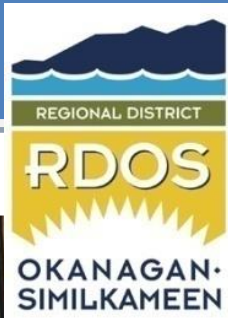


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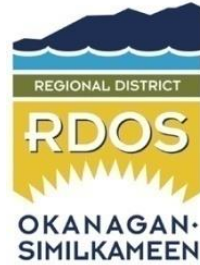
ANNUAL WATER QUALITY MONITORING REPORT WEST BENCH WATER SYSTEM



West Bench Booster Pump Station

Regional District of Okanagan-Similkameen

April, 2024



**2023 ANNUAL WATER QUALITY MONITORING REPORT
WEST BENCH WATER SYSTEM
PENTICTON, B.C.**

Copy prepared for:
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1. Introduction

As the owner and operator of the West Bench water system, the Regional District of Okanagan-Similkameen (RDOS) is responsible for the following Annual Report summarizing the results from the 2023 *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 West Bench water system is supplied treated water from the City of Penticton. The system supplies water to approximately 349 domestic connections, 2 agricultural connections and 1 commercial connection and supports fire protection. Treated water is pumped from the Booster Station into the distribution system and to two elevated storage Reservoirs.

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 West Bench distribution system remained as a *Level II* system in 2023.

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 (I-IV) 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 1 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
8266				X				X
8761		X						X
9322		X						X
1000977								

Table 1: RDOS Operator Certifications 2023

4. Annual Water Usage

The source water for the West Bench water system is treated supplied by the City of Penticton. In 2023, a total of 332,736 m³ of water was consumed, up from 296,001 m³ in 2022.

On January 31, 2023 a leak in a vacant home on Vedette Dr. was discovered and isolated. The leak accounted for a substantial increase in the total consumption recorded for January, 2023.

A minimum flow of 0 m³ results when water is not pumped daily from the City of Penticton supply line through the Boost Station. A minimum flow of zero was recorded 40 times in 2023, occurring in the winter months of February to March and November to December. The West Bench storage reservoirs supply all the water to the system on these days when there is no flow pumped from the City of Penticton supply line.

4.1. Consumption Records

	Cubic Meters (m ³)	US Gallons	Date(s)
Annual Total Usage	332,736	87,899,552	
Minimum Daily Flow	0	0	Jan to Mar, 2023 Nov to Dec, 2023
Maximum Daily Flow	2,873	758,966	July 24, 2023

Table 2: Annual Water Usage for 2023

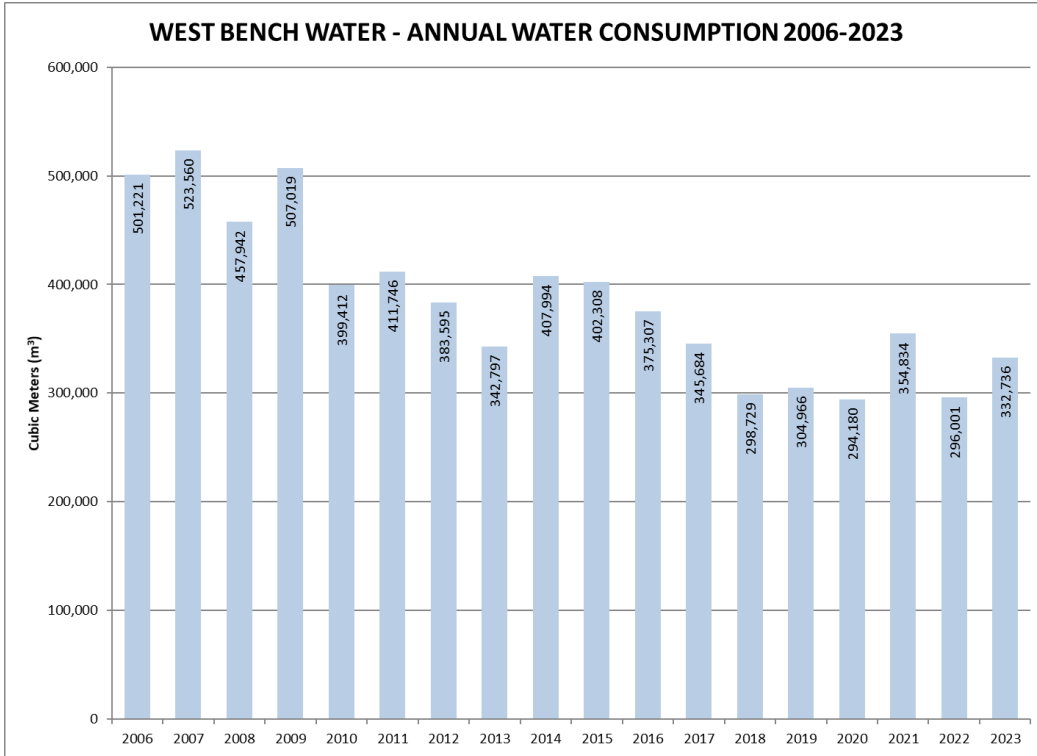


Figure 1: Annual Water Consumption 2006-2023

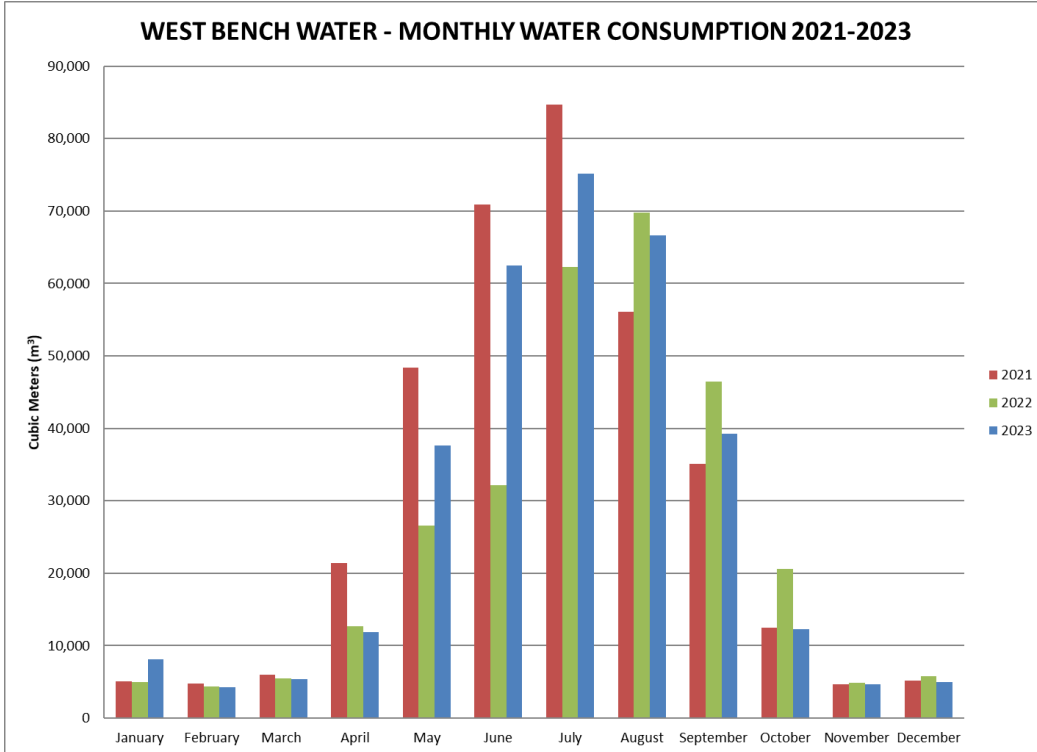


Figure 2: Monthly Water Consumption 2021 - 2023

4.2. Water Conservation Program

The West Bench water system started under Stage “Normal” water restrictions in 2023. Due to a prolonged heat wave and minimal precipitation across the region, on July 21st the RDOS implemented Stage 2 restrictions for all of its systems. Stage 2 restrictions target a 20 percent reduction in water use. On October 16th the RDOS returned all systems to Stage “Normal”.

5. Distribution System Water Quality

All treated distribution water quality parameters are compared to the applicable criteria set out in the *British Columbia Drinking Water Protection Act and Regulation (DWPA)*, the *Guidelines for Canadian Drinking Water Quality (GCDWQ)*, Interior Health Authority programs and Operational Guidelines (OG). The *DWPA* and *GCDWQ* define these parameters and set Aesthetic Objectives (AO) and Maximum Allowable Concentrations (MAC).

All 2023 accredited laboratory tests were performed by Caro Analytical Services (Kelowna, B.C.).

5.1. Distribution System Bacteriological Results

The following is a summary of the bacteriological laboratory results from the treated water distribution system. There are three regular sampling sites throughout the distribution system. One bacteriological sample is collected weekly, with rotation through each sampling site.

Schedule A of the *B C 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

In 2023, all of the samples reported no detections for Total Coliforms and *E.coli*. The following is a summary of the laboratory bacteriological results from the treated water distribution system.

Analyte	Unit	Average	Minimum	Maximum	Number of Results	Number of Results with Exceedances
Lab Results						
Microbiological						
E. coli (counts)	CFU/100 mL	<1	<1	<1	52	0
Total coliforms (counts)	CFU/100 mL	<1	<1	<1	52	0

Table 3: Annual Distribution Water Bacteriological Testing Summary 2023

5.2. Distribution System Free Chlorine Residuals

The following is a summary of the field free chlorine residual measurements from the distribution system. Free chlorine residuals are required to be maintained between 0.2 mg/L and 2.0 mg/L.

There are three regular sampling sites throughout the distribution system. Typically, one site was monitored on a weekly basis in conjunction with the bacteriological sampling.

Analyte	Sampling Location	Unit	Average	Minimum	Maximum	Number of Results
Field Results						
Chlorine (free)	Hyslop Dr	mg/L	0.53	0.02	0.87	22
	Sunglo Dr	mg/L	0.99	0.66	1.27	15
	Veteran Dr	mg/L	0.89	0.26	1.12	18

Table 4: Annual Distribution Free Chlorine Residual Summary 2023

5.3. Distribution System Water Quality Field Parameter Testing

The following is a summary of the field parameters that are measured routinely in the distribution system. There are four regular sampling sites throughout the distribution system. Typically one site was monitored on a weekly basis in conjunction with the bacteriological sampling.

Analyte	Unit	Average	Minimum	Maximum	Number of Results
Field Results					
Conductivity	µS/cm	272	242	348	56
pH		7.77	7.13	8.2	56
Total dissolved solids	mg/L	193	169	251	56
Temperature	°C	10.9	4.8	17	56
Turbidity	NTU	0.17	0.06	0.35	54

Table 5: Annual Field Water Quality Parameter Testing Summary for 2023

5.4. Disinfection By-Product Monitoring

Disinfection by-products are a result of chlorine reacting with naturally occurring organic matter such as decaying leaves and vegetation that can be present in surface water sources. The health risks from improperly treated surface water sources far out weigh the health risks from disinfection by-products found in properly treated surface water. Utilities should make every effort to maintain concentrations as low as reasonably achievable without compromising the effectiveness of disinfection.

Monitoring of disinfection by-products commenced in 2023.

5.4.1. Trihalomethane Monitoring

Total Trihalomethanes (THMs) results are based on a locational running annual average (LRAA) of a minimum of quarterly samples taken at the point in the distribution system with the highest potential THM levels with a Maximum Allowable Concentration of 0.100 mg/L (GCDWQ).

The following is a summary of the trihalomethane laboratory results and locational running average for the distribution system monitoring.

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Sampling Location	Date Sampled	Lab Results
		Halogenated Methanes
		Total Trihalomethanes (LRAA) (calculated)
		mg/L
Hyslop Dr	13-Feb-23	0.152
Hyslop Dr	27-Feb-23	0.127
Hyslop Dr	23-May-23	0.116
Hyslop Dr	28-Aug-23	0.102
Hyslop Dr	20-Nov-23	0.103
GCDWQ MAC		0.100 ^{1.1}

Table 6: Quarterly Distribution System Trihalomethane LRAA Results 2023

The following is a summary of the trihalomethane laboratory results and locational running average for the treated water supplied from the City of Penticton.

Sampling Location	Date Sampled	Lab Results
		Halogenated Methanes
		Total Trihalomethanes (LRAA) (calculated)
		mg/L
Booster Station Pre Chlorine	27-Feb-23	0.0753
Booster Station Pre Chlorine	23-May-23	0.0737
Booster Station Pre Chlorine	28-Aug-23	0.0697
Booster Station Pre Chlorine	20-Nov-23	0.0731
GCDWQ MAC		0.100 ^{1.1}

Table 7: Quarterly Source Trihalomethane LRAA Results 2023

The cause of the elevated THMs in the distribution system is under investigation. A possible cause may be the hydraulic residence time of the water in the storage reservoirs.

5.4.2. Guidelines Notes for Trihalomethanes

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

Note 1.1 for Total Trihalomethanes (LRAA) (calculated):

Trihalomethanes refers to the total of chloroform, bromodichloromethane, dibromochloromethane and bromoform compounds. The maximum acceptable concentration (MAC) for trihalomethanes (THMs) in drinking water is 0.100 mg/L (100 µg/L) based on a locational running annual average of a minimum of quarterly samples taken at the point in the distribution system with the highest potential THM levels.

5.4.3. Haloacetic Acid Monitoring

Haloacetic Acid (HAAs) results are based on a locational running annual average (LRAA) of a minimum of quarterly samples in the distribution system with a Maximum Allowable Concentration of 0.08 mg/L (GCDWQ).

The following is a summary of the haloacetic acid laboratory results and locational running annual average for the distribution system monitoring.

Sampling Location	Date Sampled	Lab Results
		Haloacetic Acids
		Haloacetic acids (LRAA) (calculated)
		mg/L
Hyslop Dr	13-Feb-23	0.085
Hyslop Dr	27-Feb-23	0.0848
Hyslop Dr	23-May-23	0.0713
Hyslop Dr	28-Aug-23	0.0633
Hyslop Dr	20-Nov-23	0.0629
Hyslop Dr	13-Feb-24	0.0771
GCDWQ MAC		0.08 ^{1.1}

Table 8: Quarterly Distribution System Haloacetic LRAA Results 2023

The following is a summary of the haloacetic acid laboratory results and locational running annual average for the treated water supplied from the City of Penticton.

Sampling Location	Date Sampled	Lab Results
		Haloacetic Acids
		Haloacetic acids (LRAA) (calculated)
		mg/L
Booster Station Pre Chlorine	27-Feb-23	0.052
Booster Station Pre Chlorine	23-May-23	0.0446
Booster Station Pre Chlorine	28-Aug-23	0.0419
Booster Station Pre Chlorine	20-Nov-23	0.0451
Booster Station Pre Chlorine	12-Feb-24	0.0548
GCDWQ MAC		0.08 ^{1.1}

Table 9: Quarterly Source Haloacetic Results 2023

5.4.4. Guidelines Notes for Haloacetic Acids

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

Note 1.1 for Haloacetic acids (LRAA) (calculated)::

Total haloacetic acids refers to the total of monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid and dibromoacetic acid. The maximum acceptable concentration (MAC) for total haloacetic acids in drinking water is 0.08 mg/L (80 µg/L) based on a locational running annual average of a minimum of quarterly samples taken in the distribution system. Utilities should make every effort to maintain concentrations as low as reasonably achievable without compromising the effectiveness of disinfection.

5.5. Water Quality Complaints

None to report for 2023.

6. 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 purveyors. The Interior Health Authority has four types of public water notifications to inform users of negative impacts to water quality.

6.1 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 for 2023.

6.2 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.

No BWNs issued in 2023.

6.3 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 2023.

6.4 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 2023.

7. Program Updates and Status

7.1. Cross Connection Control Program

A cross connection is any actual or potential connection between the drinking water (potable) system and a non-potable substance (contaminant). Backflow is when the flow of water in a pipe reverses from the normal direction. When a cross connection and backflow occur simultaneously often the result is a contaminant entering the drinking water system.

Cross connection in plumbing systems require backflow preventers corresponding to the degree of hazard as indicated by the CSA B64.10, “Manual for the Selection and Installation of Backflow Preventers”, as referenced in the BC Plumbing Code, or as determined by a CCC hazard assessment survey.

The RDOS adopted a Regional CCC Bylaw, No.2851, in 2020 to address cross connection and backflow prevention applicable to all agricultural, industrial, commercial and institutional properties. These property uses are required to have a suitable backflow protection device installed.

In February, 2023 the RDOS started implementation of its Regional Cross Connection Control program with MTS Inc. (Vernon, B.C.) contracted as the program administrator. One of main focuses of the program in 2023 was to address agricultural properties with a Severe Hazard rating that did not have an approved backflow preventer installed and/or an annual test report submitted. Properties with a Severe Hazard rating are commonly found in the agriculture sector. A common practice that results in an irrigation system being classified as a Severe Hazard is the use of fertigation/chemigation systems. This is where chemicals are injected directly into an irrigation system for application to crops. All other agricultural irrigation systems are typically rated as a Moderate Hazard. Agricultural properties with a Moderate Hazard classification were encouraged to voluntarily comply with the installation and testing of a backflow preventer in 2023 with mandatory compliance set for 2025.

In 2023 work was also done on following up on commercial properties with known existing backflow preventers along with the surveying of commercial properties that were not part of the CCC database.

7.2. Capital Works / System Additions

None to report for 2023.

7.3. Emergency Response Plan

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

7.4. Future System Upgrades

None to report.

7.5. Supervisory Control and Data Acquisition (SCADA) System Upgrades

None to report for 2023.

7.6. System Maintenance/Upgrades

In March, 2023 the electrical soft starters on Pump 2 and Pump 3 at the West Bench Booster Station were upgraded to variable frequency drives (VFD) to improve power quality at the Booster Station.

7.7. Water Quality Monitoring Program

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

8. Summary

All of the tested treated distribution water parameters, with the exception of total trihalomethanes, met the applicable criteria in 2023. It should be noted, the health risks from improperly treated surface water sources far out weigh the health risks from disinfection by-products found in properly treated surface water. An investigation has been started to determine the cause of the elevated THMs. The operation of the West Bench distribution system by a team of RDOS *EOCP* certified Operators resulted in the continuous supply of high quality water to the community of West Bench. The RDOS continues to work on reviewing and upgrading the various programs that support facilitating the highest quality of water possible.