitrate+Nitrite (as N)	mg/L	0.01	N/A	0.0319	<0.0100	0.0336	<0.0100
Colour, True	CU	5	AO≤15	5.3	<5.0	<5.0	<5.0
Alkalinity, Total (as CaCO3)	mg/L	1	N/A	37.7	35.2	40.6	36.8
Alkalinity, Phenolphthalein (as CaCO3)	mg/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	1	N/A	37.7	35.2	40.6	36.8
Alkalinity, Carbonate (as CaCO3)	mg/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Ammonia, Total (as N)	mg/L	0.05	None Required	0.071	0.061	0.076	0.073
BOD, 5-day	mg/L	2	N/A	<6.1	<6.3	<6.1	<6.3
Carbon, Total Organic	mg/L	0.5	N/A	6.91	3.08	3.96	3.68
Carbon, Dissolved Organic	mg/L	0.5	N/A	4.05	1.95	2.65	1.68
Cyanide, Total	mg/L	0.002	MAC=0.2	<0.0020	<0.0020	<0.0020	0.0027
Nitrogen, Total Kjeldahl	mg/L	0.05	N/A	0.82	0.499	0.346	0.653
Oil & Grease, Total	mg/L	2	N/A	2.3		3	<2.0
Solids, Total Dissolved	mg/L	15	AO≤500	55	64	60	62
Sulfide, Total	mg/L	0.02	AO≤0.05	<0.020	<0.020	<0.020	<0.020
Turbidity	NTU	0.1	OG<1	4.46	1.14	0.24	0.28
pH	pH units	0.1	7.0-10.5	6.49	7.15	6.73	7.06
Conductivity (EC)	uS/cm	2	N/A	99.1	91.8	120	106
MAC = Maximum Acceptable Concentration AO = Aesthetic objective OG = Operational Guidance Value							

The reported pH level for the Lac Le Jeune Booster was below the drinking water guidelines on May 28. However, the sample was past the hold time at the external lab for pH, bringing into question the reliability of the data.

Table 10: CARO Total Recoverable Metals Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				May 28	Oct 1	May 28	Oct 1
Aluminum, total	mg/L	0.005	OG<0.1	1.85	0.0474	0.014	0.0219
Antimony, total	mg/L	0.0002	MAC=0.006	<0.00020	<0.00020	<0.00020	<0.00020
Arsenic, total	mg/L	0.0005	MAC=0.01	0.00056	<0.00050	<0.00050	<0.00050
Barium, total	mg/L	0.005	MAC=2	0.0345	0.0102	0.0114	0.0111
Beryllium, total	mg/L	0.0001	N/A	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth, total	mg/L	0.0001	N/A	<0.00010	<0.00010	<0.00010	<0.00010
Boron, total	mg/L	0.05	MAC=5	<0.0500	<0.0500	<0.0500	<0.0500
Cadmium, total	mg/L	0.00001	MAC=0.007	0.000037	<0.000010	<0.000010	0.000021
Calcium, total	mg/L	0.2	None Required	15.9	12.7	14.1	13.9
Chromium, total	mg/L	0.0005	MAC=0.05	0.00407	<0.00050	<0.00050	<0.00050
Cobalt, total	mg/L	0.0001	N/A	0.00182	<0.00010	<0.00010	<0.00010
Copper, total	mg/L	0.0004	MAC=2	0.00948	0.00333	0.00474	0.00808
Iron, total	mg/L	0.01	AO<=0.3	2.86	0.077	0.02	0.027
Lead, total	mg/L	0.0002	MAC=0.005	0.00124	<0.00020	<0.00020	<0.00020
Lithium, total	mg/L	0.0001	N/A	0.0023	0.00068	0.00078	0.00077
Magnesium, total	mg/L	0.01	None Required	3.59	2.04	2.14	1.95
Manganese, total	mg/L	0.0002	MAC=0.12	0.0599	0.0057	0.00367	0.00085
Mercury, total	mg/L	0.00001	MAC=0.001	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum, total	mg/L	0.0001	N/A	0.00057	0.00061	0.00058	0.00062
Nickel, total	mg/L	0.0004	N/A	0.00607	0.00078	0.0005	0.00184
Phosphorus, total	mg/L	0.05	N/A	0.277	<0.050	<0.050	<0.050
Potassium, total	mg/L	0.1	N/A	1.5	0.94	1.09	1.15
Selenium, total	mg/L	0.0005	MAC=0.05	<0.00050	<0.00050	<0.00050	<0.00050
Silicon, total	mg/L	1	N/A	6.6	2.8	3.2	2.8
Silver, total	mg/L	0.00005	None Required	<0.000050	<0.000050	<0.000050	<0.000050
Sodium, total	mg/L	0.1	AO<=200	2.88	2.07	5.4	4.67
Strontium, total	mg/L	0.001	MAC=7	0.102	0.0757	0.0859	0.0794
Sulfur, total	mg/L	3	N/A	<3.0	<3.0	<3.0	<3.0
Tellurium, total	mg/L	0.0005	N/A	<0.00050	<0.00050	<0.00050	<0.00050
Thallium, total	mg/L	0.00002	N/A	0.000024	<0.000020	<0.000020	<0.000020
Thorium, total	mg/L	0.0001	N/A	0.0002	<0.00010	<0.00010	<0.00010
Tin, total	mg/L	0.0002	N/A	<0.00020	<0.00020	<0.00020	<0.00020
Titanium, total	mg/L	0.005	N/A	0.0935	<0.0050	<0.0050	<0.0050
Tungsten, total	mg/L	0.001	N/A	<0.0010	<0.0010	<0.0010	<0.0010
Uranium, total	mg/L	0.00002	MAC=0.02	0.00048	0.000277	0.000092	0.000085
Vanadium, total	mg/L	0.005	N/A	<0.0050	<0.0050	<0.0050	<0.0050
Zinc, total	mg/L	0.004	AO<=5	0.0153	0.0088	0.0058	0.0149
Zirconium, total	mg/L	0.0001	N/A	0.0007	<0.00010	<0.00010	<0.00010

MAC = Maximum Acceptable Concentration AO = Aesthetic objective OG = Operational Guidance Value

On May 28, the source water was above the GCDWQ for total aluminum and total iron. These values were attributed to freshet run-off impacting the source water.

Table 11: CARO Dissolved Metals Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				May 28	Oct 1	May 28	Oct 1
Aluminum, dissolved	mg/L	0.005	N/A	0.006	0.0057	0.0069	0.012
Antimony, dissolved	mg/L	0.0002	N/A	<0.00020	<0.00020	<0.00020	<0.00020
Arsenic, dissolved	mg/L	0.0005	N/A	<0.00050	<0.00050	<0.00050	<0.00050
Barium, dissolved	mg/L	0.005	N/A	0.0105	0.01	0.0106	0.0109
Beryllium, dissolved	mg/L	0.0001	N/A	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth, dissolved	mg/L	0.0001	N/A	<0.00010	<0.00010	<0.00010	<0.00010
Boron, dissolved	mg/L	0.05	N/A	<0.0500	<0.0500	<0.0500	<0.0500
Cadmium, dissolved	mg/L	0.00001	N/A	<0.000010	<0.000010	<0.000010	0.000022
Calcium, dissolved	mg/L	0.2	N/A	13	13	14	14
Chromium, dissolved	mg/L	0.0005	N/A	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, dissolved	mg/L	0.0001	N/A	<0.00010	<0.00010	<0.00010	<0.00010
Copper, dissolved	mg/L	0.0004	N/A	0.00322	0.00299	0.00403	0.00657
Iron, dissolved	mg/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Lead, dissolved	mg/L	0.0002	N/A	<0.00020	<0.00020	<0.00020	<0.00020
Lithium, dissolved	mg/L	0.0001	N/A	0.00066	0.00072	0.00065	0.00083
Magnesium, dissolved	mg/L	0.01	N/A	2.14	2.1	2.1	1.96
Manganese, dissolved	mg/L	0.0002	N/A	<0.00020	0.00023	0.00102	<0.00020
Mercury, dissolved	mg/L	0.00004	N/A	<0.000040	<0.000040	<0.000040	<0.000040
Molybdenum, dissolved	mg/L	0.0001	N/A	0.00059	0.00061	0.0006	0.00065
Nickel, dissolved	mg/L	0.0004	N/A	0.00068	0.00057	0.00045	0.00177
Phosphorus, dissolved	mg/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Potassium, dissolved	mg/L	0.1	N/A	1.22	1.05	1.09	1.26
Selenium, dissolved	mg/L	0.0005	N/A	<0.00050	<0.00050	<0.00050	<0.00050
Silicon, dissolved	mg/L	1	N/A	2.7	2.8	2.7	2.8
Silver, dissolved	mg/L	0.00005	N/A	<0.000050	<0.000050	<0.000050	<0.000050
Sodium, dissolved	mg/L	0.1	N/A	2.57	2.1	5.33	4.73
Strontium, dissolved	mg/L	0.001	N/A	0.0842	0.0789	0.0868	0.08
Sulfur, dissolved	mg/L	3	N/A	<3.0	<3.0	<3.0	<3.0
Tellurium, dissolved	mg/L	0.0005	N/A	<0.00050	<0.00050	<0.00050	<0.00050
Thallium, dissolved	mg/L	0.00002	N/A	<0.000020	<0.000020	<0.000020	<0.000020
Thorium, dissolved	mg/L	0.0001	N/A	<0.00010	<0.00010	<0.00010	<0.00010
Tin, dissolved	mg/L	0.0002	N/A	<0.00020	<0.00020	<0.00020	<0.00020
Titanium, dissolved	mg/L	0.005	N/A	<0.0050	<0.0050	<0.0050	<0.0050
Tungsten, dissolved	mg/L	0.001	N/A	<0.0010	<0.0010	<0.0010	<0.0010
Uranium, dissolved	mg/L	0.00002	N/A	0.000266	0.00026	0.000093	0.000084
Vanadium, dissolved	mg/L	0.005	N/A	<0.0050	<0.0050	<0.0050	<0.0050
Zinc, dissolved	mg/L	0.004	N/A	<0.0040	0.0059	0.0047	0.0224
Zirconium, dissolved	mg/L	0.0001	N/A	<0.00010	<0.00010	<0.00010	<0.00010
MAC = Maximum Acceptable Concentration			AO = Aesthetic objective				

Source water and distribution system water analyses indicated that GCDWQ guidelines were met for dissolved metals.

Table 12: CARO Pesticides, Herbicides, and Fungicides Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				May 28	Oct 1	May 28	Oct 1
Glyphosate	mg/L	0.05	MAC=0.28	<0.050	<0.050	<0.050	<0.050
Phenolics, Total	mg/L	0.002	N/A	<0.00200	<0.00200	<0.00200	<0.00200
Alachlor	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Aldrin	ug/L	0.006	N/A	<0.006	<0.006	<0.006	<0.006
Atrazine	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Azinphos-methyl	ug/L	0.2	MAC=20	<0.200	<0.200	<0.200	<0.200
alpha-BHC	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
beta-BHC	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
delta-BHC	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
gamma-BHC (Lindane)	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Bromacil	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Captan	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
alpha-Chlordane	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
gamma-Chlordane	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Chlorothalonil	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Chlorpyrifos	ug/L	0.01	MAC=90	<0.010	<0.010	<0.010	<0.010
Cyanazine	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
p,p-DDD	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
p,p'-DDE	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
p,p'-DDT	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Diazinon	ug/L	0.02	MAC=20	<0.020	<0.020	<0.020	<0.020
Dichlorvos	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Dieldrin	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Dimethoate	ug/L	0.2	MAC=20	<0.200	<0.200	<0.200	<0.200
Disulfoton	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Endosulfan I	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Endosulfan II	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Endrin	ug/L	0.02	N/A	<0.020	<0.020	<0.020	<0.020
Endrin aldehyde	ug/L	0.02	N/A	<0.020	<0.020	<0.020	<0.020
Endrin ketone	ug/L	0.02	N/A	<0.020	<0.020	<0.020	<0.020
Fenchlorphos (Ronnel)	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Heptachlor	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Heptachlor epoxide	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Malathion	ug/L	0.1	MAC=290	<0.100	<0.100	<0.100	<0.100
Methyl parathion	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Metolachlor	ug/L	0.1	MAC=50	<0.100	<0.100	<0.100	<0.100
Metribuzin	ug/L	0.2	MAC=80	<0.200	<0.200	<0.200	<0.200
Parathion	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Pentachloronitrobenzene	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
cis-Permethrin	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
trans-Permethrin	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Phorate	ug/L	0.1	MAC=2	<0.100	<0.100	<0.100	<0.100
Simazine	ug/L	0.2	MAC=10	<0.200	<0.200	<0.200	<0.200
Sulfotep	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Terbufos	ug/L	0.1	MAC=1	<0.100	<0.100	<0.100	<0.100
Triallate	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Trifluralin	ug/L	0.2	MAC=45	<0.200	<0.200	<0.200	<0.200

MAC = Maximum Acceptable Concentration AO = Aesthetic objective OG = Operational Guidance Value

Source water and distribution system water analyses indicated that GCDWQ guidelines were met for pesticides, herbicides and fungicides.

Table 13: CARO Polycyclic Aromatic Hydrocarbon (PAH) Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				May 28	Oct 1	May 28	Oct 1
Acenaphthene	ug/L	0.05	N/A	<0.050	<0.064	<0.050	<0.050
Acenaphthylene	ug/L	0.2	N/A	<0.200	<0.200	<0.200	<0.200
Acridine	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Anthracene	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Benz(a)anthracene	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	ug/L	0.01	MAC=0.04	<0.010	<0.010	<0.010	<0.010
Benzo(b+j)fluoranthene	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
2-Chloronaphthalene	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Chrysene	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Dibenz(a,h)anthracene	ug/L	0.01	N/A	<0.010	<0.010	<0.010	<0.010
Fluoranthene	ug/L	0.03	N/A	<0.030	<0.030	<0.030	<0.030
Fluorene	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
1-Methylnaphthalene	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
2-Methylnaphthalene	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Naphthalene	ug/L	0.2	N/A	<0.200	<0.200	<0.200	<0.200
Phenanthrene	ug/L	0.1	N/A	<0.100	<0.100	<0.100	<0.100
Pyrene	ug/L	0.02	N/A	<0.020	<0.020	<0.020	<0.020
Quinoline	ug/L	0.05	N/A	<0.050	<0.050	<0.050	<0.050
MAC = Maximum Acceptable Concentration AO = Aesthetic objective OG = Operational Guidance Value							

Source water and distribution system water analyses indicated that GCDWQ guidelines were met for PAH.

Table 14: CARO Volatile Organic Compounds Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				28-May-24	01-Oct-24	28-May-24	01-Oct-24
Benzene	ug/L	0.5	MAC=5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	ug/L	1	N/A	<1.0	<1.0	1.4	1.4
Bromoform	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	ug/L	0.5	MAC=2	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	ug/L	1	AO≤30	<1.0	<1.0	<1.0	<1.0
Chloroethane	ug/L	2	N/A	<2.0	<2.0	<2.0	<2.0
Chloroform	ug/L	1	N/A	<1.0	<1.0	50.1	48.7
Dibromochloromethane	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	ug/L	0.3	N/A	<0.3	<0.3	<0.3	<0.3
Dibromomethane	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	ug/L	0.5	AO≤3	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	ug/L	1	AO≤1	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	ug/L	1	MAC=5	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	ug/L	1	MAC=14	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethylene	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethylene	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Dichloromethane	ug/L	3	MAC=50	<3.0	<3.0	<3.0	<3.0
1,2-Dichloropropane	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
1,3-Dichloropropene (cis + trans)	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/L	1	AO≤1.6	<1.0	<1.0	<1.0	<1.0
Methyl tert-butyl ether	ug/L	1	AO≤15	<1.0	<1.0	<1.0	<1.0
Styrene	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/L	0.5	N/A	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	ug/L	1	MAC=10	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	1	MAC=60	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	ug/L	1	MAC=5	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	ug/L	1	N/A	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	ug/L	1	MAC=2	<1.0	<1.0	<1.0	<1.0
Xylenes (total)	ug/L	2	AO≤20	<2.0	<2.0	<2.0	<2.0
MAC = Maximum Acceptable Concentration AO = Aesthetic objective OG = Operational Guidance Value							

Chloroform concentrations were detected at the Lac Le Jeune Booster in 2024. Chloroform has been detected in similar concentrations in the City's booster stations at the extremities of the distribution system over the past several years. Chloroform is a disinfection byproduct when hypochlorite, which is used to disinfect water, reacts with organic matter present in the water. Chloroform is not regulated under the Canadian Drinking Water Guidelines.

Table 15: CARO Perfluorinated Compounds Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Source Water		Lac Le Jeune Booster	
				May 28	Oct 1	May 28	Oct 1
6:2 Fluorotelomer sulfonate (6:2FTS)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
8:2 Fluorotelomer sulfonate (8:2FTS)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
Perfluorobutanesulfonate (PFBS)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
Perfluorobutanoic acid (PFBA)	ug/L	0.1	N/A	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanoic acid (PFHpA)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
Perfluorohexanesulfonate (PFHxS)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
Perfluorohexanoic acid (PFHxA)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
Perfluorooctanesulfonate (PFOS)	ug/L	0.01	0.6	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoic acid (PFOA)	ug/L	0.01	0.2	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	ug/L	0.01	N/A	<0.01	<0.01	<0.01	<0.01
MAC = Maximum Acceptable Concentration AO = Aesthetic objective OG = Operational Guidance Value							

Source water and distribution system water analyses indicated that GCDWQ guidelines were met for perfluorinated compounds.

4.5 Trihalomethanes and Haloacetic Acid Analysis in the Distribution System in 2024

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are tested in drinking water because they are disinfection byproducts (DBPs) that form when chlorine or other disinfectants react with natural organic matter in the water. While disinfection is crucial for eliminating harmful pathogens, prolonged exposure to high levels of these byproducts can pose long-term health risks.

To assess DBP formation within the distribution system, monitoring sites are strategically chosen to represent locations farthest from the KCWQ. This helps determine whether THMs and HAAs develop as water travels through the system. Each year, four locations are tested, with sampling sites and timing rotating annually.

In 2024, THM and HAA samples were collected on April 15 and sent to CARO in Kelowna, BC, for analysis. The results are presented in Table 16.

Table 16: CARO Trihalomethanes and Haloacetic Acids Analysis

Analyte	Units	Method Detection Limit	Drinking Water Guidline Level	Pineview Booster	Memorial Booster	Juniper #1 Booster	Noble Creek Booster
				April 15			
Calculated Parameters							
Total Trihalomethanes	mg/L	0.00400	MAC: 0.1	0.0429	0.0264	0.0223	0.0451
Haloacetic Acids							
Monochloroacetic Acid	mg/L	0.0020	N/A	<0.0020	<0.0020	<0.0020	<0.0020
Monobromoacetic Acid	mg/L	0.0020	N/A	<0.0020	<0.0020	<0.0020	<0.0020
Dichloroacetic Acid	mg/L	0.0020	N/A	0.0172	0.0114	0.0117	0.0195
Trichloroacetic Acid	mg/L	0.0020	N/A	0.021	0.0108	0.0127	0.0221
Dibromoacetic Acid	mg/L	0.0020	N/A	<0.0020	<0.0020	<0.0020	<0.0020
Total Haloacetic Acids (HAA5)	mg/L	0.00200	MAC: 0.08	0.0382	0.0222	0.0244	0.0416
Volatile Oragnic Compounds (VOC)							
Bromodichloromethane	mg/L	0.0010	N/A	0.0013	<0.0010	<0.0010	0.0013
Bromoform	mg/L	0.0010	N/A	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	0.0010	N/A	0.0416	0.0264	0.0223	0.0438
Dibromochloromethane	mg/L	0.0010	N/A	<0.0010	<0.0010	<0.0010	<0.0010
MAC = Maximum Acceptable Concentration			AO = Aesthetic objective				

Distribution system water analysis indicated that City water met GCDWQ guidelines for THM and HAA.

5. Small Water Systems

The City owns and operates two small water systems in areas that the distribution system does not reach. One of those systems is at the Tournament Capital Ranch in Rayleigh, and the other is a reverse osmosis system (RO) for the Kamloops Sewage Treatment Centre (KSTC) administration building.

5.1 Tournament Capital Ranch Water System

The City trucks treated and chlorinated drinking water to the Tournament Capital Ranch potable water system, and the water is stored in a 38 cubic metre cistern. The cistern supplies the washroom/concession building and the outdoor fountains/taps with potable water. Operation and monitoring of this site occurs only in the summer months when the site is open to the public. Chlorine residual and microbial water sampling occur weekly, and there were no positive results for any bacteriological species in 2024.

5.2 Kamloops Sewage Treatment Center Water System

Since the City's municipal water system does not reach the KSTC, a local water supply and treatment system was installed to provide potable water solely to the KSTC administration building.

The 168 m deep well is located north of the KSTC access road and immediately to the east of the administration building parking lot. The water treatment system was housed in the mechanical room of the administration building.

Water is pumped from the well and undergoes pre-treatment and softening before passing through ultraviolet disinfection and RO systems. After treatment, the water is stored in a 1,590 L storage tank.

5.2.1 In-House Testing

Water use at the KSTC was measured at 307 m3 from January to December 2024. The usage rate of 0.84 cubic metres per day is lower than the design level of 1.35 cubic metres per day. The results of the 2024 in-house testing are shown in Table 17.

Table 17: 2024 In-House Testing of RO Treated Water at the KSTC

	Temperature (°C)	**pH**	**Conductivity (µS/cm)**
Average RO Treated Water Quality (52 samples in 2024)	21.2	9.0	112

The 2024 in-house testing indicated that the RO system is functioning well.

5.2.2 External Testing

In 2024, a sample of treated water was taken on October 23 and sent to a commercial laboratory for a full analysis. The results are shown in Table 18.

Table 18: Water Quality Results for RO Treated Water at the KSTC in 2024

	RO Treated Water	Guidelines for Canadian Drinking Water Quality
	October 23	
General Parameters		
pH	7.65	7.0–10.5
TSS (mg/L)	<2.0	No guideline for drinking water
TDS (mg/L)	75	AO: ≤ 500 mg/L
Conductivity (µS/cm)	108	No drinking water quality guideline
Total Hardness (mg/L)	11	No drinking water quality guideline
Turbidity (NTU)	0.23	OG: < 1 NTU
True Colour (TCU)	<5.0	AO: ≤ 15 TCU
Chloride (mg/L)	9.48	AO: ≤ 250 mg/L
Fluoride (mg/L)	<0.10	MAC: 1.5 mg/L
Sulphate (mg/L)	2.00	AO: ≤ 500 mg/L
Sulphide (mg/L)	<0.02	AO: ≤ 0.05 mg/L
Nutrients (ppm)		
Total Ammonia-N	<0.050	No drinking water quality guideline
Nitrate-N	<0.010	MAC: 10 mg/L
Nitrite-N	<0.010	MAC: 1 mg/L
Total Phosphorus-P	0.0192	No drinking water quality guideline
Bacteriological Parameters (CFU/100 mL)		
Faecal Coliforms	<1	0 CFU
Total Coliforms	<1	0 CFU
E. coli	<1	0 CFU
Total Metals (ppm)		
Aluminum	<0.005	OG: 0.1 mg/L

	RO Treated Water	Guidelines for Canadian Drinking Water Quality
	October 23	
Antimony	<0.00020	MAC: 0.006 mg/L
Arsenic	0.00102	MAC: 0.01 mg/L
Barium	<0.0050	MAC: 1.0 mg/L
Beryllium	<0.00010	No drinking water quality guideline
Bismuth	<0.00010	No drinking water quality guideline
Boron	0.941	MAC: 5 mg/L
Cadmium	<0.000010	MAC: 0.005 mg/L
Calcium	4.1	No drinking water quality guideline
Chromium	<0.00050	MAC: 0.05 mg/L
Cobalt	<0.00010	No drinking water quality guideline
Copper	0.0070	AO: ≤ 1 mg/L
Iron	<0.010	AO: ≤ 0.3 mg/L
Lead	<0.00020	MAC: 0.01 mg/L
Lithium	0.00079	No drinking water quality guideline
Magnesium	0.1	No drinking water quality guideline
Manganese	0.0004	AO: ≤ 0.02 mg/L
Mercury	<0.00001	MAC: 0.001 mg/L
Molybdenum	0.00883	No drinking water quality guideline
Nickel	<0.00040	No drinking water quality guideline
Potassium	<0.1	No drinking water quality guideline
Selenium	<0.00050	MAC: 0.05 mg/L
Silicon	2.7	No drinking water quality guideline
Silver	<0.000050	No drinking water quality guideline
Sodium	19.5	AO: ≤ 200 mg/L
Strontium	0.012	No drinking water quality guideline

	RO Treated Water	Guidelines for Canadian Drinking Water Quality
	October 23	
Sulphur	<3.0	No drinking water quality guideline
Tellurium	<0.00050	No drinking water quality guideline
Thallium	<0.000020	No drinking water quality guideline
Thorium	<0.00010	No drinking water quality guideline
Tin	<0.00020	No drinking water quality guideline
Titanium	<0.0050	No drinking water quality guideline
Uranium	<0.000020	MAC: 0.02 mg/L
Vanadium	<0.0050	No drinking water quality guideline
Zinc	<0.0040	AO: ≤ 5 mg/L
Zirconium	<0.0001	No drinking water quality guideline
Maximum Allowable Concentration: MAC Aesthetic Objective: AO Operational Guideline: OG		

The RO treated water at the KSTC met drinking water quality guidelines.

6. Related City of Kamloops Water Programs

6.1 Source Water Assessment and Protection Plan

In 2014, the City, in collaboration with the Fraser Basin Council, completed a Source Water Protection Plan (SWPP). The plan followed the Ministry of Health's Drinking Water Source-to-Tap Assessment Guideline and consisted of four key modules:

- Source Delineation and Characterization
- Hazard Source Inventory
- Risk Assessment
- Actions to Improve Drinking Water Protection

The SWPP outlined several recommendations to mitigate risks, with the primary one being the construction of the North Thompson Emergency Water Intake to address potential source contamination. This emergency intake was successfully completed in 2019. Additionally, the plan provided recommendations for communication strategies and emergency response measures.

Another key recommendation was the formation of a Technical Advisory Group to monitor water quality and regulatory changes. Established in 2023, this group consists of members from utility operations, utility treatment, and engineering. They are responsible for evaluating updates to Health Canada guidelines, assessing risks in the watershed, and integrating new parameters into the WQMP as needed.

In 2024, the City launched a Watershed Climate Change Adaptation Study to examine the impacts of drought and geological changes on the water supply. The study also explores alternative water sources in response to drought and geomorphological shifts. Funded by the Community Emergency Preparedness Fund and the Disaster Resilience and Innovation Fund, specialists will spend the next two years analyzing watershed changes, including erosion effects on Kamloops Lake and drought risks to the City's two water sources.

6.2 Cross-Connection Program

The City of Kamloops has enacted the stand-alone *Cross Connection Control Bylaw No. 12-71*, replacing section 30 of *Waterworks Bylaw No. 12-31*. This updated bylaw is crafted to align with *Municipal Ticket Information Bylaw No. 43-15*, allowing for the imposition of fines in cases of non-compliance. Oversight and enforcement of the Cross Connection Control Bylaw are jointly managed by the City of Kamloops Utilities Operations and Community Services.

The Cross Connection Control Bylaw serves the crucial purpose of establishing a robust framework for the organization and utility to meet Interior Health's requirements for operating a water system under the *Drinking Water Protection Act*. Its core objective is to protect public health by preventing the contamination of the City's pristine drinking water supply through backflow incidents. The formulation of this bylaw and its accompanying procedures is informed by industry best practices and closely reflects similar frameworks adopted by municipalities across British Columbia.

This proactive measure underscores our unwavering dedication to ensuring the uninterrupted provision of high-quality drinking water to our residents, all while upholding regulatory standards and safeguarding public health.

In 2024, the City began the Cross Connection Surveys within City facilities and launched an online mechanism for submitting backflow testing reports.

6.3 Emergency Response Plan Update

Safe and reliable drinking water is a top priority for the City's Utilities Services Division. Emergency response planning is one of several important steps in preparing our staff for the different scenarios that may arise. Like other water systems of this size, the City's public water system can have emergencies, such as pipe breaks, pump malfunctions, bacteriological contamination, and power outages. The purpose of the City's Main Water System Emergency Response Plan, which was created in 2013, is to implement a plan to make these situations more manageable. The Response Plan is currently undergoing an upgrade and will be presented to IH in 2025.