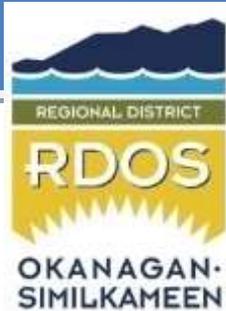
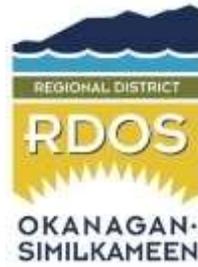


# 2022

## ANNUAL WATER QUALITY MONITORING REPORT FAULDER WATER SYSTEM



Faulder Uranium Treatment System



**2022 ANNUAL WATER QUALITY MONITORING REPORT  
FAULDER WATER SYSTEM  
FAULDER, B.C.**

Copy prepared for:  
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## 1. Introduction

As the owner and operator of the Faulder water system, the Regional District Okanagan-Similkameen is responsible for the following Annual Report summarizing the results from the 2022 *Water Quality Monitoring Program*. The report is a conditional requirement of the *Permit to Operate* issued by the Interior Health Authority (IHA) and the *BC Drinking Water Protection Act and Regulation*.

## 2. System Description

The Faulder water system is located within Electoral Area F, approximately ten kilometers west of Summerland. The water system consists of a primary and a backup deep groundwater wells, a Uranium Treatment Plant, storage reservoir and a distribution system. The system supplies domestic water to approximately 80 connections, however, it does not support fire protection. A portion of the well water (approximately 80%) is pumped through a uranium treatment system and blended with an untreated portion (approximately 20%) to achieve a uranium concentration below the Maximum Acceptable Concentration (MAC) of 0.02 mg/L total uranium. Water is then pumped into the distribution system and to an elevated storage reservoir. There is one Booster Zone in the system supplying water to the Upper Zone, a small subdivision at an elevation higher than the Reservoir.

## 3. System Classification and Operator Certifications

### 3.1. System Classification

The *British Columbia Environmental Operators Certification Program (BC EOCP)* is responsible for the classification of potable water systems in BC. The Faulder water system remained classified as a *Small Water System (SWS)* in 2022.

### 3.2. Operator Certification

The *British Columbia Environmental Operators Certification Program (BC EOCP)* is also responsible for certification of all water system operators. Operators may hold certification(s) in the disciplines of *Water Distribution* and/or *Water Treatment* with four levels of certification achievable within each discipline. RDOS Operators annually attend courses, seminars and complete online training required to maintain their levels of certification. In addition, all operators annually continue to work on augmenting and furthering their levels of certification. All RDOS Operators are certified through the *BC EOCP* as indicated in the table below.

OPERATOR EOCP CERTIFICATION No.	WATER DISTRIBUTION CERTIFICATION LEVELS				WATER TREATMENT CERTIFICATION LEVELS			
	IV	III	II	I	IV	III	II	I
1162	X						X	
4194			X					
4840			X				X	
4839		X						X
6926		X						X
8761		X						X
9322		X						X

Table 1: RDOS Operator Certifications 2022

**4. Annual Water Usage**

The source water for the Faulder water system is a deep groundwater well. In 2022, a total of 42,930 m<sup>3</sup> of water was pumped from the Faulder well down from 48,110 m<sup>3</sup> in 2021.

**4.1. Annual Water Usage**

	Cubic Meters (m <sup>3</sup> )	US Gallons	
<b>Annual Total Usage</b>	42,930	11,340,906	
<b>Minimum Daily Flow</b>	24	6,340	December 28, 2022
<b>Maximum Daily Flow</b>	425	112,273	July 20, 2022

Table 2: Annual Water Consumption 2022

Both annual and monthly water consumption are trended in the following two graphs.

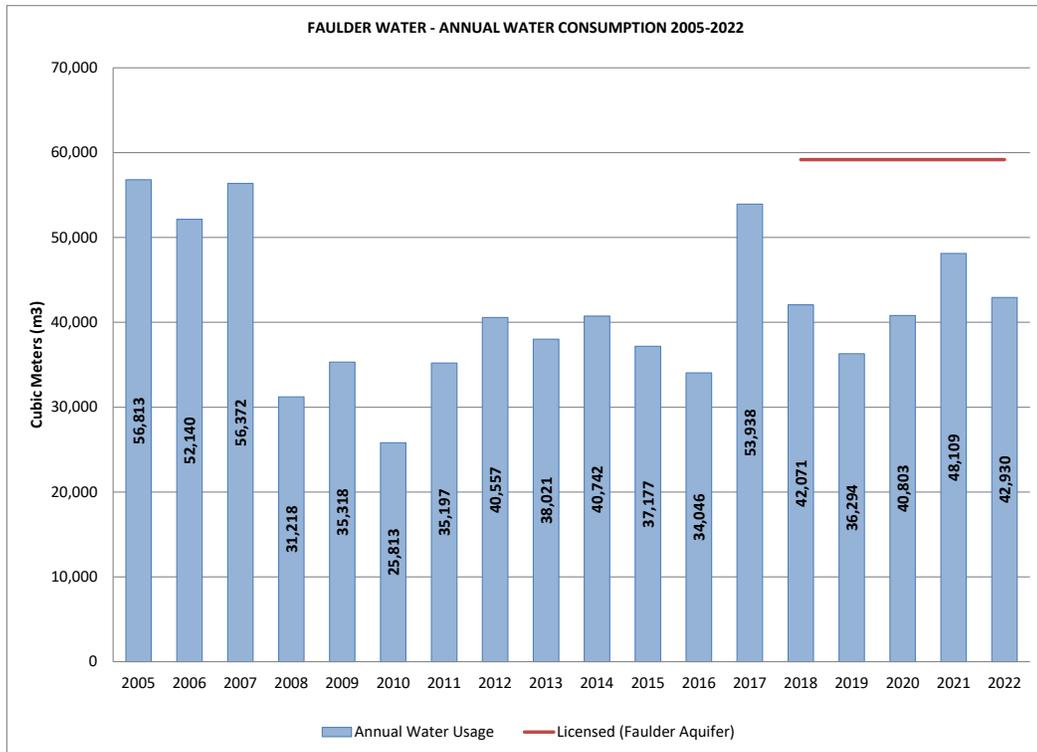


Figure 1: Annual Water Consumption 2005 to 2022

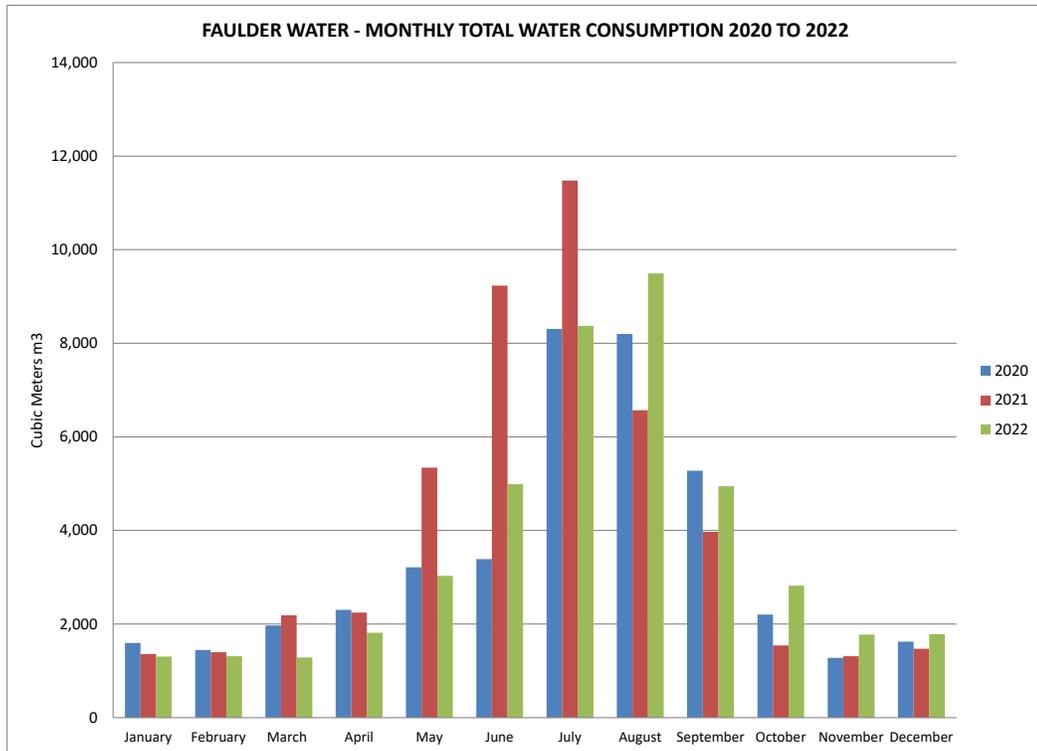


Figure 2: Monthly Water Consumption 2020 to 2022

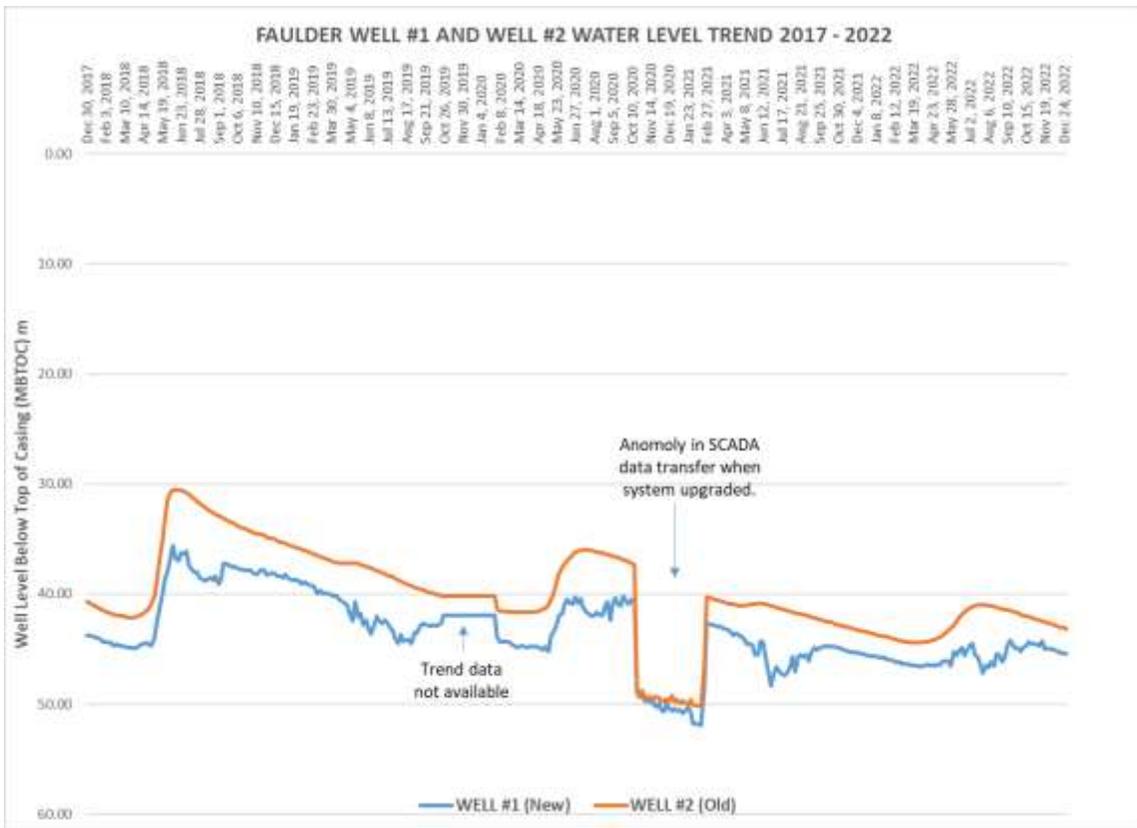
**4.2. Water Conservation**

On July 27, 2022 the Faulder water system moved from Stage “Normal” to Stage 1 water restrictions in response to an extended heat wave and remained at Stage 1 for the remainder of the season.

**5. Aquifer Monitoring**

The Faulder wells draw water from the Meadow Valley aquifer. Recharge into the Faulder section of the aquifer declined annually in 2019 through 2022 compared to 2018 which saw substantial recharge. The static water level has declined approximately 15 meters over the past 5 years.

The measured recharge into the Faulder aquifer was minimal in 2022.



**Figure 3: Faulder Aquifer Level 2017 to 2022 Trend**

**6. Source Water Quality**

All untreated source water quality parameters are compared to the *British Columbia Drinking Water Protection Act and Regulation (DWPA)* and the *Guidelines for Canadian Drinking Water Quality (GCDWQ)* unless otherwise noted, which could be indicated as an Operational Guideline (OG). The *DWPA* and *GCDWQ* define these parameters and set Aesthetic Objectives (AO) and Maximum Acceptable Concentrations (MAC).

All accredited laboratory tests in 2022 were performed by Caro Analytical Services (Kelowna, B.C.).

**6.1. Source Water Bacteriological Results**

Typically, bacteriological samples are only collected annually from Faulder’s untreated groundwater well. In 2022, a sample was collected on September 26<sup>th</sup>. Both Total Coliforms and *E. coli* were not detected in samples collected from the untreated Faulder groundwater well, as tabulated below.

Analyte	Unit	Average	Minimum	Maximum	Number of Results	Number of Results with Exceedances
<b>Lab Results: Microbiological</b>						
E. coli (counts)	CFU/100 mL	<1	<1	<1	1	0
Total coliforms (counts)	CFU/100 mL	<1	<1	<1	1	0

**Table 3: Faulder Well Bacteriological Testing 2022 Summary**

**6.2. Source Water Potable Water Testing**

Annually, the RDOS submits a sample of the untreated well water to an accredited lab for comprehensive potable water testing. The results of these test are compared against the *Guidelines for Canadian Drinking Water Quality*. The *GCDWQ* establishes Maximum Acceptable Concentration (MAC), Interim Maximum Acceptable Concentrations (IMAC) and Aesthetic Objectives (AO) for parameters if applicable. In 2022, with the exception of uranium, there were no exceedances of the guidelines in the Faulder groundwater well annual sample.

This comprehensive test includes physical parameters (e.g. color, turbidity, temperature, ultraviolet transmittance), chemical parameters (e.g. hardness, total metals and nutrients). Changes in these parameters may result in the need for water notifications for customers (i.e. Boil Water Notice or Water Quality Advisory) or the requirement for treatment processes to be implemented. The following tables display the results for the respective comprehensive potable water test.

### 6.2.1. Source Water General Potability Parameters 2022

Analyte	Unit	Guideline		Sampling Location		
		GCDWQ MAC	GCDWQ AO	Well 1 (New Well)	Well 1 (New Well)	Well 1 (New Well)
				Date Sampled 22-Sep- 20	14-Sep- 21	26-Sep- 22
<b>Lab Results</b>						
<b>General</b>						
Alkalinity (total, as CaCO <sub>3</sub> )	mg/L	NG	NG	159	180	192
Total organic carbon	mg/L	NG	NG	1.27	1.64	0.69
Chloride	mg/L	NG	250	8.73	10.7	13.0
Colour	CU	NG	15	<5.0	<5.0	<5.0
Conductivity	µS/cm	NG	NG	319	338	370
Total cyanide	mg/L	0.2 <sup>1.1</sup>	NG	<0.0020	<0.0020	<0.0020
Fluoride	mg/L	1.5	NG	0.16	0.24	0.14
Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	mg/L	NG	NG	156	201	165
Langelier Index		NG	NG	0.3	<-5.0	0.3
pH		NG	7.0 - 10.5 <sub>2.1</sub>	7.89	7.92	7.93
Total dissolved solids (computed)	mg/L	NG	500	192	225	221
Sulphate	mg/L	NG	500 <sup>2.2</sup>	15.2	15.6	16.9
Sulphide (total, as S)	mg/L	NG	0.047 <sup>2.3</sup>	<0.020	<0.020	<0.020
Turbidity	NTU	N <sup>1.2</sup>	NG	0.11	0.1	<0.10
UV transmittance at 254 nm - filtered	%	NG	NG	98	97.6	97.6
<b>Nutrients</b>						
Ammonia (total, as N)	mg/L	NG	NG	<0.050	<0.050	<0.050
Nitrate (as N)	mg/L	10	NG	0.306	0.347	0.309
Nitrite (as N)	mg/L	1	NG	<0.010	<0.010	<0.010
Potassium (total)	mg/L	NG	NG	3.21	3.16	3.17

See Guideline Notes in Section 6.2.2

**Table 4: Faulder Well General Potability Parameters 2022 Summary**

## 6.2.2. Guidelines Notes for General Potability Parameters

### 1. Notes for Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentrations (GCDWQ MAC)

#### **Note 1.1 for Total cyanide:**

The MAC for free cyanide is 0.2 mg/L. A maximum of 0.2 mg/L was used, in this report, to identify exceedances for total cyanide as a means for determining the potential for exceeding the free cyanide guideline.

#### **Note 1.2 for Turbidity:**

"Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet health-based turbidity limits, as defined for specific treatment technologies. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters should meet the requirements described in GCDWQ.

For systems that use groundwater that is not under the direct influence of surface water, which are considered less vulnerable to faecal contamination, turbidity should generally be below 1.0 NTU.

For effective operation of the distribution system, it is good practice to ensure that water entering the distribution system has turbidity levels below 1.0 NTU."

### 2. Notes for Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives (GCDWQ AO)

#### **Note 2.1 for pH:**

The operational guideline for pH is a range of 7.0 to 10.5 in finished drinking water.

#### **Note 2.2 for Sulphate:**

There may be a laxative effect in some individuals when sulphate levels exceed 500 mg/L. Health authorities should be notified of drinking water sources containing above 500 mg/L.

#### **Note 2.3 for Sulphide (total, as S):**

The aesthetic objective for sulphide (as H<sub>2</sub>S) is 0.05 mg/L. This is equivalent to 0.047 mg/L sulphide (as S).

6.2.3. Source Water Total Metals 2022

Analyte	Unit	Sampling Location		Well 1 (New Well)	Well 1 (New Well)	Well 1 (New Well)
		Date Sampled		22-Sep-20	14-Sep-21	26-Sep-22
		Guideline				
		GCDWQ MAC	GCDWQ AO			
<b>Lab Results</b>						
<b>Total Metals</b>						
Aluminum (total)	mg/L	2.9 <sup>1.1</sup>	0.100 <sup>2.1</sup>	0.0177	0.0114	<0.0050
Antimony (total)	mg/L	0.006	NG	<0.00020	<0.00020	<0.00020
Arsenic (total)	mg/L	0.010 <sup>1.2</sup>	NG	<0.00050	<0.00050	<0.00050
Barium (total)	mg/L	2.0 <sup>1.3</sup>	NG	0.0946	0.103	0.100
Boron (total)	mg/L	5	NG	<0.0500	<0.0500	<0.0500
Cadmium (total)	mg/L	0.007 <sup>1.4</sup>	NG	0.000015	0.00001	<0.000010
Calcium (total)	mg/L	NG	NG	42.1	58.8	45.6
Chromium (total)	mg/L	0.05	NG	<0.00050	<0.00050	0.0016
Cobalt (total)	mg/L	NG	NG	<0.00010	<0.00010	<0.00010
Copper (total)	mg/L	2 <sup>1.5</sup>	1	0.00135	0.00346	0.00245
Iron (total)	mg/L	NG	0.3	<0.010	<0.010	<0.010
Lead (total)	mg/L	0.005 <sup>1.6</sup>	NG	<0.00020	<0.00020	0.00021
Magnesium (total)	mg/L	NG	NG	12.4	13.1	12.5
Manganese (total)	mg/L	0.12 <sup>1.7</sup>	0.02 <sup>2.2</sup>	<0.00020	0.00025	<0.00020
Mercury (total)	mg/L	0.001	NG	<0.000010	<0.000010	<0.000010
Molybdenum (total)	mg/L	NG	NG	0.0240	0.0235	0.0215
Nickel (total)	mg/L	NG	NG	<0.00040	<0.00040	0.00052
Selenium (total)	mg/L	0.05	NG	<0.00050	<0.00050	<0.00050
Sodium (total)	mg/L	NG	200	12.1	13.1	11.5
Strontium (total)	mg/L	7.0 <sup>1.8</sup>	NG	0.643	0.677	0.725
Uranium (total)	mg/L	0.02	NG	0.0231	0.0237	0.0212
Zinc (total)	mg/L	NG	5.0	<0.0040	0.0046	0.0046

See Guideline Notes in Section 6.2.4

Table 5: Faulder Well Total Metals Potability 2022 Summary

#### 6.2.4. Guidelines Notes for Total Metals Potability

##### 1. Notes for Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentrations (GCDWQ MAC)

**Note 1.1 for Aluminum (total):** The maximum acceptable concentration (MAC) for total aluminum in drinking water is 2.9 mg/L (2 900 µg/L) based on a locational running annual average of a minimum of quarterly samples taken in the distribution system. (Update March 5, 2021)

**Note 1.2 for Arsenic (total):** Every effort should be made to maintain arsenic levels in drinking water as low as reasonably achievable.

**Note 1.3 for Barium (total):** Update January 24, 2020. The MAC was revised from 1.0 mg/L to 2.0 mg/L.

**Note 1.4 for Cadmium (total):** A maximum acceptable concentration (MAC) of 0.007 mg/L (7 µg/L) is established for total cadmium in drinking water, based on a sample of water taken at the tap. (Update July 14, 2020).

**Note 1.5 for Copper (total):** A maximum acceptable concentration (MAC) of 2 mg/L is established for total copper in drinking water, based on a sample of water taken at the tap. Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on Copper, June 2019.

**Note 1.6 for Lead (total):** The maximum acceptable concentration (MAC) for total lead in drinking water is 0.005 mg/L (5 µg/L), based on a sample of water taken at the tap and using the appropriate protocol for the type of building being sampled. Every effort should be made to maintain lead levels in drinking water as low as reasonably achievable (or ALARA). (GCDWQ: Guideline Technical Document; March, 2019)

**Note 1.7 for Manganese (total):** Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on manganese, May 2019.

**Note 1.8 for Strontium (total):** Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on strontium, May 2019.

2. **Notes for Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives (GCDWQ AO)**

**Note 2.1 for Aluminum (total):** The operational guidance (OG) value for total aluminum in drinking water is 0.100 mg/L (100 µg/L) to optimize water treatment and distribution system operations. This value is based on a locational running annual average. The sampling frequency required to calculate the locational running annual average will vary based on the type of treatment facility and the sampling location. (Update March 5, 2021)

**Note 2.2 for Manganese (total):** Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on manganese, May 2019.

## 7. Distribution System Water Quality

All treated distribution system water quality parameters are compared to the *British Columbia Drinking Water Protection Act and Regulation (DWPA)* and the *Guidelines for Canadian Drinking Water Quality (GCDWQ)* unless otherwise noted, which could be indicated as an operational guideline (OG). The *DWPA* and *GCDWQ* define these parameters and set Aesthetic Objectives (AO) and Maximum Acceptable Concentrations (MAC).

All accredited laboratory tests in 2022 were performed by Caro Analytical Services (Kelowna, B.C.)

### 7.1. Distribution System Bacteriological Results

Samples from the distribution system were analyzed for Total Coliforms and *Escherichia coli* (*E.coli*). Schedule A of the *BC Drinking Water Protection Regulation* provides bacteriological testing criteria as given below.

#### Schedule A

#### Water Quality Standards for Potable Water (sections 2 and 9)

Parameter:	Standard:
Fecal coliform bacteria	No detectable fecal coliform bacteria per 100 ml
<i>Escherichia coli</i>	No detectable <i>Escherichia coli</i> per 100 ml
Total coliform bacteria	
(a) 1 sample in a 30 day period	No detectable total coliform bacteria per 100 ml
(b) more than 1 sample in a 30 day period	At least 90% of samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml

The Faulder distribution system has three dedicated sample stations:

- Sampling Location S107 UTS (Uranium Treatment System) Discharge is located after the untreated well water has been blended with treated well water for uranium removal prior to entering the distribution system.
- The other two sampling locations, 176 Fish Lake Road (Lower Zone) and Mountain View Road (Upper Zone), are sampling locations within the distribution system.

The following is a summary of the bacteriological laboratory results which are collected bi-weekly from the Faulder Water System. Samples were analyzed for Total Coliforms and *Escherichia coli* (*E.coli*) and neither were detected in any of the distribution samples.

Analyte	Sampling Location	Unit	Average	Min	Max	Number of Results	Number of Results with Exceedances
<b>Lab Results: Microbiological</b>							
Background bacteria	176 Fish Lake Rd	CFU/100 mL	<1	<1	1	10	0
	Mountain View Rd	CFU/100 mL	18	<1	300	18	0
	S107 UTS Discharge	CFU/100 mL	<1	<1	1	25	0
E. coli (counts)	176 Fish Lake Rd	CFU/100 mL	<1	<1	<1	12	0
	Mountain View Rd	CFU/100 mL	<1	<1	<1	18	0
	S107 UTS Discharge	CFU/100 mL	<1	<1	<1	26	0
Total coliforms (counts)	176 Fish Lake Rd	CFU/100 mL	<1	<1	<1	12	0
	Mountain View Rd	CFU/100 mL	<1	<1	<1	18	0
	S107 UTS Discharge	CFU/100 mL	<1	<1	<1	26	0

**Table 6: Post Uranium Treatment and Distribution Water Bacteriological Testing 2022 Summary**

In addition to the bacteriological samples which are collected bi-weekly, field parameters of pH, temperature, conductivity, total dissolved solids (TDS) and turbidity are also recorded using portable probes or test kits by Operations staff.

## 7.2. Distribution System Water Quality Field Parameters

The following is a summary of the field parameters that are measured routinely in the distribution system.

Analyte	Unit	Average	Minimum	Maximum	Number of Results
<b>Field Results</b>					
Chlorine (free)	mg/L				0
Conductivity	µS/cm	384	354	405	42
pH		7.52	7.06	7.74	42
Total dissolved solids	mg/L	273	252	288	42
Temperature	°C	10.85	4.7	19.2	42
Turbidity	NTU	0.49	0.05	10	49

**Table 7: Post Uranium Treatment and Distribution Field Measured Parameters 2022 Summary**

## 7.3. Total Uranium Results

A monthly sample is collected for total uranium from the sample location (S107 UTS Discharge) post uranium treatment after the treated well water and untreated well water have been blended before the water enters the distribution system. In 2022, all water samples were below *The Guidelines for Canadian Drinking Water Quality* Maximum Acceptable Concentration (MAC) of 0.02 mg/L for total uranium prior to entering the distribution system.

Analyte	Unit	Average	Minimum	Maximum	Number of Results	Number of Results with Exceedances
<b>Lab Results: Total Metals</b>						
Uranium (total)	mg/L	0.0153	0.0137	0.0169	12	0

**Table 8: Faulder Water System Total Uranium 2022 Summary**

## 7.4. Water Quality Complaints

None to report for 2022.

**8. Water System Notifications**

The Interior Health Authority’s team of drinking water officers are responsible for providing the oversight to ensure compliance and drinking water safety. The IHA is responsible for issuing *Permits to Operate* to drinking water systems. The Interior Health Authority has four types of water notifications to inform users of negative impacts to water quality.

**8.1. Water Quality Advisory (WQA)**

There is some level of risk associated with consuming the drinking water but a Boil Water Notice is not needed. The risk is elevated for people with weakened immune systems, the elderly and infants and young children.

No WQAs issued in 2022.

**8.2. Boil Water Notice (BWN)**

There are organisms in the water that can make you sick. To safely consume (swallow) the water, you must bring it to a rolling boil for at least 60 seconds, or use a safe alternate source of water. In 2022, there were two (2) *Boil Water Notices* issued, as tabulated below, for the Upper Zone because of loss of system pressure when the emergency generator failed during a utility power outage.

Date BWN Issued	Date BWN Rescinded
May 18, 2022	May 27, 2022
October 10, 2022	October 14, 2022

**Table 9: Faulder Water System Boil Water Notices 2022 Dates**

**8.3. Do Not Consume (DNC)**

There are harmful chemicals or other bad things in the water that can make you sick. You cannot make the water safe by boiling. The water can make you sick if you consume (swallow) it. You cannot use the water for drinking, brushing teeth, washing/preparing/cooking food or pet’s drinking water. You can bath, shower and water plants and gardens with the water.

No DNCs issued in 2022.

**8.4. Do Not Use (DNU)**

There are known microbial, chemical or radiological contaminants in the water and that any contact with the water with the skin, lungs or eyes can be dangerous. Do not turn on your tap for any reason and do not use your water. You CANNOT make the water safe by boiling it.

No DNUs issued in 2022.

## **9. Program Updates and Status**

### **9.1. Cross Connection Control Program**

The RDOS continued work in 2022 towards implementing an official Cross Connection Control program. In 2021, the RDOS adopted Bylaw No 2851, 2020 Cross Connection Control. Bylaw 2851 is a Regional bylaw that will be applicable to all RDOS owned water systems.

### **9.2. Capital Works / System Additions**

No items of note in 2022.

### **9.3. Emergency Response Plan**

The *Emergency Response Plan* is scheduled to be updated in 2024.

### **9.4. Future System Upgrades**

A Water Capital Master Plan was budgeted to be completed in 2023. This will include an assessment of the current water system and an upgrade plan for the Faulder water system infrastructure with a focus on asset management and meeting future climate conditions and water demands.

**9.5. Supervisory Control and Data Acquisition (SCADA System) Upgrades**

No items of note in 2022.

**9.6. System Maintenance/Upgrades**

The five year preventative maintenance service performed on Well Pump Station/Uranium Treatment generator July 2022.

**9.7. Water Quality Monitoring Program**

The *Water Quality Monitoring Program* is scheduled to be updated in 2024.

**10. Summary**

All tested source water parameters from the Faulder groundwater well met the applicable criteria in 2022 with the exception of uranium exceeding the Maximum Acceptable Concentration (MAC) as set by *The Guidelines for Canadian Drinking Water Quality*. All tested treated distribution water parameters also met the applicable criteria in 2022. The operation of the Faulder Uranium Treatment System and distribution system by a team of RDOS *EOCP* certified Operators resulted in the continuous supply of high quality water to the community of Faulder. The RDOS continues to work on reviewing and upgrading the various programs that support facilitating the highest quality of water possible.