

Town of
Oliver

CANADA'S WINE CAPITAL 

2023 Annual Water Report

EXECUTIVE SUMMARY

The Town of Oliver (Town) operates an extensive Municipal and Rural water system that consists of seven ground water well sites, a surface water source, and six reservoirs. The water system covers the Town itself and a substantial portion of area 'C' of the Regional District of Okanagan-Similkameen. The Town provides domestic water to approximately 2,408 residential and 174 commercial/ industrial connections, which all have water meters to record consumption. Irrigation water is also provided to 591 connections irrigating approximately 5,200 acres of farmland with 1,025 acres of that pumping their own water from the Town's irrigation canal, excluding 455 acres of non-agricultural land that is also irrigated from this system.

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1.0 INTRODUCTION

The *British Columbia Drinking Water Protection Act* requires that each municipal government that supplies or distributes domestic drinking water must provide a water quality report that is reviewed by the local Drinking Water Officer (Interior Health Authority) and published for public access. This report has been prepared for the community of the Town and in accordance with the requirement in the *Drinking Water Protection Act*.

1.1 HISTORY

In 1918, the Provincial Government, led by “Honest John Oliver”, the Premier at that time, purchased over 22,000 acres of land in the South Okanagan to develop an irrigation canal system to convert 8,000 acres of desert land on each side of the Okanagan River into viable agricultural land. This land would then be for sale, at a reasonable cost, designated to the soldiers returning from World War I. This land arrangement was known as the “The Soldiers’ Land Act.” This project then became SOLP (South Okanagan Lands Project)

Construction of the irrigation system, including the intake dam at the base of McIntyre Bluff, began in 1918. Over the next seven years, the canal, known as “The Ditch”, had an overall length of approximately 40 concrete-lined kilometres measuring 5.6m across the top, and 1.5m deep, delivering 6.5m³ of water per second. The SOLP designed the canal to transport irrigation water from one side of the Valley to the other. To accomplish this, a 2.1m diameter siphon made out of wood stave pipe had to be built underground, which ran approximately 590m long directly beneath the center of Oliver, connecting the north and south parts of the canal.

Over the next forty years, the canal was maintained and run by the provincial government employees (SOLP) until the spring of 1964, as the province decided it was removing itself from the irrigation business. Premier W.A.C. Bennet passed the canal to the Oliver and Osoyoos Fruit Growers’ Association, which volunteered itself to become the cornerstone of the South Okanagan Lands and Irrigation District (SOLID). The district operated and maintained the canal system until 1989 when it was divided into two municipal governments: the Town of Oliver “Town” and the Town of Osoyoos. The Town was given the responsibility to maintain and operate the canal, which is still a major contributor to the rest of the 100 billion liters of water that Town and Osoyoos delivers annually to the parched desert area of the valley.

Today, the Town provides domestic water to approximately 2,408 residential (including rural), and 174 commercial and industrial connections. Irrigation water is provided to 591

connections, irrigating approximately 5,200 acres of farmland with 1,025 acres of that pumping their own water from the Town's irrigation canal. 455 acres of non-farm land is also irrigated from this system. The change in the non-farm arable area from previous years is due to a change in the new Water Regulations Bylaw 1351 where customers previously received a half acre with the payment of their parcel tax.

2.0 WATER SYSTEM OVERVIEW

The Town's water system is broken down into seven individual systems, which over time have been inter-connected to provide a more sustainable water supply system as a whole. Each system is defined, or known by, the area and the wells that support it:

(Please See Appendix A: Town of Oliver Water System Map)

- System 1 – also referred to as Rural North – Buchanan Road Pumphouse
- System 2 & 2B – Black Sage Area – Black Sage and Miller Road Pumphouses
- Municipal System – also referred to as System 3 – Rockcliffe and Tucelnuit Pumphouses
- System 4 - 7 – also referred to as Rural South – Fairview and Miller Road 13 Pumphouses

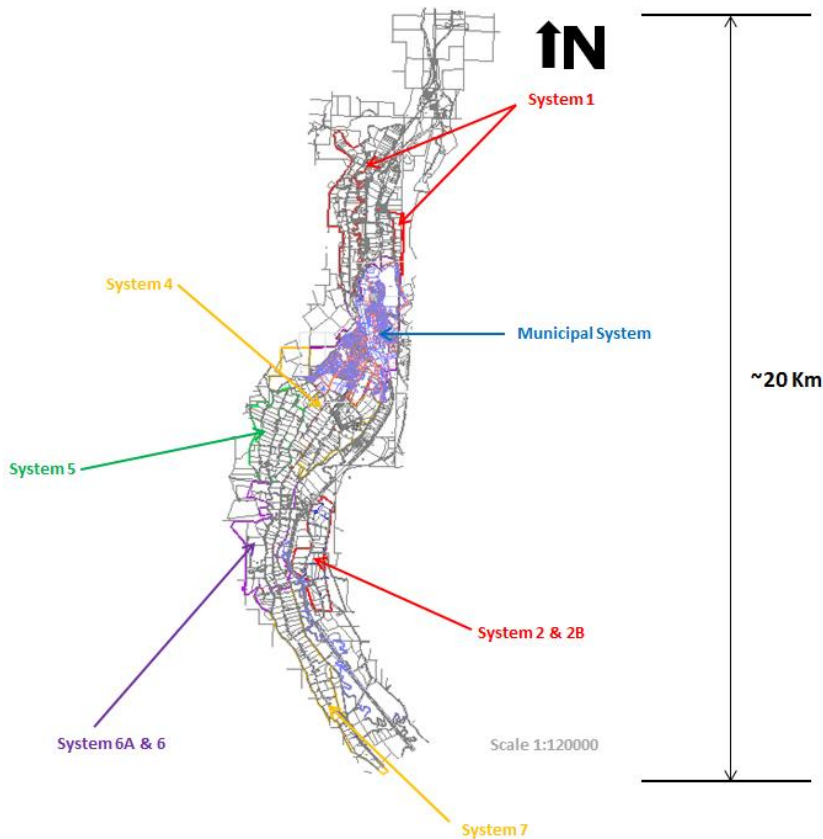


Figure 1: Town of Oliver's 7 Water System Overview

As of 2014, the Town uses groundwater for all of its domestic water connections. Therefore, the canal surface water system is providing irrigation only, with the addition of low-pressure users who pump out of the canal using their own private pump houses. Each system is twinned except for System 2 (Black Sage). This system is groundwater only, and there are no current plans to complete the twinning of System 2.

As part of the water distribution system, the Town maintains approximately 143 kilometres of water main. The distribution system consists of Asbestos Concrete (AC), Polyvinyl Chloride (PVC), Cast Iron (CI), and High-Density Polyethylene (HDPE) material, with pipe sizes ranging from 50mm to 600mm in diameter.

The age of the water mains ranges from new to approximately 80 years old. The age of the pipe does not necessarily reflect the need to replace it as the various material types and installation conditions make for different average life expectancies. Normal operating pressures range from 60psi to 120psi for standard pressurized services.

2.1 DOMESTIC SYSTEM

The domestic water system storage capacity is 1,025,000 US gallons (US GAL) (3880 cubic metres (m³)) between four reservoirs. Existing Municipal reservoirs consist of a 360,000 US GAL (1360m³) reservoir and a newer (constructed in 2010) 500,000 US GAL (2470m³) reservoir. The other two reservoirs still in use are located in System 6 & 6A; Road 13 reservoir at 150,000 US gallons (568m³) and Hester Creek reservoir at 15,000 US gallons (57m³).

2.1.1 SYSTEM 1 DOMESTIC

System 1, also known as “Rural North,” supplies domestic water to approximately 168 accounts. System 1 has an irrigation main, and a domestic main that runs approximately 4.5km from the edge of town N. to the end of Sportsman Bowl Road. Buchanan pump station, which is located adjacent to 1748 Buchanan Road and near the east side of the Okanagan River, supplies both irrigation surface water to System 1 and domestic ground water to System 1 and into Municipal System 3. Buchanan pump station has one domestic ground water pump with a total 125 horsepower (hp) that has a pumping capacity of 1,000 gallons per minute (gpm).

2.1.2 SYSTEM 2 & 2B DOMESTIC

System 2, also known as “Black Sage” area, supplies domestic and irrigation water to approximately 53 accounts. System 2 is unique having been separated into two areas, System 2, and 2B. System 2B, along with every other system, is twinned. Whereas System 2 is the only system that does not have separate water sources for both irrigation and domestic water. System 2 and 2B have two domestic pump stations within its boundary, Black Sage pump station, and Miller Well pump station. The Black Sage pump station is located approximately 154m W. from Ryegrass Road between Miller Road and Watters Road. The Black Sage well supplies groundwater to both domestic and irrigation services in System 2 and 2B utilizing three pumps with a total 240hp, and a pumping capacity of 2,600gpm. The Miller Well, located on the west end of Miller Road, approximately 67m E. of the Okanagan River, supplements up to 500gpm of domestic groundwater to System 2 and 2B during the peak demand season, along with Systems 4 thru 7, via Reservoir 13.

2.1.3 MUNICIPAL SYSTEM DOMESTIC

The Municipal System, also known as System 3, supplies domestic groundwater to approximately 2400 accounts. The Municipal System utilizes two pump stations, and one

booster station to supply its users within the Town boundary, Rockcliffe pump station, Tucelnuit pump station, and the Airport Booster station. Rockcliffe is located between the parcels of 781 and 715 Skagit Avenue. Rockcliffe has one pump at 150hp, and a pumping capacity of 1,500gpm. Tucelnuit pump station is located on the SE corner of Merlot Avenue, and Lakeside Drive, W of the Tucelnuit Elementary School. Tucelnuit utilizes two pumps having a total pumping capacity of 1,750gpm. The Airport Booster station is located on the NE corner of the intersection of Airport Street, and Road 1. The Airport Booster is typically set to supply water from within the Municipal boundaries to the rural area south but can also be used to intake water from the rural area south, and supply the Municipal System depending on demands or if there was a maintenance malfunction of another pump.

2.1.4 SYSTEM 4 - 7 DOMESTIC

System 4 - 7, also known as "Rural South," supplies domestic ground water to approximately 523 accounts. The Systems utilizes the Miller Well pump station, 6A Domestic Booster station, and the Airport Booster station. Miller Well pump station also aids in a supplement supply of domestic groundwater to System 2 during peak demands, and the Road 13 Reservoir. The Miller Well pump has 125hp, and a pumping capacity of 1,000gpm. 6A Domestic Booster feeds Hester Creek Reservoir (6A), while the Airport Booster has the option to alternate between the Municipal System and Rural South to have a continuous loop in the system, and so that each pump is working in its most efficient phase.

2.2 IRRIGATION SYSTEM

Surface water, specifically the Okanagan River, is the primary source for the irrigation water system. The irrigation water also includes groundwater sources from Buchannan well, Fairview well and Black Sage oxbow. The surface water runs through a canal system from McIntyre Dam (where the diversion is complete with a fish screen to divert fish back to the Okanagan River) north of the Town to Road 18. From Road 18 the water is pumped south of the Town as a piped irrigation system and ends after Road 22. Black Sage oxbow supplies the irrigation system in System 2B, with the remainder of System 2 not twinned. The Town maintains multiple water licences to allow these surface water diversions. There are five additional irrigation pump stations along the canal: Mud Lake, Rockcliffe, Fairview, Hester Creek, and Mount Kobau.

Heavier creek flows of creeks during the years of 2017 & 2018 on the west side of the Okanagan valley had staff continual monitoring of; Hester, Tinhorn, Reid & Park Rill Creeks as the heavier flow could affect the irrigation system, such as the 2017 debris run-off into the

canal. During past years, staff spent extra time monitoring, periodically removing material from culvert inlets and outlets that could potentially damage the Town's irrigation infrastructure.

2.2.1 SYSTEM 1 IRRIGATION

System 1 utilizes two pump stations for its irrigation supply, Mud Lake, and Buchanan. Mud Lake pump station intakes water from the canal utilizing two pump units at a combined 200hp, and having a pumping capacity of 5,000gpm. Mud Lake is located 90m W of Buchanan Drive. Buchanan is a ground water supplied irrigation station with a single 50hp pump and has a capacity of 500gpm. System 1 covers 420 acres of agriculture that is pressure irrigated, excluding low-pressure users in the area.

2.2.2 SYSTEM 2 & 2B IRRIGATION

As mentioned earlier, System 2 is the only system that is not twinned, having pumps that supply groundwater for both domestic and irrigation uses with a combined 240hp, and having a pumping capacity of 2,600gpm. However, System 2B has its own irrigation pump which is called Black Sage Irrigation pump that intakes from the Black Sage oxbow located 65m S of Road #9, and 100m E of the Okanagan River. This pump has 150hp with a capacity of 1,540gpm. System 2 and 2B provide pressurized irrigation water to approximately 405 acres of agriculture land.

2.2.3 SYSTEM 4-7 IRRIGATION

The second canal pump station is Rockcliffe Irrigation in System 4. This station utilizes three pumps having a combined 500hp, and a pump capacity of 9,100gpm. Rockcliffe supplies pressurized irrigation to approximately 916 acres of agriculture. This pump station is located between the properties of 824 and 760 of Road 2. System 4 also includes a 25,000 US GAL (94m³) irrigation water reservoir, called System 4 Irrigation Reservoir.

The third canal pump station along the system is Fairview Irrigation pump station, which is located in System 5 on the NE corner of Road 5 and the canal intersection. Fairview utilizes two pumping units with a combined horsepower of 300hp, and having a pumping capacity of 4,400gpm. Fairview Irrigation supplies pressurized irrigation to approximately 467 acres. Another Fairview Irrigation well in System 5, which used to be part of the domestic water system, was changed over to supply the irrigation system when the nitrate levels exceeded the Canadian Drinking Water Standards. Its primary use now is to supply water in the

shoulder seasons or low demand portions in the irrigation year, but it can also help supplement peak demands. System 5 includes a 50,000 US GAL (189m³) irrigation water reservoir, called Fairview Irrigation Reservoir.

Hester Creek Irrigation pump station located in System 6 at the NE corner of the West end of Road 11 and the canal intersection. Hester Creek pump station utilizes two pumping units having a combined horsepower of 175hp, and a pumping capacity of 4,000gpm. Hester Creek Irrigation pump station delivers pressurized irrigation to approximately 426 acres of land. System 6 also contains a booster pump station that has two 15hp pumps and is utilized during the peak season.

Mt Kobau Irrigation pump station is the most southern in the water system, in System 7, located at the west end of Road 18. Mt Kobau has two pumping units that have a combined total of 150hp, with a capacity of 4,000gpm. Mt Kobau provides pressurized irrigation to approximately 545 acres of land.

3.0 WATER QUALITY, SAMPLING, AND MONITORING PROGRAM

In the past the Town utilized two sources of water, surface water (Okanagan River) and groundwater (well water); the surface water is now restricted to irrigation water only. Groundwater is now the **only source** of water used for domestic purposes, and the only source that is **thoroughly monitored** and sampled for quality purposes.

3.1 SAMPLING AND MONITORING

The Town works closely with CARO Analytical Services out of Kelowna, BC to monitor drinking water quality in accordance with the *BC Drinking Water Protection Act*, and *Guidelines for Canadian Drinking Water Quality (GCDWQ)*. The Town's staff submits weekly samples from various sampling sites throughout the domestic system for bacteriological testing for Total Coliforms, and E-Coli Bacteria. In conjunction with these submittals, the Town also conducts their own in-house 'presence/absence' tests. The Town also monitors the Nitrate levels in the drinking water sampling six times a year in February, April, June, August, October, and December. In 2024, the Town was requested by Interior Health Authority to increase sampling, including test stations, wells sites and start sampling for Trihalomethanes "THMs"

and Haloacetic Acids “HAAs”. Once a year, the Town commences a full spectrum test on the domestic water system. The full spectrum analyzes all physical parameters and characteristics of the Town’s drinking water. The water results are then compared to the *GCDWQ* to ensure compliance.

- *(Please See Appendix A: The Town of Oliver Water System Map for Sampling Sites)*
- *(Please See Appendix B: 2023 Full Spectrum Results and GCDWQ)*
- *(Please See Appendix C: 2023 Weekly Water Sampling Result Table)*
- *(Please See Appendix D: 2023 THMs and HAAs Sampling Result Table)*

There are seven test stations located in the Municipal boundaries. The Rural Area north of Town has one test station and there are six testing sites (excluding wells) south of Town. When any sample result shows the presence of Total Coliform or E-Coli, the Interior Health Environmental Health Officer is consulted, standard protocols are initiated with a flushing of the contaminated system and resampling of water where contamination was located. Resampling occurs immediately for lab testing and in-house ‘presence/absence’ samples are also taken to identify coliforms.

In August, The Town had one sample come back positive for coliforms then the Town sampled and did in house testing following the positive result. The tests came back negative for coliforms.

4.0 WATER CONSUMPTION

4.1 TOTAL CONSUMPTION

The water works system is twinned in Oliver which means that the groundwater used for domestic purposes and surface water is used for irrigation purposes, each having their own piping system. System 2 is not twinned, as it uses groundwater for both irrigation and domestic purposes. The Town of Oliver consumed 2,863,373,288 US GAL of water in 2023. That is 10,839,046,986 liters (L) of water or 10,839,047 m³ of water.

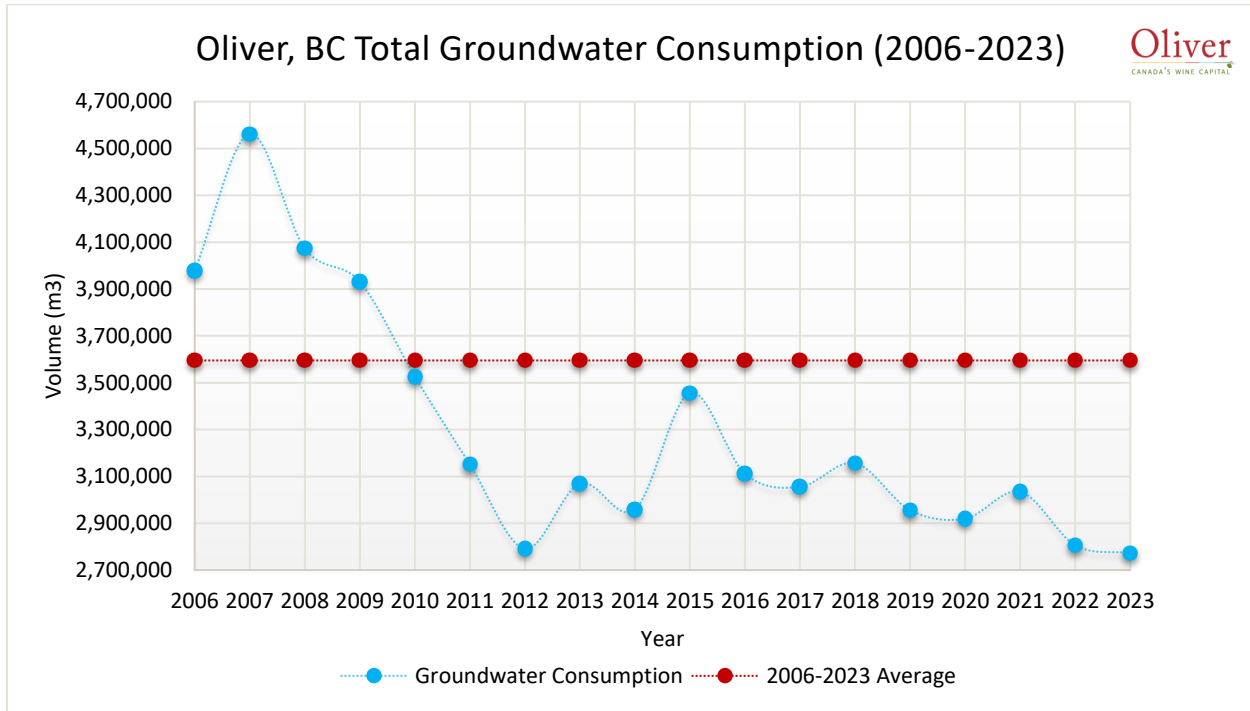


Figure 2: Total Water Consumption 17 Year Trend

As shown in *Figure 2*, the Town consumed 7.59% less water than the previous year (2022). The seventeen-year average is 3,165,451,968 US GAL. In 2023, the Town consumed 10% less than the seventeen-year average. Water demand is influenced by population and irrigation usage, population has been slightly increasing each year in the Town and surrounding area. The 2021 Census reported the Town’s population as 5,094, however, the Town’s water system extends beyond its borders making it difficult to define how many people it serves; it is estimated to be over 6,000 people.

Irrigation technology has seen improvements over the years for ground crops, orchards, and vineyards; this has had a significant change on the water demand and peak demand decreases. Irrigation practices and water conservation through these practices have been the major influence on the change in water demand; this includes the final twinning stages of the water system in 2014. The other major contributing factor for irrigating is weather and precipitation. In 2021, The South Okanagan reached drought level 4, by the government of BC. In 2015, The South Okanagan reached drought level 4, by the government of BC. In 2016, the South Okanagan did not reach a drought level 4, instead it had a normal snowpack season, and was considered a “dry” year, but did not see the same level of drought as 2015. In 2017, above normal snowpack and late winter/early spring precipitation caused unsuspected flooding throughout the region. In 2018, the Okanagan was in a valley wide emergency state due to flooding again. The snowpack in March was 6% above normal, and April came along

with high temperatures, with limited precipitation. In 2023, the province declared a level 5 drought condition for the Okanagan. The Town of Oliver declared stage 2 drought conditions and was rescinded in October. Agriculture development over the years has changed the lay of the land and the natural watercourses, causing the spring runoff to flow through vineyards and orchards damaging crops. The spring flooding caused the Town's agriculture season to be a wet one, and the large amount of precipitation influenced the irrigation demand. The Town's maximum residential domestic water demand was on July 21, 2023. See Figure 3. The Town had a maximum daily water demand peak of 19311.00 m³ on June 6, 2023, while minimum daily demand occurred on January 24, 2023, of 1996.50 m³.

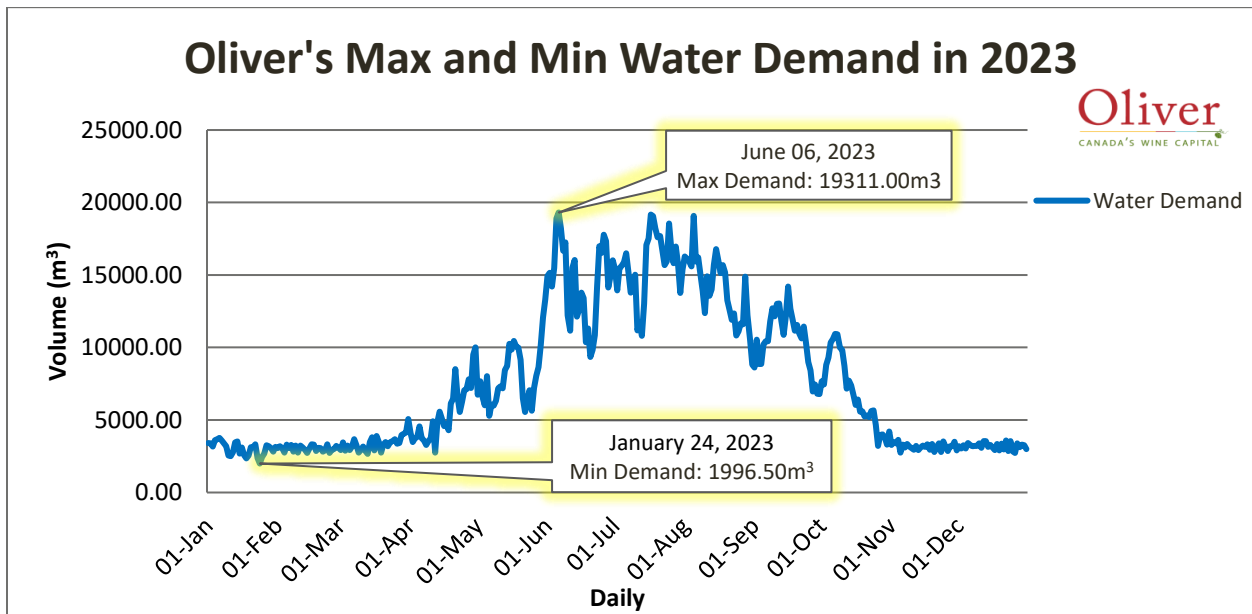


Figure 3: Oliver's 2023 Max and Min Domestic Water Demand

4.2 BREAKDOWN OF CONSUMPTION

The Town consumed 732,550,775 US GAL (2,773,006m³, 2,773,006,336L) of groundwater in 2023. This amount is 25.58% of the total consumption. The remaining 74.42% is surface water, primarily used for irrigation, having a total consumption of 2,130,822,513 US GAL (8,066,041m³, 8,066,040,650L). See Table 1 below for the breakdown of percentages.

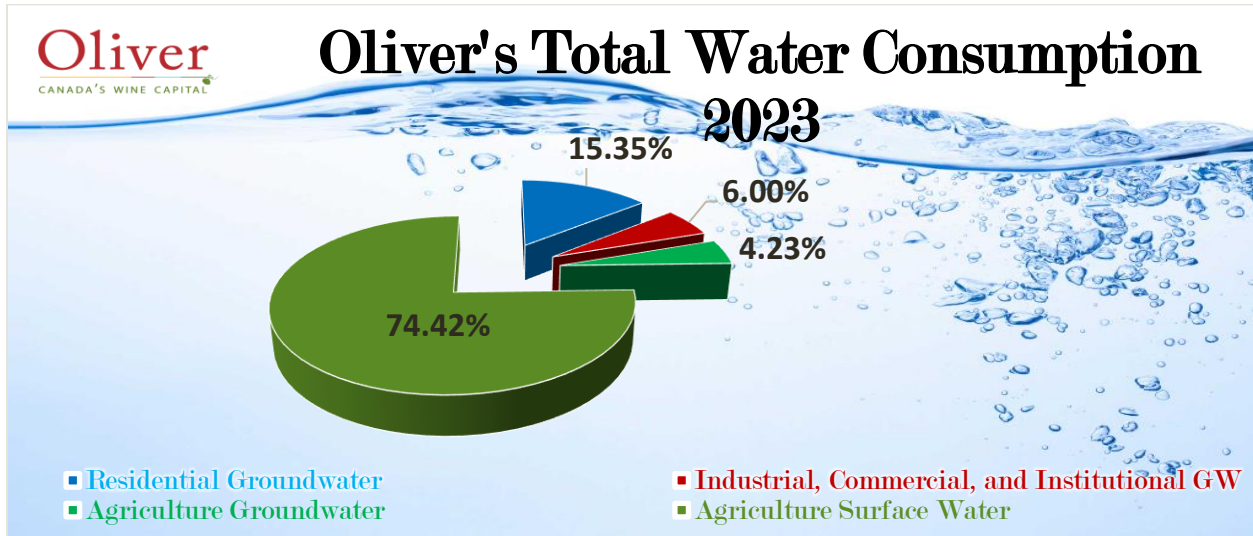


Figure 4: Oliver's Total Water Consumption 2023

4.3 WATER CONSERVATION

The Town works closely with the OBWB, and its *Okanagan Water Wise* program called “Make Water Work”, to spread a valley wide awareness on water conservation in the Okanagan. The program acts as a campaign where residents take water conservation survey pledges. OBWB will bring awareness in 2023 with more Radio Ads, Facebook Ads, Billboards, other social media support, yard signs, posters, and magnets linking the Make Water Work website www.makewaterwork.ca.

5.0 STAFF

According to EOCP (Environmental Operator Certification Program), the Town’s Water Distribution System is classified as Class III. In 2023 the Town’s operations has four certified Water Distribution Operators on staff; two Level I, one Level II, and one Level III.

The Town is also classified as a Level I Water Treatment facility (at multiple locations). We currently have five Operators with Level I, one with level II and one working on receiving their Level I.

All Operators are required to keep up with their education and to maintain 2.4 certified education units (CEU’s) every two years, monitored by the EOCP. Various accredited courses were put on at the Town regarding safe work practices.

6.0 CAPITAL PROJECTS AND IMPROVEMENTS

6.1 PROJECTS COMPLETED IN 2023

The Town continues to make minor and major improvements to the Town's water system every year and works with the Interior Health Authority (IHA) to prioritize some of these goals. Here are the main projects that were completed or started in 2023:

Canal Lining Rehabilitation

- Town staff worked with contractors to overlay 260 m section of existing irrigation canal floor and walls located next to the Mudlake Spillway and south towards Mudlake Pumphouse. The work was completed in time for the early April canal diversion fill.

Blacksage domestic well investigation

- Two new depth well probes were installed.
- Well casing inspected by CCTV.
- Pump #1 was removed, and full servicing is being conducted in 2024.
- Flow capacity test was completed on pump #1.

Fairview irrigation pumphouse

- New Programmable Logic Controller was installed.

Canal irrigation algae control program

- Program started in 2023, to reduce amounts of algae.
- Shade cloth was installed on temporary bases.
- Manual labour shift work was established.
- Design of new irrigation pump house intake screens.

6.2 CONTINUING PROJECTS INTO 2024

Water Meter Replacements

- This project started in 2020 and scheduled for several years in order to complete some necessary change outs. The water meters are coming to the end of their useful life and our Finance Department is looking at upgrading to new replacement meters that have less moving parts, are less susceptible to any damages and have longer battery life.

Explore pump house location & testing

- The Town will research data and look at the current capacity of our domestic water system. If future capacity is required, the Town will start looking for new locations for a pumphouse and could undertake some drilling.

New Ionizer and intake screens

- New ionizer and intake screens for the canal.

Black Sage winter domestic 6" chlorine contact line

- This project is required to provide treatment for domestic water for Black Sage pumphouse when not using irrigation demands during the winter season.

Tuc el nuit pumphouse HVAC and chlorine pumps

- HVAC unit for Tucelnuit pump house # 2 & 3 and chlorine pumps

Diversion new flow meter

- Installation of a replacement flow control meter at the start of the canal

New 16" main line isolation valve

- New 16" isolation valve to be installed at Hester Creek Irrigation pump house.

Water reservoir feed line relining

- Spray a new polyurea liner in the reservoir feed lines from the reservoir valve chamber all the way to Station Street.

Co-op Avenue

- Install new watermain, upsizing as required.

Rockcliffe Domestic Pumphouse

- VFD and soft start additions

SCADA & PLCs

- SCADA upgrades to the entire system with new PLCs.

6.3 LONG TERM IMPROVEMENT PLANS

The Town has a 5-year budgeted capital plan for known upgrades and new infrastructure and/or projects. These projects include canal rehabilitation on an annual basis:

Projects for 2025

- Water Meter Replacements Continued
- Fairview Irrigation New Flow Meter
- New 12" Isolation Valve at Park Rill System#1
- New Main Line Isolation 18" Valve Kabou Road 18
- Proposed Domestic Pump Station Design, Domestic Well Testing and Report
- Hydrant replacement yearly
- Main Street – Veterans Avenue to School Avenue
- Similkameen Avenue – Fairview Road to Airport Street
- Canal Lining Rehabilitation Continued
- Booster Station SCADA (6A)
- New SCADA and PLC's for system Continued

2026

- Water Meter Replacements Continued
- Canal Lining Rehabilitation Continued
- Water reservoir feed line 2 relining
- Hydrant replacement yearly
- Domestic Pump Station
- Domestic Pump Station Loop Lines
- Pacific Silica River Crossing
- Earl Crescent Water Relining
- Rockcliffe Irrigation VFD/Soft Starts electrical upgrade/HVAC/Flow Meter/New MCC
- New SCADA and PLC's for system Continued

2027

- Water Meter Replacements Continued
- Canal Lining Rehabilitation Continued
- Station Street – Fairview Rd to Co-op Ave
- Hydrant replacement yearly
- Rockcliffe Irrigation VFD/Sof Starts electrical upgrade/HVAC/Flow Meter/New MCC
- Water reservoir feed line 2
- River Crossing Park Drive and Fairview Road
- Kootenay Street

2028

- Canal Lining Rehabilitation Continued
- Raw waterline investigation
- Sawmill Road Rehabilitation
- Hydrant replacement yearly
- Sawmill Road Rehabilitation
- Okanagan Street – Co-op Ave to Haven St.
- Okanagan Street – Similkameen Avenue to Skagit Avenue
- Laneway between Main Street and Okanagan Street

2029

- Water Meter Replacements Continued
- Canal Lining Rehabilitation Continued
- Hydrant replacement yearly
- Mud Lake Irrigation VFD/Soft Starts Electrical Upgrade
- Black Sage River Crossing
- Canal – Modify turnouts
- Canal – Upgrade trash racks
- Canal Solar Panel – Mud Lake Pumphouse

7.0 EMERGENCY RESPONSE PLAN

The Town has an *Emergency Response Plan* pertaining to any natural disaster, and the water system. The *Emergency Response Plan* identifies a number of potential emergencies that could occur and provides a systematic approach on how the Town will respond to the emergency.

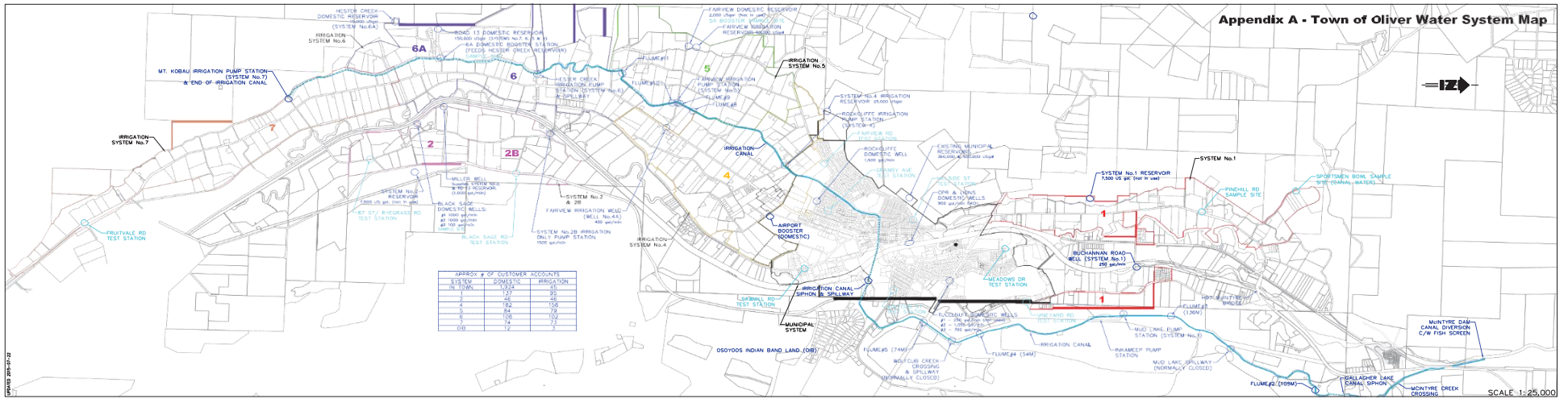
8.0 CROSS CONNECTION CONTROL PROGRAM

Cross connection is an actual or potential connection between a potable water supply and a non-potable source, where it is possible for a contaminant to enter the drinking water supply. The Town’s Cross Connection Control Program continues to work towards addressing the potential for the water system to be compromised by service connections, which could introduce contaminated water into the domestic water system. The program is used to monitor Backflow devices and cross connections through the FAST Program (Facility Assessment & Survey Technology) and is administered by FAST employees. The Cross Connection Program focuses on premise isolation for commercial and industrial customers. In 2023, there were 354 testable backflow assemblies in service (including agricultural devices) being tracked.

9.0 CONCLUSION

The Town works hard to maintain water quality and quantity for their residents as well as numerous customers in the Regional District of Okanagan Similkameen Area 'C'. Efforts are made to ensure appropriate water usage and to educate the public whenever possible. Without these ongoing efforts, the area would not be the robust agricultural community that it is today. If you have any comments regarding this report or other information that you would like to see included, please email works@oliver.ca or request a customer concern form at the Town Hall.

APPENDIX A: THE TOWN OF OLIVER WATER SYSTEM MAP FOR SAMPLING SITES



APPENDIX B: 2023 FULL SPECTRUM

CERTIFICATE OF ANALYSIS

REPORTED TO Oliver, Town of
5971 Sawmill Road, PO Box 638
Oliver, BC V0H 1T0

ATTENTION Shannon Grata

PO NUMBER 49087

PROJECT Full Spectrum Analysis

PROJECT INFO A.1.

WORK ORDER 23H1992

RECEIVED / TEMP 2023-08-15 09:15 / 17.0°C

REPORTED 2023-08-22 10:47

COC NUMBER No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: <https://www.caro.ca/terms-conditions>

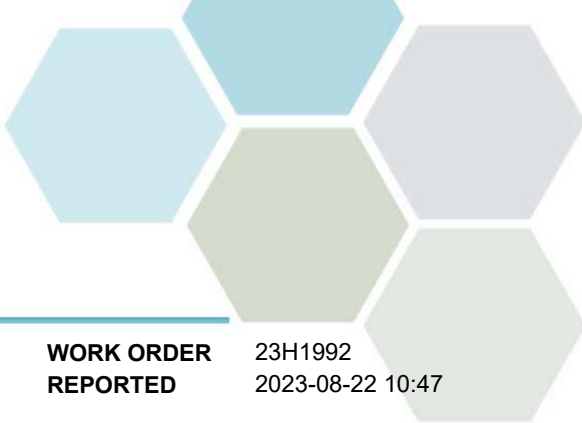
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

1-888-311-8846 | www.caro.ca

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

REPORTED TO PROJECT Oliver, Town of
Full Spectrum Analysis

WORK ORDER REPORTED 23H1992
2023-08-22 10:47

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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Rockcliff Pump Stn (23H1992-01) | Matrix: Water | Sampled: 2023-08-14 10:15

Anions

Chloride	39.0	AO ≤ 250	0.10 mg/L	2023-08-16	
Fluoride	0.35	MAC = 1.5	0.10 mg/L	2023-08-16	
Nitrate (as N)	4.36	MAC = 10	0.010 mg/L	2023-08-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010 mg/L	2023-08-16	
Sulfate	74.8	AO ≤ 500	1.0 mg/L	2023-08-16	

Calculated Parameters

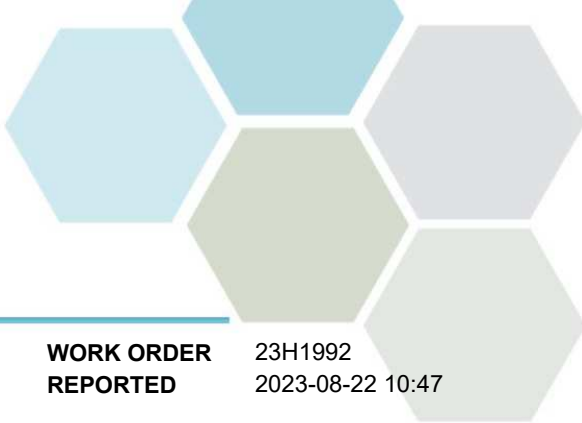
Hardness, Total (as CaCO3)	348	None Required	0.500 mg/L	N/A	
Nitrate+Nitrite (as N)	4.36	N/A	0.0100 mg/L	N/A	

General Parameters

Alkalinity, Total (as CaCO3)	275	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Bicarbonate (as CaCO3)	275	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2023-08-18	
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2023-08-15	
Conductivity (EC)	730	N/A	2.0 µS/cm	2023-08-18	
pH	7.97	7.0-10.5	0.10 pH units	2023-08-18	HT2
Solids, Total Dissolved	460	AO ≤ 500	15 mg/L	2023-08-17	
Turbidity	< 0.10	OG < 1	0.10 NTU	2023-08-16	

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050 mg/L	2023-08-19	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2023-08-19	
Arsenic, total	0.00137	MAC = 0.01	0.00050 mg/L	2023-08-19	
Barium, total	0.0673	MAC = 2	0.0050 mg/L	2023-08-19	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Boron, total	0.0744	MAC = 5	0.0500 mg/L	2023-08-19	
Cadmium, total	0.000010	MAC = 0.007	0.000010 mg/L	2023-08-19	
Calcium, total	95.9	None Required	0.20 mg/L	2023-08-19	
Chromium, total	0.00068	MAC = 0.05	0.00050 mg/L	2023-08-19	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Copper, total	0.00204	MAC = 2	0.00040 mg/L	2023-08-19	
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2023-08-19	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2023-08-19	
Lithium, total	0.00977	N/A	0.00010 mg/L	2023-08-19	
Magnesium, total	26.3	None Required	0.010 mg/L	2023-08-19	
Manganese, total	< 0.00020	MAC = 0.12	0.00020 mg/L	2023-08-19	
Molybdenum, total	0.00550	N/A	0.00010 mg/L	2023-08-19	
Nickel, total	0.00053	N/A	0.00040 mg/L	2023-08-19	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2023-08-19	
Potassium, total	6.07	N/A	0.10 mg/L	2023-08-19	



TEST RESULTS

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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Rockcliff Pump Stn (23H1992-01) Matrix: Water Sampled: 2023-08-14 10:15, Continued						
<i>Total Metals, Continued</i>						
Selenium, total	0.00346	MAC = 0.05	0.00050	mg/L	2023-08-19	
Silicon, total	9.4	N/A	1.0	mg/L	2023-08-19	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-08-19	
Sodium, total	23.9	AO ≤ 200	0.10	mg/L	2023-08-19	
Strontium, total	1.03	MAC = 7	0.0010	mg/L	2023-08-19	
Sulfur, total	26.0	N/A	3.0	mg/L	2023-08-19	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-08-19	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-08-19	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2023-08-19	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2023-08-19	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-08-19	
Uranium, total	0.0143	MAC = 0.02	0.000020	mg/L	2023-08-19	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-08-19	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2023-08-19	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	

Tucelnuit P2 (23H1992-02) | Matrix: Water | Sampled: 2023-08-14 10:30

Anions

Chloride	4.40	AO ≤ 250	0.10	mg/L	2023-08-16	
Fluoride	0.42	MAC = 1.5	0.10	mg/L	2023-08-16	
Nitrate (as N)	0.058	MAC = 10	0.010	mg/L	2023-08-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-08-16	
Sulfate	31.8	AO ≤ 500	1.0	mg/L	2023-08-16	

Calculated Parameters

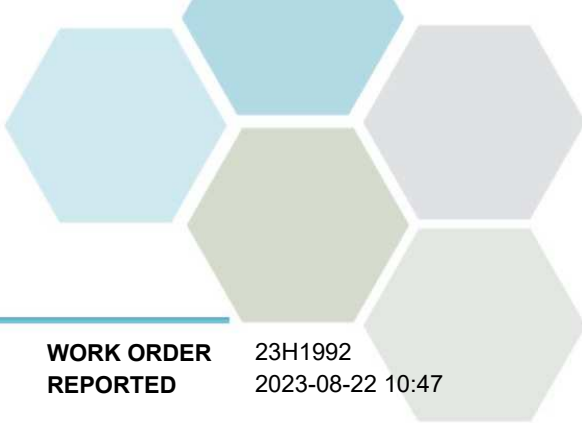
Hardness, Total (as CaCO3)	163	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0584	N/A	0.0100	mg/L	N/A	

General Parameters

Alkalinity, Total (as CaCO3)	168	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Bicarbonate (as CaCO3)	168	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2023-08-15	
Conductivity (EC)	333	N/A	2.0	µS/cm	2023-08-18	
pH	8.11	7.0-10.5	0.10	pH units	2023-08-18	HT2
Solids, Total Dissolved	209	AO ≤ 500	15	mg/L	2023-08-17	
Turbidity	1.01	OG < 1	0.10	NTU	2023-08-16	

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-08-19	
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TEST RESULTS

REPORTED TO PROJECT Oliver, Town of
Full Spectrum Analysis

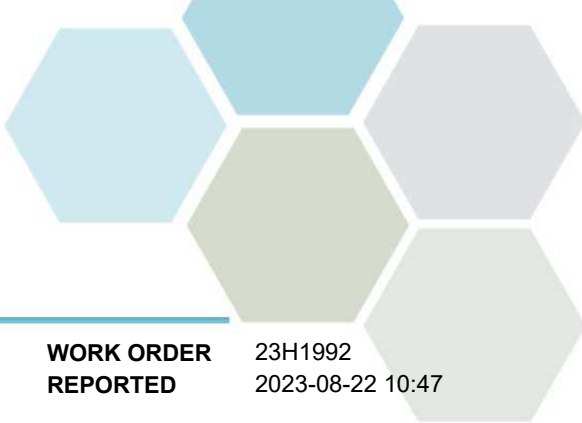
WORK ORDER REPORTED 23H1992
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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Tucelnuit P2 (23H1992-02) Matrix: Water Sampled: 2023-08-14 10:30, Continued						
<i>Total Metals, Continued</i>						
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-08-19	
Arsenic, total	0.00315	MAC = 0.01	0.00050	mg/L	2023-08-19	
Barium, total	0.0469	MAC = 2	0.0050	mg/L	2023-08-19	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-08-19	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010	mg/L	2023-08-19	
Calcium, total	45.3	None Required	0.20	mg/L	2023-08-19	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-08-19	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Copper, total	0.00366	MAC = 2	0.00040	mg/L	2023-08-19	
Iron, total	0.077	AO ≤ 0.3	0.010	mg/L	2023-08-19	
Lead, total	0.00047	MAC = 0.005	0.00020	mg/L	2023-08-19	
Lithium, total	0.00565	N/A	0.00010	mg/L	2023-08-19	
Magnesium, total	12.0	None Required	0.010	mg/L	2023-08-19	
Manganese, total	0.00251	MAC = 0.12	0.00020	mg/L	2023-08-19	
Molybdenum, total	0.00411	N/A	0.00010	mg/L	2023-08-19	
Nickel, total	0.00045	N/A	0.00040	mg/L	2023-08-19	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-08-19	
Potassium, total	3.24	N/A	0.10	mg/L	2023-08-19	
Selenium, total	0.00147	MAC = 0.05	0.00050	mg/L	2023-08-19	
Silicon, total	9.7	N/A	1.0	mg/L	2023-08-19	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-08-19	
Sodium, total	12.3	AO ≤ 200	0.10	mg/L	2023-08-19	
Strontium, total	0.519	MAC = 7	0.0010	mg/L	2023-08-19	
Sulfur, total	9.9	N/A	3.0	mg/L	2023-08-19	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-08-19	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-08-19	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2023-08-19	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2023-08-19	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-08-19	
Uranium, total	0.00281	MAC = 0.02	0.000020	mg/L	2023-08-19	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-08-19	
Zinc, total	0.0088	AO ≤ 5	0.0040	mg/L	2023-08-19	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	

Black Sage (23H1992-03) | Matrix: Water | Sampled: 2023-08-14 11:30

Anions

Chloride	9.27	AO ≤ 250	0.10	mg/L	2023-08-16	
Fluoride	0.24	MAC = 1.5	0.10	mg/L	2023-08-16	
Nitrate (as N)	0.766	MAC = 10	0.010	mg/L	2023-08-16	



TEST RESULTS

REPORTED TO PROJECT Oliver, Town of
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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Black Sage (23H1992-03) | Matrix: Water | Sampled: 2023-08-14 11:30, Continued

Anions, Continued

Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-08-16	
Sulfate	45.5	AO ≤ 500	1.0	mg/L	2023-08-16	

Calculated Parameters

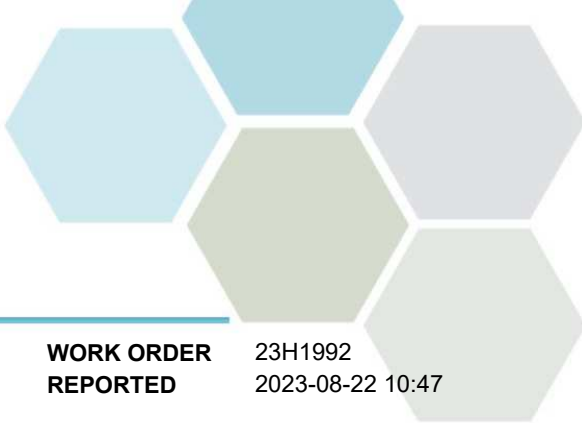
Hardness, Total (as CaCO3)	193	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.766	N/A	0.0100	mg/L	N/A	

General Parameters

Alkalinity, Total (as CaCO3)	174	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Bicarbonate (as CaCO3)	174	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2023-08-15	
Conductivity (EC)	397	N/A	2.0	µS/cm	2023-08-18	
pH	8.05	7.0-10.5	0.10	pH units	2023-08-18	HT2
Solids, Total Dissolved	247	AO ≤ 500	15	mg/L	2023-08-17	
Turbidity	0.24	OG < 1	0.10	NTU	2023-08-16	

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-08-19	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-08-19	
Arsenic, total	0.00087	MAC = 0.01	0.00050	mg/L	2023-08-19	
Barium, total	0.0425	MAC = 2	0.0050	mg/L	2023-08-19	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-08-19	
Cadmium, total	0.000026	MAC = 0.007	0.000010	mg/L	2023-08-19	
Calcium, total	51.7	None Required	0.20	mg/L	2023-08-19	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-08-19	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Copper, total	0.367	MAC = 2	0.00040	mg/L	2023-08-19	
Iron, total	0.031	AO ≤ 0.3	0.010	mg/L	2023-08-19	
Lead, total	0.00367	MAC = 0.005	0.00020	mg/L	2023-08-19	
Lithium, total	0.00558	N/A	0.00010	mg/L	2023-08-19	
Magnesium, total	15.6	None Required	0.010	mg/L	2023-08-19	
Manganese, total	0.0108	MAC = 0.12	0.00020	mg/L	2023-08-19	
Molybdenum, total	0.00428	N/A	0.00010	mg/L	2023-08-19	
Nickel, total	0.00050	N/A	0.00040	mg/L	2023-08-19	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-08-19	
Potassium, total	3.86	N/A	0.10	mg/L	2023-08-19	
Selenium, total	0.00056	MAC = 0.05	0.00050	mg/L	2023-08-19	
Silicon, total	7.2	N/A	1.0	mg/L	2023-08-19	
Silver, total	0.000131	None Required	0.000050	mg/L	2023-08-19	



TEST RESULTS

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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
Black Sage (23H1992-03) Matrix: Water Sampled: 2023-08-14 11:30, Continued					
<i>Total Metals, Continued</i>					
Sodium, total	14.6	AO ≤ 200	0.10 mg/L	2023-08-19	
Strontium, total	0.563	MAC = 7	0.0010 mg/L	2023-08-19	
Sulfur, total	15.0	N/A	3.0 mg/L	2023-08-19	
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2023-08-19	
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2023-08-19	
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Tin, total	0.00454	N/A	0.00020 mg/L	2023-08-19	
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2023-08-19	
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2023-08-19	
Uranium, total	0.00467	MAC = 0.02	0.000020 mg/L	2023-08-19	
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2023-08-19	
Zinc, total	0.0132	AO ≤ 5	0.0040 mg/L	2023-08-19	
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	

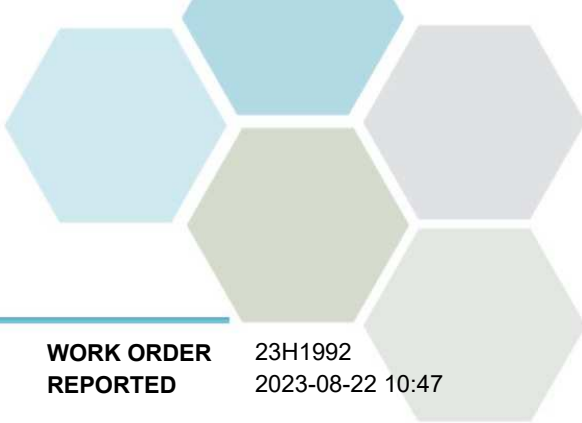
Buchanan (23H1992-04) | Matrix: Water | Sampled: 2023-08-14 10:27

<i>Anions</i>					
Chloride	5.35	AO ≤ 250	0.10 mg/L	2023-08-16	
Fluoride	0.19	MAC = 1.5	0.10 mg/L	2023-08-16	
Nitrate (as N)	< 0.010	MAC = 10	0.010 mg/L	2023-08-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010 mg/L	2023-08-16	
Sulfate	24.7	AO ≤ 500	1.0 mg/L	2023-08-16	

<i>Calculated Parameters</i>					
Hardness, Total (as CaCO3)	127	None Required	0.500 mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100 mg/L	N/A	

<i>General Parameters</i>					
Alkalinity, Total (as CaCO3)	125	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Bicarbonate (as CaCO3)	125	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2023-08-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2023-08-18	
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2023-08-15	
Conductivity (EC)	271	N/A	2.0 µS/cm	2023-08-18	
pH	7.84	7.0-10.5	0.10 pH units	2023-08-18	HT2
Solids, Total Dissolved	155	AO ≤ 500	15 mg/L	2023-08-17	
Turbidity	< 0.10	OG < 1	0.10 NTU	2023-08-16	

<i>Total Metals</i>					
Aluminum, total	< 0.0050	OG < 0.1	0.0050 mg/L	2023-08-19	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2023-08-19	
Arsenic, total	0.00104	MAC = 0.01	0.00050 mg/L	2023-08-19	
Barium, total	0.0514	MAC = 2	0.0050 mg/L	2023-08-19	



TEST RESULTS

REPORTED TO PROJECT Oliver, Town of
Full Spectrum Analysis

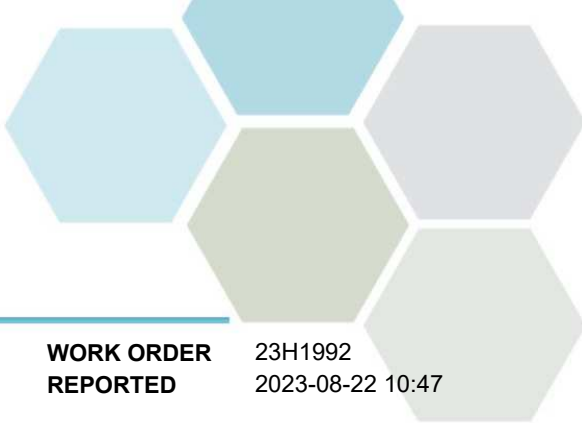
WORK ORDER REPORTED 23H1992
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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
Buchanan (23H1992-04) Matrix: Water Sampled: 2023-08-14 10:27, Continued					
<i>Total Metals, Continued</i>					
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2023-08-19	
Cadmium, total	0.000028	MAC = 0.007	0.000010 mg/L	2023-08-19	
Calcium, total	36.4	None Required	0.20 mg/L	2023-08-19	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2023-08-19	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Copper, total	0.00658	MAC = 2	0.00040 mg/L	2023-08-19	
Iron, total	0.013	AO ≤ 0.3	0.010 mg/L	2023-08-19	
Lead, total	0.00025	MAC = 0.005	0.00020 mg/L	2023-08-19	
Lithium, total	0.00376	N/A	0.00010 mg/L	2023-08-19	
Magnesium, total	8.66	None Required	0.010 mg/L	2023-08-19	
Manganese, total	0.0749	MAC = 0.12	0.00020 mg/L	2023-08-19	
Molybdenum, total	0.00322	N/A	0.00010 mg/L	2023-08-19	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2023-08-19	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2023-08-19	
Potassium, total	2.62	N/A	0.10 mg/L	2023-08-19	
Selenium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2023-08-19	
Silicon, total	5.6	N/A	1.0 mg/L	2023-08-19	
Silver, total	< 0.000050	None Required	0.000050 mg/L	2023-08-19	
Sodium, total	11.3	AO ≤ 200	0.10 mg/L	2023-08-19	
Strontium, total	0.355	MAC = 7	0.0010 mg/L	2023-08-19	
Sulfur, total	8.3	N/A	3.0 mg/L	2023-08-19	
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2023-08-19	
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2023-08-19	
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Tin, total	< 0.00020	N/A	0.00020 mg/L	2023-08-19	
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2023-08-19	
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2023-08-19	
Uranium, total	0.00135	MAC = 0.02	0.000020 mg/L	2023-08-19	
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2023-08-19	
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L	2023-08-19	
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	

Tucelnuit P3 (23H1992-05) | Matrix: Water | Sampled: 2023-08-14 10:40

Anions

Chloride	16.1	AO ≤ 250	0.10 mg/L	2023-08-16	
Fluoride	0.36	MAC = 1.5	0.10 mg/L	2023-08-16	
Nitrate (as N)	2.28	MAC = 10	0.010 mg/L	2023-08-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010 mg/L	2023-08-16	
Sulfate	52.3	AO ≤ 500	1.0 mg/L	2023-08-16	



TEST RESULTS

REPORTED TO PROJECT Oliver, Town of
Full Spectrum Analysis

WORK ORDER REPORTED 23H1992
2023-08-22 10:47

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Tucelnuit P3 (23H1992-05) | Matrix: Water | Sampled: 2023-08-14 10:40, Continued

Calculated Parameters

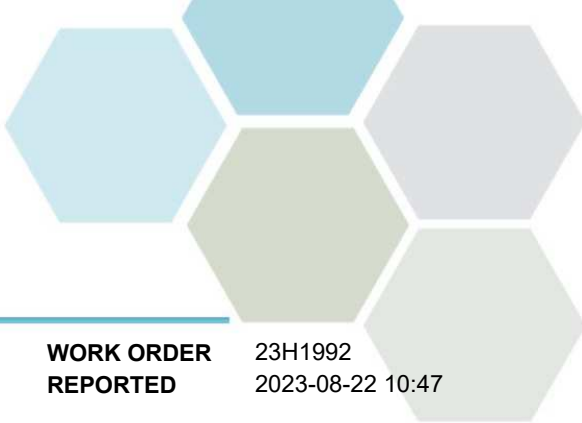
Hardness, Total (as CaCO3)	236	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	2.28	N/A	0.0100	mg/L	N/A	

General Parameters

Alkalinity, Total (as CaCO3)	211	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Bicarbonate (as CaCO3)	211	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2023-08-15	
Conductivity (EC)	493	N/A	2.0	µS/cm	2023-08-18	
pH	8.06	7.0-10.5	0.10	pH units	2023-08-18	HT2
Solids, Total Dissolved	317	AO ≤ 500	15	mg/L	2023-08-17	
Turbidity	< 0.10	OG < 1	0.10	NTU	2023-08-16	

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-08-17	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-08-17	
Arsenic, total	0.00283	MAC = 0.01	0.00050	mg/L	2023-08-17	
Barium, total	0.0741	MAC = 2	0.0050	mg/L	2023-08-17	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-17	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-08-17	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-08-17	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010	mg/L	2023-08-17	
Calcium, total	68.1	None Required	0.20	mg/L	2023-08-17	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-08-17	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2023-08-17	
Copper, total	0.00241	MAC = 2	0.00040	mg/L	2023-08-17	
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2023-08-17	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2023-08-17	
Lithium, total	0.00810	N/A	0.00010	mg/L	2023-08-17	
Magnesium, total	15.9	None Required	0.010	mg/L	2023-08-17	
Manganese, total	0.00041	MAC = 0.12	0.00020	mg/L	2023-08-17	
Molybdenum, total	0.00411	N/A	0.00010	mg/L	2023-08-17	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-08-17	
Phosphorus, total	0.063	N/A	0.050	mg/L	2023-08-17	
Potassium, total	4.37	N/A	0.10	mg/L	2023-08-17	
Selenium, total	0.00370	MAC = 0.05	0.00050	mg/L	2023-08-17	
Silicon, total	10.7	N/A	1.0	mg/L	2023-08-17	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-08-17	
Sodium, total	20.2	AO ≤ 200	0.10	mg/L	2023-08-17	
Strontium, total	0.737	MAC = 7	0.0010	mg/L	2023-08-17	
Sulfur, total	17.2	N/A	3.0	mg/L	2023-08-17	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-08-17	



TEST RESULTS

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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Tucelnuit P3 (23H1992-05) Matrix: Water Sampled: 2023-08-14 10:40, Continued						
<i>Total Metals, Continued</i>						
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-08-17	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-17	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2023-08-17	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2023-08-17	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-08-17	
Uranium, total	0.00700	MAC = 0.02	0.000020	mg/L	2023-08-17	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-08-17	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2023-08-17	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-17	

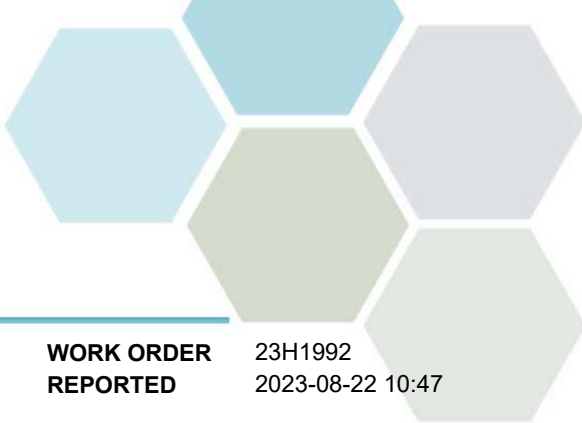
Miller Rd (23H1992-06) | Matrix: Water | Sampled: 2023-08-14 11:03

<i>Anions</i>						
Chloride	11.7	AO ≤ 250	0.10	mg/L	2023-08-16	
Fluoride	0.26	MAC = 1.5	0.10	mg/L	2023-08-16	
Nitrate (as N)	1.30	MAC = 10	0.010	mg/L	2023-08-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-08-16	
Sulfate	64.8	AO ≤ 500	1.0	mg/L	2023-08-16	

<i>Calculated Parameters</i>						
Hardness, Total (as CaCO3)	296	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	1.30	N/A	0.0100	mg/L	N/A	

<i>General Parameters</i>						
Alkalinity, Total (as CaCO3)	256	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Bicarbonate (as CaCO3)	256	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-08-18	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2023-08-15	
Conductivity (EC)	577	N/A	2.0	µS/cm	2023-08-18	
pH	8.04	7.0-10.5	0.10	pH units	2023-08-18	HT2
Solids, Total Dissolved	356	AO ≤ 500	15	mg/L	2023-08-17	
Turbidity	< 0.10	OG < 1	0.10	NTU	2023-08-16	

<i>Total Metals</i>						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-08-19	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-08-19	
Arsenic, total	0.00235	MAC = 0.01	0.00050	mg/L	2023-08-19	
Barium, total	0.0774	MAC = 2	0.0050	mg/L	2023-08-19	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-08-19	
Boron, total	0.0592	MAC = 5	0.0500	mg/L	2023-08-19	
Cadmium, total	0.000023	MAC = 0.007	0.000010	mg/L	2023-08-19	



TEST RESULTS

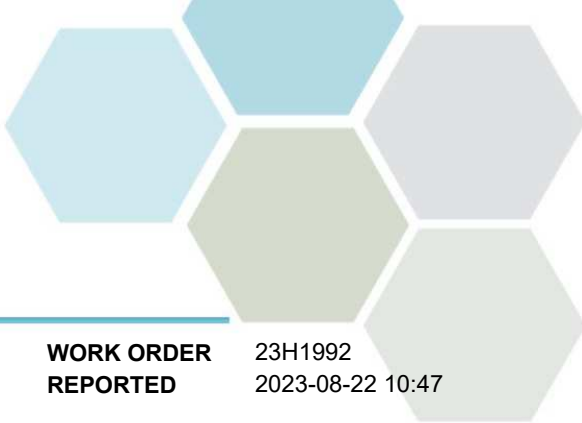
REPORTED TO PROJECT Oliver, Town of
Full Spectrum Analysis

WORK ORDER REPORTED 23H1992
2023-08-22 10:47

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
Miller Rd (23H1992-06) Matrix: Water Sampled: 2023-08-14 11:03, Continued					
<i>Total Metals, Continued</i>					
Calcium, total	74.7	None Required	0.20 mg/L	2023-08-19	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2023-08-19	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Copper, total	0.00550	MAC = 2	0.00040 mg/L	2023-08-19	
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2023-08-19	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2023-08-19	
Lithium, total	0.00690	N/A	0.00010 mg/L	2023-08-19	
Magnesium, total	26.5	None Required	0.010 mg/L	2023-08-19	
Manganese, total	0.0760	MAC = 0.12	0.00020 mg/L	2023-08-19	
Molybdenum, total	0.00424	N/A	0.00010 mg/L	2023-08-19	
Nickel, total	0.00068	N/A	0.00040 mg/L	2023-08-19	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2023-08-19	
Potassium, total	5.26	N/A	0.10 mg/L	2023-08-19	
Selenium, total	0.00282	MAC = 0.05	0.00050 mg/L	2023-08-19	
Silicon, total	9.0	N/A	1.0 mg/L	2023-08-19	
Silver, total	< 0.000050	None Required	0.000050 mg/L	2023-08-19	
Sodium, total	16.5	AO ≤ 200	0.10 mg/L	2023-08-19	
Strontium, total	0.880	MAC = 7	0.0010 mg/L	2023-08-19	
Sulfur, total	22.3	N/A	3.0 mg/L	2023-08-19	
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2023-08-19	
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2023-08-19	
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	
Tin, total	< 0.00020	N/A	0.00020 mg/L	2023-08-19	
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2023-08-19	
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2023-08-19	
Uranium, total	0.00658	MAC = 0.02	0.000020 mg/L	2023-08-19	
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2023-08-19	
Zinc, total	0.0043	AO ≤ 5	0.0040 mg/L	2023-08-19	
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2023-08-19	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Oliver, Town of
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Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Colour, True in Water	SM 2120 C (2021)	Spectrophotometry (456 nm)	✓	Kelowna
Conductivity in Water	SM 2510 B (2021)	Conductivity Meter	✓	Kelowna
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
pH in Water	SM 4500-H+ B (2021)	Electrometry	✓	Kelowna
Solids, Total Dissolved in Water	Solids in Water, Filtered / SM 2540 C* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Turbidity in Water	SM 2130 B (2020)	Nephelometry	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

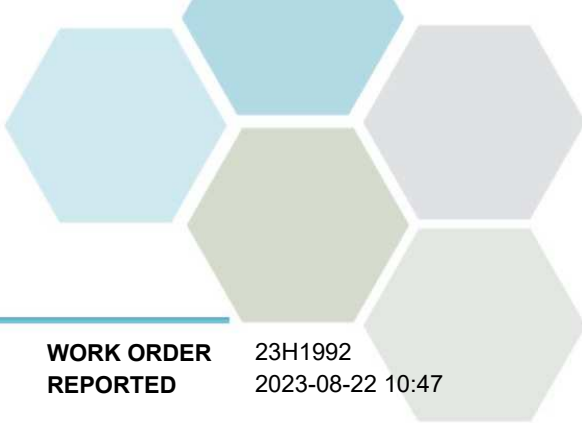
Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, pH > 7 = basic
µS/cm	Microsiemens per centimetre
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, September 2022\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Oliver, Town of
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WORK ORDER REPORTED 23H1992
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General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. CarO will dispose of all samples within 30 days of sample receipt, unless otherwise agreed. The quality control (QC) data is available upon request

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: bwhitehead@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

APPENDIX C: 2023 WEEKLY WATER SAMPLING

2023 WEEKLY CHLORINE RESIDUAL & COLIFORMS SAMPLING

(Target 0.2 to 1.50 - Chlorine Residual)

	RURAL NORTH								BLACK SAGE								RURAL SOUTH														MUNICIPAL			
	System #1				System #2				System #4				System #5				System #6				System #7				Groundwater Source									
	Groundwater Source				Groundwater Source				Groundwater Source				Groundwater Source				Groundwater Source				Groundwater Source				Groundwater Source									
DATE	Chlorine Residual	Sample Location	Coliform Total	Ecoli	Chlorine Residual	Sample Location	Coliform Total	Ecoli	Chlorine Residual	Sample Location	Coliform Total	Ecoli	Chlorine Residual	Sample Location	Coliform Total	Ecoli	Chlorine Residual	Sample Location	Coliform Total	Ecoli	Chlorine Residual	Sample Location	Coliform Total	Ecoli	Chlorine Residual	Sample Location	Coliform Total	Ecoli						
Jan-03	0.27	Pinehill	<1	<1									0.22	Sumac	<1	<1											0.33	Fairview	<1	<1				
Jan-09	0.19	McGowan	<1	<1					0.28	Snowbrush	<1	<1															0.24	Hillside	<1	<1				
Jan-16	0.23	Mikes Auto	<1	<1													<0.02	Fruitvale	<1	<1						0.30	Meadows	<1	<1					
Jan-23	0.37	Pinehill	<1	<1												0.12	6A Booster	<1	<1								0.35	Vineyard	<1	<1				
Jan-30	0.23	McGowan	<1	<1									0.15	Sumac	<1	<1											0.33	Wolfcub	<1	<1				
Feb-06	0.26	Mikes Auto	<1	<1					0.14	Snowbrush	<1	<1															0.37	Sawmill	<1	<1				
Feb-13	0.16	Pinehill	<1	<1													0.04	Fruitvale	<1	<1							0.36	Granby	<1	<1				
Feb-21	0.17	McGowan	<1	<1												0.16	6A Booster	<1	<1								0.37	Fairview	<1	<1				
Mar-01	0.12	Mikes Auto	<1	<1									0.08	Sumac	<1	<1											0.20	Hillside	<1	<1				
Mar-06	0.22	Pinehill	<1	<1					0.27	Snowbrush	<1	<1															0.33	Meadows	<1	<1				
Mar-13	0.27	McGowan	<1	<1													0.14	Fruitvale	<1	<1							0.28	Vineyard	<1	<1				
Mar-20	0.29	Mikes Auto	<1	<1												0.12	6A Booster	<1	<1								0.40	Wolfcub	<1	<1				
Mar-27	0.20	Pinehill	<1	<1									0.22	Sumac	<1	<1											0.33	Sawmill	<1	<1				
Apr-03	0.16	McGowan	<1	<1					0.25	Snowbrush	<1	<1															0.42	Granby	<1	<1				
Apr-11	0.30	Mikes Auto	<1	<1													0.02	Fruitvale	<1	<1							0.26	Hillside	<1	<1				
Apr-17	0.22	Pinehill	<1	<1												0.19	6A Booster	<1	<1								0.43	Fairview	<1	<1				
Apr-24	0.26	McGowan	<1	<1									0.20	Sumac	<1	<1											0.33	Meadows	<1	<1				
May-01	0.28	Mikes Auto	<1	<1	0.25	Ryegrass	<1	<1	0.26	Snowbrush	<1	<1															0.34	Vineyard	<1	<1				
May-08	0.27	Pinehill	<1	<1	0.05	Black Sage	<1	<1									0.05	Fruitvale	<1	<1							0.26	Wolfcub	<1	<1				
May-15	0.31	Mikes Auto	<1	<1	0.24	Ryegrass	<1	<1								0.15	6A Booster	<1	<1								0.20	Sawmill	<1	<1				
May-23	0.07	McGowan	<1	<1	0.02	Black Sage	<1	<1					0.12	Sumac	<1	<1											0.37	Granby	<1	<1				
May-29	0.05	Pinehill	<1	<1	0.24	Ryegrass	<1	<1	0.08	Snowbrush	<1	<1															0.36	Fairview	<1	<1				
Jun-05	0.18	McGowan	<1	<1	0.12	Black Sage	<1	<1									0.08	Fruitvale	<1	<1							0.17	Hillside	<1	<1				
Jun-12	0.42	Mikes Auto	<1	<1	0.22	Ryegrass	<1	<1								0.15	6A Booster	<1	<1								0.45	Meadows	<1	<1				
Jun-19	0.32	Pinehill	<1	<1	0.15	Black Sage	<1	<1					0.08	Sumac	<1	<1											0.39	Vineyard	<1	<1				
Jun-26	0.06	McGowan	<1	<1	0.12	Ryegrass	<1	<1	0.16	Snowbrush	<1	<1															0.29	Wolfcub	<1	<1				
Jul-04																																		
Jul-10	0.28	Mikes Auto	<1	<1	0.18	Black Sage	<1	<1									0.17	Fruitvale	<1	<1						0.23	Granby	<1	<1					
Jul-17	0.20	Pinehill	<1	<1	0.27	Ryegrass	<1	<1								0.23	6A Booster										0.17	Sawmill	<1	<1				
Jul-24	0.18	McGowan	<1	<1	0.23	Black Sage	<1	<1					0.21	Sumac	<1	<1											0.26	Fairview	<1	<1				
Jul-31	0.36	Mikes Auto	<1	<1	0.60	Ryegrass	<1	<1	0.18	Snowbrush	<1	<1															0.15	Hillside	<1	<1				
Aug-08	0.33	Pinehill	<1	<1	0.22	Black Sage	<1	<1									0.14	Fruitvale	<1	<1							0.23	Meadows	<1	<1				
Aug-14	0.14	McGowan	<1	<1	0.29	Ryegrass	<1	<1								0.25	6A Booster	<1	<1								0.44	Vineyard	<1	<1				
Aug-15																											0.16	Vineyard	<1	<1				
Aug-21	0.19	Mikes Auto	<1	<1	0.21	Black Sage	<1	<1					0.20	Sumac	<1	<1											0.22	Wolfcub	<1	<1				
Aug-28	0.18	Pinehill	<1	<1	0.40	Ryegrass	<1	<1	0.30	Snowbrush	<1	<1															0.27	Vineyard	<1	<1				
Aug-28	0.18	Pinehill	<1	<1	0.40	Ryegrass	<1	<1	0.30	Snowbrush	<1	<1															0.16	Sawmill	<1	<1				
Sep-05	0.35	McGowan	<1	<1	0.16	Black Sage	<1	<1									0.21	Fruitvale	<1	<1							0.33	Granby	<1	<1				
Sep-11	0.16	Mikes Auto	<1	<1	0.19	Ryegrass	<1	<1								0.15	6A Booster	<1	<1								0.11	Hillside	<1	<1				
Sep-18	0.31	Pinehill	<1	<1	0.23	Black Sage	<1	<1					0.12	Sumac	<1	<1											0.37	Meadows	<1	<1				
Sep-25	0.36	McGowan	<1	<1	0.27	Ryegrass	<1	<1	0.26	Snowbrush	<1	<1															0.37	Vineyard	<1	<1				
Oct-03	0.27	Mikes Auto	<1	<1	0.18	Black Sage	<1	<1									0.08	Fruitvale	<1	<1							0.29	Wolfcub	<1	<1				
Oct-10	0.26	Pinehill	<1	<1	0.33	Ryegrass	<1	<1								0.10	6A Booster	<1	<1								0.14	Sawmill	<1	<1				
Oct-16	0.17	McGowan	<1	<1	0.22	Ryegrass	<1	<1					0.05	Sumac	<1	<1											0.26	Granby	<1	<1				
Oct-23	0.16	Mikes Auto	<1	<1					0.37	Snowbrush	<1	<1															0.35	Fairview	<1	<1				
Oct-30	0.18	Pinehill	<1	<1													0.12	Fruitvale	<1	<1							0.33	Hillside	<1	<1				
Nov-06	0.18	McGowan	<1	<1												0.17	6A Booster	<1	<1								0.21	Meadows	<1	<1				
Nov-14	0.30	Mikes Auto	<1	<1									0.18	Sumac	<1	<1											0.31	Vineyard	<1	<1				
Nov-20	0.20	Pinehill	<1	<1					0.17	Snowbrush	<1	<1															0.18	Wolfcub	<1	<1				
Nov-27	0.19	McGowan	<1	<1	0.15	Black Sage	<1	<1									0.15	Fruitvale	<1	<1							0.40	Granby	<1	<1				
Dec-4	0.22	Mikes Auto	<1	<1	0.14	Ryegrass	<1	<1								0.22	6A Booster	<1	<1								0.21	Fairview	<1	<1				
Dec-11	0.13	Pinehill	<1	<1									0.16	Sumac	<1	<1											0.20	Hillside	<1	<1				
Dec-12					0.18	Black Sage	<1	<1																										
Dec-21	0.14	McGowan	<1	<1	0.14	Ryegrass	<1	<1	0.18	Snowbrush	<1	<1															0.33	Granby	<1	<1				
Dec-27	0.21	Mikes Auto	<1	<1	0.09	Black Sage	<1	<1									0.13	Fruitvale	<1	<1							0.18	Hillside	<1	<1				

APPENDIX D: 2023 PUMPING DATA

APPENDIX E: 2023 GROUNDWATER AND SURFACE WATER CONSUMPTION DATA

Town of Oliver

Groundwater Consumption Data

US GALLONS															
YEAR	January	February	March	April	May	June	July	August	September	October	November	December	YTD	10 YR Average	Average
2023	24,771,142	22,491,971	27,709,991	43,078,316	65,835,695	116,612,458	128,236,293	114,972,194	83,439,470	55,847,904	25,121,453	26,160,971	734,277,859	798,688,217	949,768,557
2022	23,392,643	21,770,642	29,197,368	51,081,623	75,877,918	87,600,014	114,826,928	130,859,944	87,938,299	67,326,124	25,201,930	26,213,514	741,286,947	798,688,217	949,768,557
2021	25,841,686	21,679,210	27,670,223	65,785,664	105,278,837	111,539,990	144,023,757	110,585,662	81,648,387	59,604,827	24,297,510	23,676,188	801,631,941	798,688,217	949,768,557
2020	25,795,469	24,648,672	38,939,523	48,618,456	75,490,661	78,829,209	129,972,821	128,329,944	95,213,591	71,385,016	28,671,338	25,394,770	771,289,469	798,688,217	949,768,557
2019	23,543,266	28,561,243	28,581,167	50,920,567	109,979,293	132,432,802	119,129,918	119,860,386	69,368,736	46,730,582	27,035,693	24,575,289	780,718,943	798,688,217	949,768,557
2018	25,693,865	23,678,138	32,157,774	48,096,882	102,453,177	117,372,052	157,067,454	138,706,689	81,652,713	55,774,737	27,718,659	23,604,690	833,976,828	798,688,217	949,768,557
2017	27,531,385	26,935,811	32,381,863	33,127,917	69,692,881	105,839,743	156,311,916	147,447,499	92,667,928	64,715,211	25,437,142	25,053,945	807,143,242	798,688,217	949,768,557
2016	26,495,703	25,304,817	29,968,727	64,556,558	114,449,576	105,588,928	126,590,568	139,721,723	84,497,704	52,219,628	26,892,706	25,529,293	821,815,931	798,688,217	949,768,557
2015	24,995,670	22,331,907	28,348,130	69,828,360	107,509,652	134,080,260	163,478,571	140,709,274	101,276,667	68,802,269	26,439,576	25,334,906	913,135,245	798,688,217	949,768,557
2014	24,199,544	21,567,526	24,744,328	54,446,855	90,368,412	100,455,656	133,158,307	123,562,365	88,162,857	72,119,009	24,827,571	23,993,338	781,605,767	798,688,217	949,768,557
10 Yr Average	25,226,037	23,896,994	29,969,909	52,954,120	91,693,610	109,035,111	137,279,653	129,475,568	86,586,635	61,452,531	26,164,358	24,953,690	798,688,217		
Average	29,886,673	28,164,039	34,159,753	62,678,882	106,137,309	126,066,612	168,231,116	159,131,995	105,298,373	70,664,796	30,892,411	28,456,598	949,768,557		

CUBIC METERS															
YEAR	January	February	March	April	May	June	July	August	September	October	November	December	YTD	10 YR Average	Average
2023	93,769	85,141	104,894	163,069	249,215	441,426	485,427	435,217	315,853	211,407	95,095	99,030	2,779,543	3,023,362	2,791,538
2022	88,551	82,411	110,524	193,365	287,229	331,602	434,667	495,359	332,883	254,857	95,400	99,229	2,806,075	3,023,362	2,791,538
2021	97,821	82,065	104,743	249,026	398,524	422,225	545,189	418,612	309,073	225,629	91,976	89,624	3,034,506	3,023,362	2,791,538
2020	97,646	93,305	147,402	184,041	285,763	298,401	492,000	485,781	360,422	270,222	108,533	96,130	2,919,647	3,023,362	2,791,538
2019	89,121	108,116	108,191	192,755	416,317	501,312	450,956	453,721	262,589	176,894	102,341	93,028	2,955,341	3,023,362	2,791,538
2018	97,262	89,631	121,730	182,066	387,827	444,301	594,565	525,062	309,089	211,130	104,926	89,353	3,156,944	3,023,362	2,791,538
2017	104,218	101,963	122,579	125,403	263,816	400,647	591,705	558,149	350,786	244,974	96,290	94,839	3,055,368	3,023,362	2,791,538
2016	100,297	95,789	113,444	244,373	433,239	399,697	479,197	528,904	319,858	197,673	101,800	96,639	3,110,910	3,023,362	2,791,538
2015	94,619	84,535	107,309	264,329	406,968	507,549	618,833	532,642	383,374	260,445	100,085	95,903	3,456,591	3,023,362	2,791,538
2014	91,605	81,642	93,667	206,104	342,081	380,266	504,059	467,734	333,733	273,000	93,983	90,825	2,958,698	3,023,362	2,791,538
10 Yr Average	95,491	90,460	113,448	200,453	347,098	412,743	519,660	490,118	327,766	232,623	99,043	94,460	3,023,362		
Average	100,112	94,376	101,098	164,018	326,633	274,176	388,259	520,061	382,149	218,475	122,571	99,609	2,791,538		

Town of Oliver
Surface Water Consumption Data

US GALLONS															
YEAR	January	February	March	April	May	June	July	August	September	October	November	December	YTD	10 YR Average	Average
2023	0	0	0	61,221,704	321,954,557	421,197,704	522,582,759	460,647,063	261,602,574	81,617,579			2,094,652,429	2,596,347,384	3,163,879,356
2022	0	0	0	59,412,793	225,763,988	263,141,747	441,635,349	502,405,303	289,296,849	138,359,835	0	0	1,920,015,865	2,596,347,384	3,163,879,356
2021	0	0	0	131,173,678	480,211,035	488,526,601	683,405,424	465,518,500	287,895,480	156,505,073	0	0	2,693,235,792	2,596,347,384	3,163,879,356
2020	0	0	0	107,305,198	280,525,580	304,925,510	614,021,375	629,381,619	379,719,000	110,748,840	0	0	2,426,627,121	2,596,347,384	3,163,879,356
2019	0	0	0	70424042.85	459652685.8	631412787.1	557726718	683650532.7	143240570.7	36355871.47	0	0	2,582,463,209	2,596,347,384	3,163,879,356
2018	0	0	0	28,796,595	449,315,489	472,710,593	680,783,618	632,482,659	363,156,943	92,730,107	0	0	2,719,976,003	2,596,347,384	3,163,879,356
2017	0	0	0	25,906,471	159,593,999	441,096,535	687,142,179	604,322,130	365,509,904	130,755,733	0	0	2,414,326,951	2,596,347,384	3,163,879,356
2016	0	0	0	195,820,565	424,420,450	369,144,236	517,489,259	674,696,799	320,877,783	132,229,659	0	0	2,634,678,752	2,596,347,384	3,163,879,356
2015	0	0	0	242,341,115	487,581,169	653,959,751	763,431,674	667,904,291	465,978,262	223,374,730	0	0	3,504,570,991	2,596,347,384	3,163,879,356
2014	0	0	0	9,259,933	450,829,671	532,264,210	770,607,532	655,345,192	415,486,514	139,133,678	0	0	2,972,926,730	2,596,347,384	3,163,879,356
10 Yr Average	0	0	0	93,166,210	373,984,862	457,837,967	623,882,589	597,635,409	329,276,388	124,181,110	0	0	2,596,347,384		
Average	0	0	0	129,954,935	437,691,393	521,418,768	762,368,958	729,591,055	441,763,409	142,663,511	0	0	3,165,452,031		
CUBIC METERS															
YEAR	January	February	March	April	May	June	July	August	September	October	November	December	YTD	10 YR Average	Average
2023	0	0	0	231,749	1,218,730	1,594,406	1,978,190	1,743,738	990,273	308,956	0	0	8,066,042	9,841,932	11,982,534
2022	0	0	0	224,902	854,609	996,099	1,671,771	1,901,810	1,095,107	523,749	0	0	7,268,047	9,841,932	11,982,534
2021	0	0	0	496,546	1,817,796	1,849,273	2,586,970	1,762,178	1,089,802	592,436	0	0	10,195,002	9,841,932	11,982,534
2020	0	0	0	406,194	1,061,904	1,154,268	2,324,323	2,382,467	1,437,392	419,230	0	0	9,185,779	9,841,932	11,982,534
2019	0	0	0	266,584	1,739,974	2,390,156	2,111,224	2,587,898	542,224	137,622	0	0	9,775,682	9,841,932	11,982,534
2018	0	0	0	109,007	1,700,843	1,789,403	2,577,045	2,394,206	1,374,698	351,021	0	0	10,296,224	9,841,932	11,982,534
2017	0	0	0	98,067	604,129	1,669,731	2,601,115	2,287,607	1,383,605	494,964	0	0	9,139,217	9,841,932	11,982,534
2016	0	0	0	741,261	1,606,605	1,397,362	1,958,909	2,554,004	1,214,654	500,543	0	0	9,973,339	9,841,932	11,982,534
2015	0	0	0	917,360	1,845,695	2,475,506	2,889,902	2,528,292	1,763,919	845,565	0	0	13,266,238	9,841,932	11,982,534
2014	0	0	0	35,053	1,706,575	2,014,838	2,917,065	2,480,750	1,572,787	526,678	0	0	11,253,747	9,841,932	11,982,534
10 Yr Average	0	0	0	352,672	1,415,686	1,733,104	2,361,651	2,262,295	1,246,446	470,076	0	0	9,841,932		
Average	0	0	0	491,933	1,656,841	1,973,784	2,885,879	2,761,801	1,672,256	540,040	0	0	11,982,534		