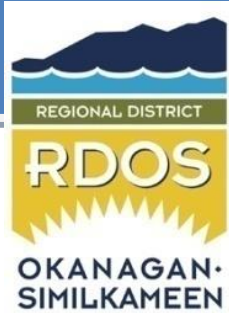


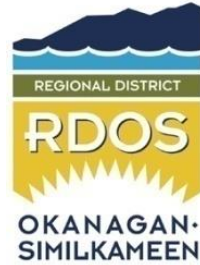
2023

ANNUAL WATER QUALITY MONITORING REPORT

SAGE MESA WATER SYSTEM



Sage Mesa Lake Pump Station



**2023 ANNUAL WATER QUALITY MONITORING REPORT
SAGE MESA WATER SYSTEM
PENTICTON, B.C.**

Copy prepared for:

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Table of Contents

| | | |
|--------|--|----|
| 1. | Introduction..... | 1 |
| 2. | System Description..... | 1 |
| 3. | System Classification and Operator Certifications..... | 2 |
| 3.1. | System Classification..... | 2 |
| 3.2. | Operator Certification..... | 2 |
| 4. | Annual Water Usage..... | 3 |
| 4.1. | Consumption Records..... | 3 |
| 4.2. | Water Conservation Program..... | 4 |
| 5. | Distribution System Water Quality..... | 5 |
| 5.1. | Distribution System Bacteriological Results..... | 5 |
| 5.2. | Distribution System Free Chlorine Residuals..... | 6 |
| 5.3. | Distribution System Water Quality Field Parameter Testing..... | 7 |
| 5.4. | Disinfection By-Product Monitoring..... | 7 |
| 5.4.1. | Trihalomethane Monitoring..... | 7 |
| 5.4.2. | Guidelines Notes for Trihalomethanes..... | 8 |
| 5.4.3. | Haloacetic Acid Monitoring..... | 8 |
| 5.4.4. | Guidelines Notes for Haloacetic Acids..... | 9 |
| 5.5. | Water Quality Complaints..... | 9 |
| 6. | Source Water Quality..... | 10 |
| 6.2. | Source Water Weekly/Bi-Weekly Monitoring..... | 12 |
| 6.3. | Source Water Potable Water Testing..... | 14 |
| 6.3.1. | Source Water General Parameters..... | 15 |
| 6.3.2. | Guideline Notes for General Potability Parameters..... | 16 |
| 6.3.3. | Source Water Total Metals..... | 17 |
| 6.3.4. | Guideline Notes for Total Metals Potability..... | 18 |
| 7. | Water System Notifications..... | 19 |
| 7.1. | Water Quality Advisory (WQA)..... | 19 |
| 7.2. | Boil Water Notices (BWN)..... | 19 |
| 7.3. | Do Not Consume (DNC)..... | 19 |
| 7.4. | Do Not Use (DNU)..... | 20 |
| 8. | Program Updates and Status..... | 20 |
| 8.1. | Capital Works..... | 20 |
| 8.2. | Emergency Response Plan..... | 20 |
| 8.3. | Water Quality Monitoring Program..... | 20 |
| 8.4. | Future System Upgrades..... | 20 |
| 8.5. | System Maintenance/Upgrades..... | 21 |
| 9. | Summary..... | 21 |

TABLES

Table 1: RDOS Operator Certifications for 2023 2
Table 2: Annual Water Usage for 2023 3
Table 3: Annual Distribution Water Bacteriological Testing Summary for 2023 6
Table 4: Annual Distribution Free Chlorine Residual Summary for 2023 6
Table 5: Annual Field Water Quality Parameter Testing Summary for 2023..... 7
Table 6: Quarterly Distribution System Trihalomethane LRAA Results 2023 8
Table 7: Quarterly Distribution System Haloacetic LRAA Results 2023 9
Table 8: Weekly/Bi-Weekly Source Water Parameter Summary 2023..... 12
Table 9: Okanagan Lake General Parameters 2021 to 2023..... 15
Table 10: Okanagan Lake Total Metals 2021 to 2023 17

FIGURES

Figure 1: Annual Water Consumption 2010 to 2023 3
Figure 2: Monthly Water Consumption 2021 to 2023..... 4
Figure 3: Okanagan Lake Average Monthly Turbidity 2023..... 11
Figure 4: Okanagan Lake Online Average Turbidity 2021 to 2023 11
Figure 5: Okanagan Lake Monthly *E.coli* and Total Coliform 2021 to 2023..... 13

1. Introduction

The Regional District of Okanagan-Similkameen is the Operations contractor for the Sage Mesa water system and therefore 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 Sage Mesa water system is located within Electoral Area F, just to the northwest of Penticton. The Sage Mesa system is a privately owned water system which is currently under the management of the British Columbia *Ministry Water Land and Natural Stewardship*. The RDOS provides Operations and Maintenance under a contract agreement with the *Ministry Water Land and Natural Stewardship*.

The Sage Mesa water system is supplied by Okanagan Lake. The system supplies treated water to approximately 242 domestic connections and irrigation water to two golf courses. Water is pumped from the Lake Pump Station into the distribution system and to an elevated storage reservoir (Lower Reservoir). The only treatment of the raw lake water is chlorination through the addition of sodium hypochlorite at the Lake Pump Station. A Booster Station is located at the Lower Reservoir and provides for re-chlorination of the treated water as it is boosted to the Upper Reservoir at a higher elevation. The Upper Reservoir supplies the Sandstone, Westwood and Husula-Highlands areas.

The Interior Health Authority has identified an insufficient chlorine contact time for users in the Lower Zone of the Sage Mesa Water system. Chlorine contact times are required to allow for proper disinfection of surface water sources that may contain pathogens such as viruses, bacteria and protozoa. In order to meet the required contact time, infrastructure improvements will be required following the provincial *Drinking Water Treatment Objectives for Surface Water*.

3. System Classification and Operator Certifications

3.1. System Classification

The *British Columbia Environmental Operators Certification Program (BC EOCP)* is responsible for classifying potable water systems in BC.

The Sage Mesa Lake Pump Station remained classified as *Water Treatment II* in 2023.

The Sage Mesa distribution system remained classified as *Water Distribution II* 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 for 2023

4. Annual Water Usage

The source water for the Sage Mesa water system is Okanagan Lake. In 2023, a total of 253,440 m³ was pumped from Okanagan Lake, down from 235,672 m³ in 2022.

4.1. Consumption Records

| | Cubic Meters (m ³) | US Gallons | Date |
|---------------------------|--------------------------------|------------|--------------|
| Annual Total Usage | 253,440 | 66,951,762 | |
| Minimum Daily Flow | 57 | | Nov 29, 2023 |
| Maximum Daily Flow | 2,801 | | July 3, 2023 |

Table 2: Annual Water Usage for 2023

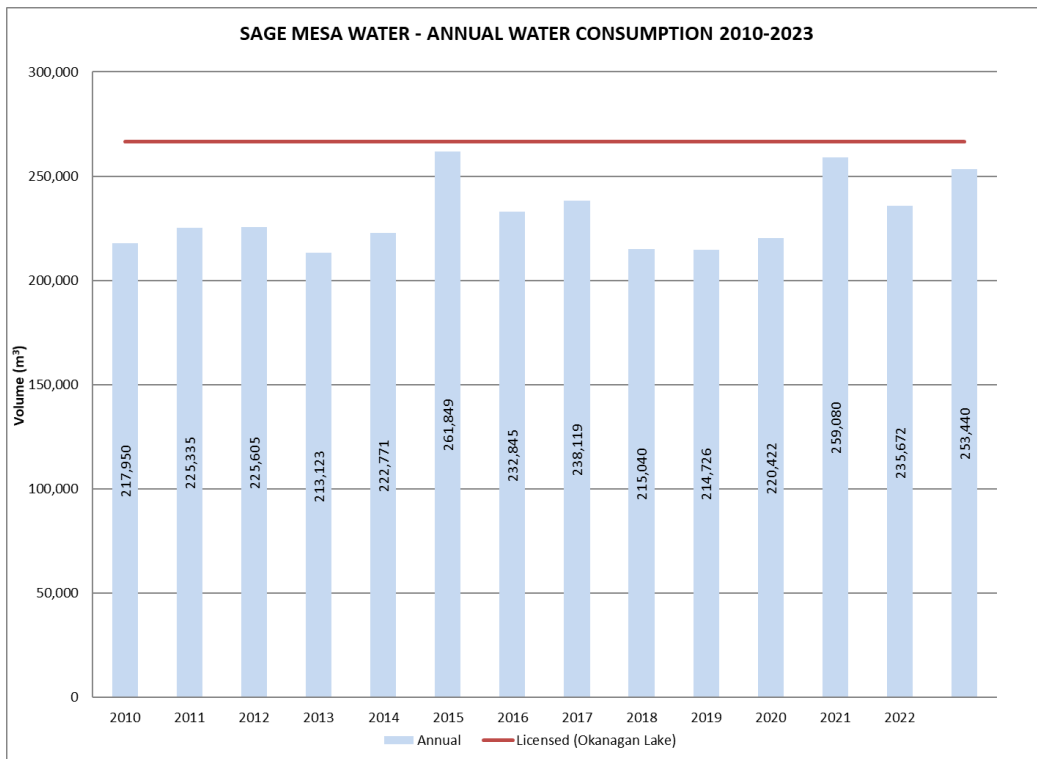


Figure 1: Annual Water Consumption 2010 to 2023

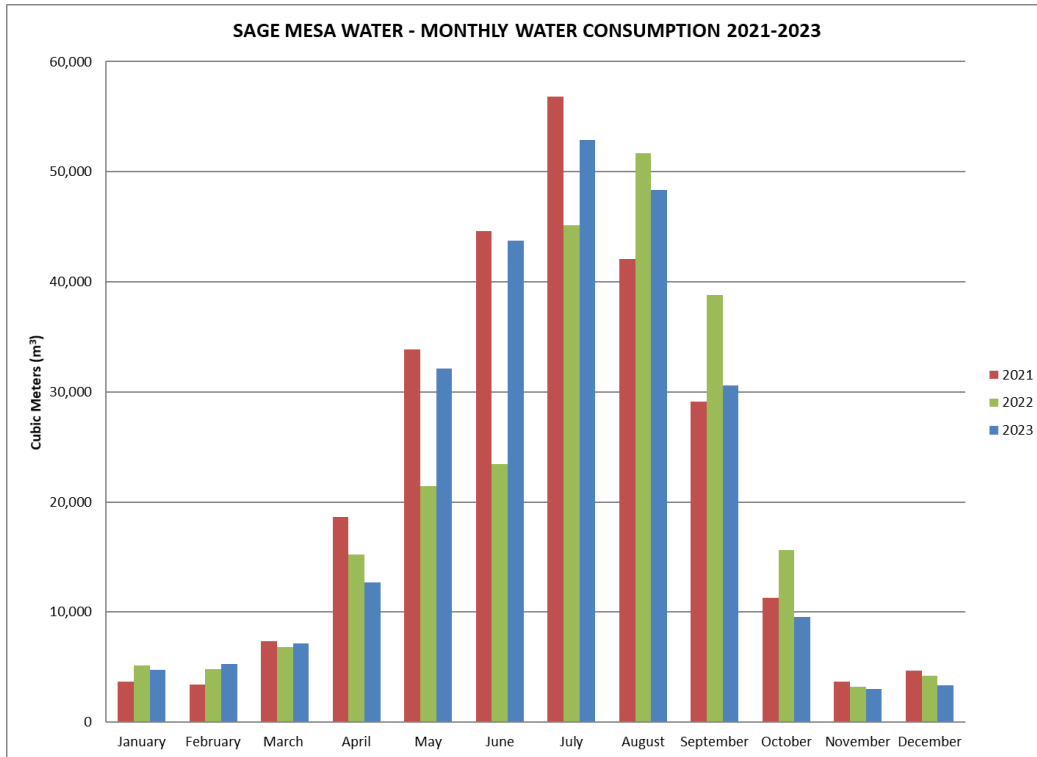


Figure 2: Monthly Water Consumption 2021 to 2023

4.2. Water Conservation Program

The Sage Mesa 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 testing results from the treated water distribution system. There are two regular sampling sites (dedicated sample stations) throughout the distribution system that are alternated between weekly.

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 distribution 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 | | | | | | |
| Total coliforms (counts) | CFU/100 mL | | | | 52 | 0 |
| E. coli (counts) | CFU/100 mL | | | | 52 | 0 |

Table 3: Annual Distribution Water Bacteriological Testing Summary for 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.

Typically, one to two monitoring sites were monitored on a weekly basis.

Flushing of water mains occurred at all locations when measured residual levels were below the MAC.

| Analyte | Sampling Location | Unit | Average | Minimum | Maximum | Number of Results |
|----------------------|-------------------|------|---------|---------|---------|-------------------|
| Field Results | | | | | | |
| Chlorine (free) | Booster Station | mg/L | 1.36 | 0.93 | 1.85 | 26 |
| | Sandstone Dr. | mg/L | 0.88 | 0.36 | 1.25 | 27 |

Table 4: Annual Distribution Free Chlorine Residual Summary for 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 two 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 | | | | | |
| Chlorine (free) | mg/L | 1.11 | 0.36 | 1.85 | 53 |
| Conductivity | µS/cm | 310 | 268 | 409 | 54 |
| pH | | 8.09 | 7.55 | 8.85 | 54 |
| Total dissolved solids | mg/L | 220 | 189 | 294 | 54 |
| Temperature | °C | 12.3 | 3.6 | 23 | 54 |
| Turbidity | NTU | 0.6 | 0.25 | 2.88 | 53 |

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.

| Sampling Location | Date Sampled | Lab Results |
|-------------------|--------------|---|
| | | Halogenated Methanes |
| | | Total Trihalomethanes (LRAA) (calculated) |
| | | mg/L |
| Sandstone Dr. | 06-Mar-23 | 0.0784 |
| Sandstone Dr. | 26-Jun-23 | 0.0877 |
| Sandstone Dr. | 28-Aug-23 | 0.0968 |
| Sandstone Dr. | 20-Nov-23 | 0.0996 |
| GCDWQ MAC | | 0.100 ^{1.1} |

Table 6: Quarterly Distribution System Trihalomethane LRAA Results 2023

5.4.2. Guidelines Notes for Trihalomethanes

- 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. Utilities should make every effort to maintain concentrations as low as reasonably achievable without compromising the effectiveness of disinfection.

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 Allowble 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 |
| Sandstone Dr. | 6-Mar-23 | 0.0508 |
| Sandstone Dr. | 26-Jun-23 | 0.0527 |
| Sandstone Dr. | 28-Aug-23 | 0.053 |
| Sandstone Dr. | 20-Nov-23 | 0.0546 |
| GCDWQ MAC | | 0.08 ^{1.1} |

Table 7: Quarterly Distribution System Haloacetic LRAA 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. Source Water Quality

All untreated source 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 Acceptable Concentrations (MAC).

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

6.1. Source Water Turbidity Monitoring

Turbidity is a measure of the relative clarity or cloudiness of water measured in Nephelometric Turbidity Units (NTU). Turbidity is measured by passing light through a sample and measuring how light reflects off of the suspended particles within the sample.

The Interior Health Authority requires source water turbidity values to be evaluated against the following criteria. Exceedances of the criteria, typically compared to the average 24 hour turbidity value, will require a level of public notification as described below.

| Source Water Quality | Turbidity Range | Public Notification Required |
|----------------------|-----------------|------------------------------|
| Good | NTU < 1 | None |
| Fair | 1 < NTU < 5 | Water Quality Advisory (WQA) |
| Poor | 5 ≤ NTU | Boil Water Notice (BWN) |

Online continuous turbidity monitoring and trending of the Okanagan Lake source water is part of the SCADA (Supervisory Control and Data Acquisition) system. In addition to the online monitoring, grab samples are drawn on a weekly basis and measured using portable field test kits to verify the operation of the online instrumentation.

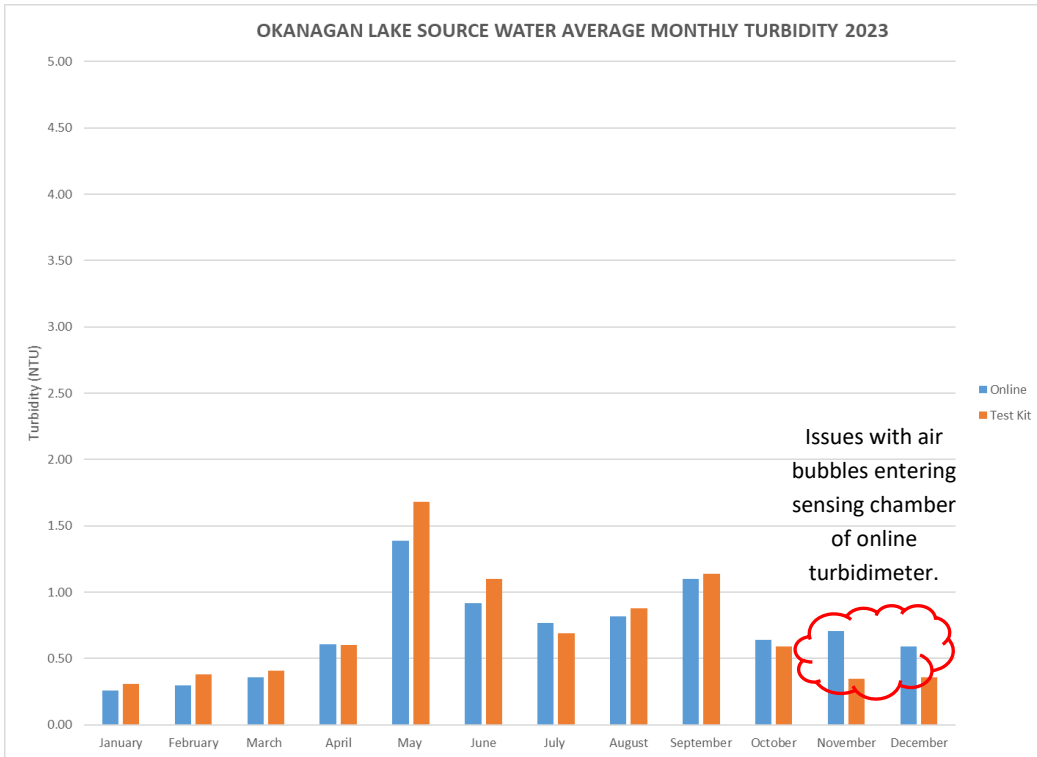


Figure 3: Okanagan Lake Average Monthly Turbidity 2023

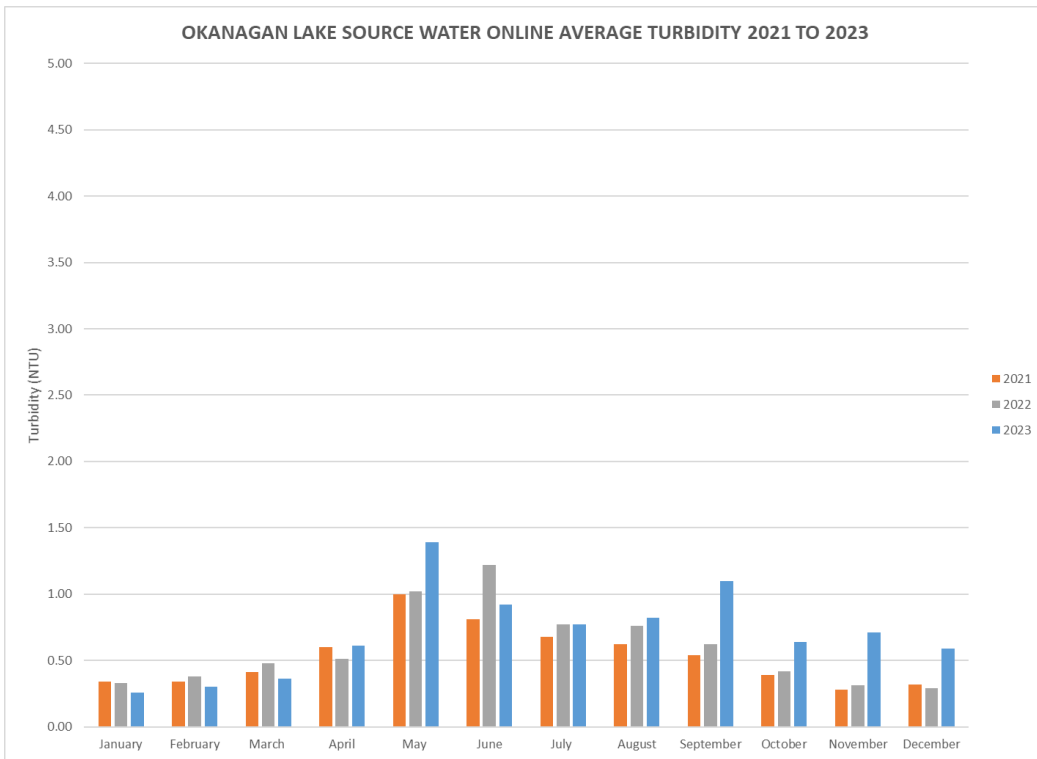


Figure 4: Okanagan Lake Online Average Turbidity 2021 to 2023

6.2. Source Water Weekly/Bi-Weekly Monitoring

Various parameters are monitored weekly and bi-weekly on the source water. These parameters provide support for operational decisions. These parameters are monitored by both field kits and grab samples that are sent to the laboratory for analysis.

| Analyte | Unit | Average | Minimum | Maximum | Number of Results |
|--|------------|---------|---------|---------|-------------------|
| Field Results | | | | | |
| Conductivity | µS/cm | 300 | 238 | 465 | 51 |
| pH | | 8.02 | 7.18 | 8.8 | 52 |
| Total dissolved solids | mg/L | 213 | 172 | 332 | 52 |
| Temperature | °C | 11.5 | 3.5 | 23.4 | 52 |
| Turbidity | NTU | 0.76 | 0.29 | 3.49 | 50 |
| Lab Results | | | | | |
| General | | | | | |
| Alkalinity (total, as CaCO ₃) | mg/L | 117 | 104 | 135 | 28 |
| Total organic carbon | mg/L | 4.67 | 3.63 | 6.63 | 28 |
| Colour | CU | 3.9 | <5.0 | 12 | 51 |
| Hardness (as CaCO ₃), from total Ca/Mg | mg/L | 125 | 115 | 137 | 28 |
| UV transmittance at 254 nm - unfiltered | % | 84.6 | 75.9 | 88.6 | 51 |
| Microbiological | | | | | |
| Total coliforms (counts) | CFU/100 mL | <1 | <1 | <1 | 1 |
| Total coliforms (MPN) | MPN/100 mL | 118 | 1 | 1550 | 51 |
| E. coli (counts) | CFU/100 mL | <1 | <1 | <1 | 1 |
| E. coli (MPN) | MPN/100 mL | 1 | 1 | 6 | 51 |
| Total Metals | | | | | |
| Calcium (total) | mg/L | 34 | 30.1 | 37.7 | 28 |
| Magnesium (total) | mg/L | 9.59 | 8.78 | 10.7 | 28 |

Table 8: Weekly/Bi-Weekly Source Water Parameter Summary 2023

The following graph shows the three year trend for Total Coliforms and *E.coli* from the Okanagan Lake intake. Note, the laboratory changed analytical methods for the raw water bacteriological testing from Membrane Filtration (MF CFU/100ml) to Most Probable Number (MPN) in late 2019. Only the MPN data was graphed.

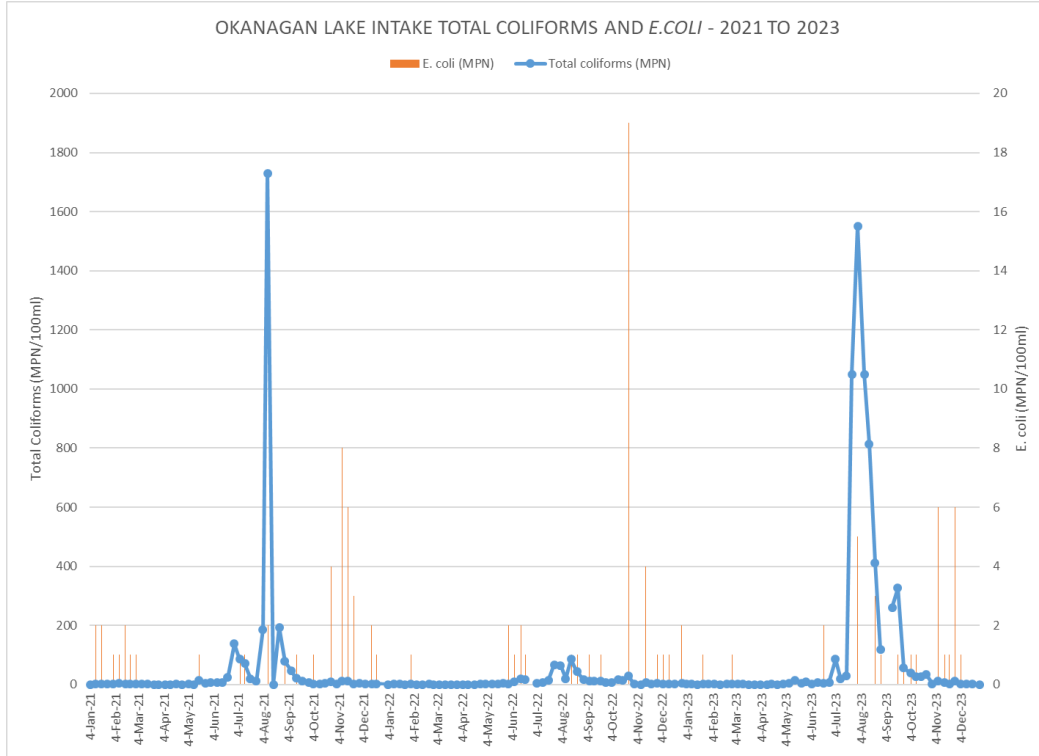


Figure 5: Okanagan Lake Monthly *E.coli* and Total Coliform 2021 to 2023

6.3. Source Water Potable Water Testing

Annually, the RDOS submits a sample of the untreated water from the Okanagan Lake intake 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 Concentrations (MAC), Interim Maximum Acceptable Concentrations (IMAC) and Aesthetic Objectives (AO) for parameters if applicable. In 2023, there were no exceedances of the guidelines in the Sage Mesa source water 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 tests.

All tested source water parameters met the applicable guidelines in 2023. Chloride showed an increasing trend, from 2021 to 2023. No other increasing or decreasing trends were noted.

6.3.1. Source Water General Parameters

| Analyte | Unit | Sampling Location | | Lake Pump Station | Lake Pump Station | Lake Pump Station |
|--|-------|--------------------|---------|-------------------|-------------------|-------------------|
| | | Date Sampled | | 28-Sep-21 | 27-Jun-22 | 11-Sep-23 |
| | | Guideline | | | | |
| | | GCDWQ MAC | | | | |
| Lab Results | | | | | | |
| General | | | | | | |
| Alkalinity (total, as CaCO ₃) | mg/L | NG | 121 | 113 | 118 | |
| Total organic carbon | mg/L | NG | 3.94 | 4.13 | 5.96 | |
| Chloride | mg/L | NG | 5.42 | 5.56 | 5.81 | |
| Colour | CU | NG | <5.0 | 6.2 | <5.0 | |
| Conductivity | µS/cm | NG | 270 | 250 | 283 | |
| Total cyanide | mg/L | 0.2 ^{1.1} | <0.0020 | <0.0020 | <0.0020 | |
| Fluoride | mg/L | 1.5 | 0.19 | <0.10 | 0.18 | |
| Hardness (as CaCO ₃), from total Ca/Mg | mg/L | NG | 120 | 122 | 128 | |
| Langelier Index | | NG | 0.3 | 0.2 | 0.3 | |
| pH | | NG | 8.16 | 8.04 | 8.2 | |
| Sulphate | mg/L | NG | 30.2 | 29.7 | 32.2 | |
| Sulphide (total, as S) | mg/L | NG | <0.020 | <0.020 | <0.020 | |
| Turbidity | NTU | N ^{1.2} | 0.37 | 0.68 | 1.44 | |
| UV transmittance at 254 nm - filtered | % | NG | 85.2 | 81.8 | 84.2 | |
| UV transmittance at 254 nm - unfiltered | % | NG | | | | |
| | | | | | | |
| Nutrients | | | | | | |
| Ammonia (total, as N) | mg/L | NG | <0.050 | 0.069 | <0.050 | |
| Nitrate (as N) | mg/L | 10 | 0.036 | <0.010 | <0.010 | |
| Nitrite (as N) | mg/L | 1 | <0.010 | <0.010 | <0.010 | |
| Potassium (total) | mg/L | NG | 2.42 | 2.28 | 2.61 | |

See Guideline Notes in Section 6.3.2

Table 9: Okanagan Lake General Parameters 2021 to 2023

6.3.2. Guideline 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 H₂S) is 0.05 mg/L. This is equivalent to 0.047 mg/L sulphide (as S).

6.3.3. Source Water Total Metals

| Analyte | Unit | Guideline | Lake Pump Station | Lake Pump Station | Lake Pump Station |
|---------------------|------|--------------------------|-------------------|-------------------|-------------------|
| | | GCDWQ MAC | 28-Sep-21 | 27-Jun-22 | 11-Sep-23 |
| | | Sampling Location | | | |
| | | Date Sampled | | | |
| Lab Results | | | | | |
| Total Metals | | | | | |
| Aluminum (total) | mg/L | 2.9 ^{1.1} | 0.014 | 0.0214 | 0.046 |
| Antimony (total) | mg/L | 0.006 | <0.00020 | <0.00020 | <0.00020 |
| Arsenic (total) | mg/L | 0.010 ^{1.2} | <0.00050 | <0.00050 | <0.00050 |
| Barium (total) | mg/L | 2.0 ^{1.3} | 0.0219 | 0.0212 | 0.0234 |
| Boron (total) | mg/L | 5 | <0.0500 | <0.0500 | <0.0500 |
| Cadmium (total) | mg/L | 0.007 ^{1.4} | <0.000010 | <0.000010 | <0.000010 |
| Calcium (total) | mg/L | NG | 32.4 | 34.3 | 35 |
| Chromium (total) | mg/L | 0.05 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt (total) | mg/L | NG | <0.00010 | <0.00010 | <0.00010 |
| Copper (total) | mg/L | 2 ^{1.5} | 0.00149 | 0.00514 | 0.0017 |
| Iron (total) | mg/L | NG | 0.015 | 0.017 | 0.048 |
| Lead (total) | mg/L | 0.005 ^{1.6} | <0.00020 | <0.00020 | <0.00020 |
| Magnesium (total) | mg/L | NG | 9.52 | 8.76 | 9.92 |
| Manganese (total) | mg/L | 0.12 ^{1.7} | 0.00162 | 0.00187 | 0.00351 |
| Mercury (total) | mg/L | 0.001 | <0.000010 | <0.000010 | <0.000010 |
| Molybdenum (total) | mg/L | NG | 0.00365 | 0.00323 | 0.00353 |
| Nickel (total) | mg/L | NG | 0.0007 | 0.00046 | 0.00069 |
| Selenium (total) | mg/L | 0.05 | <0.00050 | <0.00050 | <0.00050 |
| Sodium (total) | mg/L | NG | 11.8 | 11.1 | 12.3 |
| Strontium (total) | mg/L | 7.0 ^{1.8} | 0.264 | 0.254 | |
| Uranium (total) | mg/L | 0.02 | 0.00259 | 0.00233 | 0.00251 |
| Zinc (total) | mg/L | NG | <0.0040 | <0.0040 | <0.0040 |

See Guideline Notes in Section 6.3.4

Table 10: Okanagan Lake Total Metals 2021 to 2023

6.3.4. Guideline 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.

7. 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.

7.1. 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.

On May 3rd, a *Water Quality Advisory* for Okanagan Lake intake turbidity greater than 1 NTU (a "FAIR" rating) was issued for the Upper Zone of Sage Mesa (the Lower Zone remained on the permanent Boil Water Notice, see next section). The WQA was upgraded to *Boil Water Notice* on May 11th, in response to Okanagan Lake turbidity greater than 5NTU. July 6th when Lake turbidity levels were consistently below 1 NTU (a "GOOD" rating). On May 31st, the BWN was downgraded to a WQA in response to lower intake turbidity levels. The WQA was rescinded on June 26th after intake turbidity levels were consistently below 1 NTU.

7.2. Boil Water Notices (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.

A permanent Boil Water Notice (BWN) was issued in 2019 for the Lower Zone of the Sage Mesa system which remained in effect for 2023. This BWN is in response to insufficient contact time between the added chlorine and the source water from Okanagan Lake before the water reaches the first customers in the Lower portion of the system. With insufficient contact time there is the potential for inadequate pathogen reduction in the water supplied to the properties in the Lower Zone year round. This BWN will remain in effect until the appropriate engineered upgrades are in place to meet the provincial *Drinking Water Treatment Objectives for Surface Water*. Permanent metal *Boil Water Notice* signs with high visibility post covers are in place year round at the entrances to the Lower Zone.

7.3. 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.

7.4. 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.

8. Program Updates and Status

8.1. Capital Works

No capital works were completed in 2023.

8.2. Emergency Response Plan

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

8.3. Water Quality Monitoring Program

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

8.4. Future System Upgrades

In 2020 both the Upper and Lower water storage reservoirs were inspected by a structural engineer. Both reservoirs are showing signs of deteriorating structural integrity with the Upper Reservoir showing more pronounced deterioration. As a result, access to both reservoirs is not permitted at this time. The RDOS continued work in 2023 with the Province and engineering consultants to determine the best plan for addressing the concerns identified in the structural engineer's report.

In addition, work continued between the Province, the water system owner and the RDOS on planning for upgrading the Sage Mesa water system to meet the provincial *Drinking Water Treatment Objectives for Surface Water*.

8.5. System Maintenance/Upgrades

In April, 2023 a new 4 inch (100mm) surge relief valve was installed at the Booster Station to replace the existing valve which had failed.

On June 26, 2023 the 2 inch (50mm) PVC main on Forsyth Dr. was repaired after a small leak was discovered.

Complaints of pressure surging were reported in 2023 from portions of the Upper Zone. An investigation is ongoing to determine the cause of the surging.

In 2023 the online turbidimeter at the Lake Pump Station frequently encountered elevated readings. After taking corresponding readings with a portable turbidimeter it was found that the online values were not accurate at times. It was determined small air bubbles entering the sensing chamber were the cause of the elevated online turbidity readings. A stilling chamber was installed upstream of the turbidimeter in an attempt to release some of the air before entering the turbidimeter. The supply line to the turbidimeter was also upsized. These changes appear to have provided improved readings, however, ongoing monitoring of this issue will continue.

On October 4, 2023 a new water meter and vault was installed to the golf course at 3415 Pine Hill Rd.

9. Summary

All tested source water parameters from the Okanagan Lake supplying the Sage Mesa water system met the applicable criteria with the exception of turbidity which resulted in both a *Water Quality Advisory* and *Boil Water Notice* being issued for the Upper Zone. The Lower Zone remained on a permanent *Boil Water Notice* due to insufficient chlorine contact time. The RDOS continues to work with the *Ministry of Water, Land and Resource Stewardship* on reviewing and upgrading the various programs that support facilitating the highest quality of water possible.