CITY OF SALMON ARM

WATER QUALITY REPORT 2023

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1.0 INTRODUCTION

As required by the British Columbia Drinking Water Protection Act, the City of Salmon Arm provides the following annual water quality report. This information has been compiled by the City of Salmon Arm to help you better understand your drinking water.

This report outlines where your water comes from, how it is distributed, and how we ensure it is safe to drink. This information will provide those who want to further inform themselves about their drinking water to do so.

"Water links us to our neighbour in a way more profound and complex than any other."

John Thorson

Drinking water can be a complex issue and much of the information provided in the report is technical in nature. Every effort has been made to provide it in a format that is as easy to understand as possible. Please contact the City of Salmon Arm Engineering & Public Works Department at 803-4000, should you have any questions.

2.0 BACKGROUND

The City currently operates and maintains a public water distribution system under the regulations of the Water Users' Communities Act, found here:

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96483_01

The Interior Health Authority (IHA) have advised the City that *"Under the legislation, the province has increased the basic expectations around assessing water systems, certifying operators and suppliers, and monitoring and reporting on water quality. The legislation gives provincial drinking water officers (i.e. Interior Health Authority) increased powers to protect water sources from contamination by a drinking-water health hazard. In addition, the drinking-water officers will oversee a source-to-tap assessment of every drinking-water system in the province to address all potential risks to human health."*

The City of Salmon Arm commissioned a new water treatment plant in 2009. The new water plant was built to ensure consistent safe drinking water for the growing population of Salmon Arm and to meet new potable water regulations.

3.0 WATER SYSTEM OVERVIEW

The City's water is supplied by way of two (2) primary sources: East Canoe Creek at Metford Dam and Shuswap Lake at Canoe Beach. A previous source of water from Rumball creek has been decommissioned and is no longer used for irrigation at the Mt. Ida Cemetery. The Shuswap Lake source has a Water Treatment Plant that meets the Interior Health Authority 4-3-2-1-0 water treatment objective of four (4) log inactivation of viruses, three (3) log removal/inactivation of Giardia Lamblia and Cryptosporidium, two (2) treatment processes for surface water sources, one (1) for less than 1 NTU of turbidity, and zero (0) total and fecal coliforms and E. Coli. The East Canoe Creek source has been upgraded to utilize two forms of disinfection: ultra-violet light (UV) and sodium hypochlorite chlorination. The water from Metford Dam is only used when the turbidity is less than 1 NTU. Extensive SCADA programming and interlocks are in place to prevent the distribution of inadequately treated water from either source. The distribution system includes approximately 205 km of watermain, varying in diameter from 100 mm to 600 mm. The City's waterworks system provides water through gravity and pump systems. The waterworks system is complex and is comprised of eight (8) pressure zones, 1032 hydrants (864 City owned), eight (8) pumping stations, fourteen (14) reservoirs and one (1) dam. There is a total concrete reservoir storage capacity of 17,398 cubic meters and Metford reservoir storage capacity of 15,800 cubic meters, servicing a population of approximately 18,811 people and approximately 6,337 connections. Water meters are installed for an estimated 43% of the City's residential connections and 96% of all other connections.

Did you know …?

- *Canada holds 20% of the world's freshwater, but has only 9% of the world's renewable freshwater supply; the rest is "fossil water", a legacy of the melting of large ice sheets that once covered much of Canada.*
- *Canada has more lake area than any other country in the world.*
- *Every time Beethoven sat down to write music, he poured ice water over his head.*
- *Once you drink water, it leaves your stomach in about 5 minutes!*

Figure 1 – Water Treatment Plant in Salmon Arm

"When the well is dry, we learn the worth of water."

Benjamin Franklin

The public water system services an area of approximately 7,418 hectares (see Appendix 2) of which 969 hectares includes Band Lands. The City distributes water in pipes made of a variety of materials.

Pipe Material	Length In Service	Comments
Cast Iron	0.1 km	Majority installed prior to 1978
Ductile Iron	17.6 km	Ductile iron is still used in some applications in Salmon Arm
PVC	107.4 km	Most pipe installed since 1979 has been PVC
Asbestos Cement	79.4 km	Majority installed prior to 1978

Figure 2 - Pipe materials in service in Salmon Arm

Shuswap Lake is at a nominal elevation of about 347 m (1138 ft.) Geodetic Survey of Canada (GSC) datum while the Metford Dam intake on East Canoe Creek is at elevation 567 m (1860 ft.) GSC. The Utilities Division attempts to maximize the supply of water from East Canoe Creek so that pumping into the system from Shuswap Lake and the associated costs are minimized. The flow of water from East Canoe Creek into the water system is by gravity.

Did you know ...?

- *About 70% of the earth is covered in water.*
- *3% of the water on earth is freshwater and only 1% is available for human consumption.*
- *Nearly 70% of the earth's fresh water exists in the form of glaciers and permanent snow cover.*
- *Only 0.3% of total global fresh water is stored in lakes and rivers.*

Periodic problems are experienced with East Canoe Creek, such as:

- Turbidity levels that exceed the Interior Health Maximum Allowable Concentration. High turbidity levels are typically associated with higher creek flows during the spring snowmelt and extended high rainfall events in the watershed; and
- Peak summer water demands that exceed the low natural summer flows in the creek.

The distribution system is segregated into eight (8) pressure zones. The storage reservoir in the highest pressure zone (Zone 5) is at elevation 615 m (2017 ft.) GSC above sea level. Water has to be pumped over 268 m (879 ft.) in elevation from Shuswap Lake to the storage reservoir at the highest elevation.

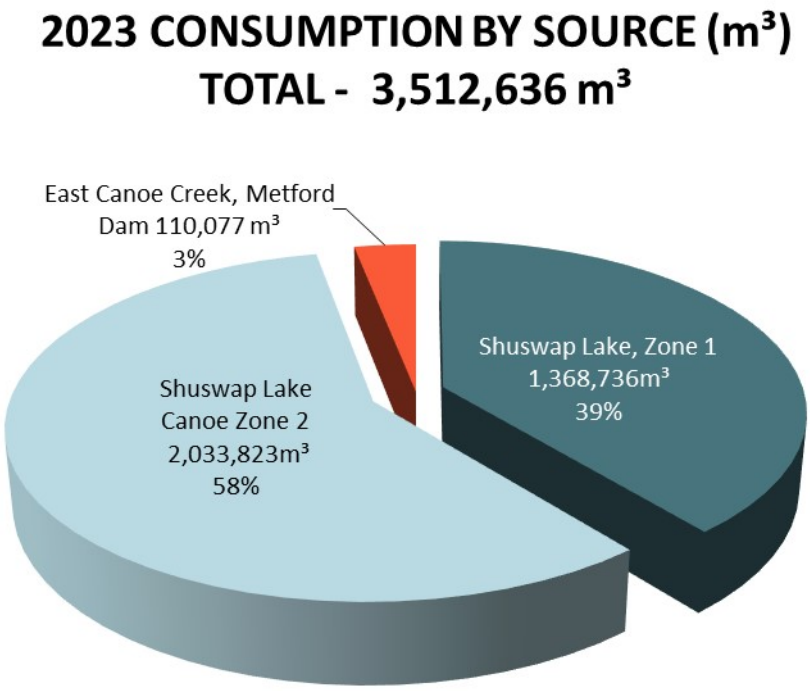

Figure 3 - Water Source Distribution

"If there is magic on this planet, it is contained in water."

Loran Eisley (Anthropologist), The Immense Journey, 1957

Water treatment Plant

The new Water Treatment Plant was online in May 2009 and dramatically improved the water quality for all City residents. The treatment process includes coagulation, flocculation, and filtration, followed by disinfection with ultraviolet light and chlorine (via sodium hypochlorite generated on-site). The raw water intake was extended further offshore and lowered to provide a more consistent raw water supply for the water treatment plant.

Water Pumping Stations

The municipal water system includes 14 water storage facilities and eight pumping stations. Normally, if there is a major pumping station or storage facility failure, water service to a large area of the community could be interrupted or adversely affected until repair work is completed. With our gravity feed supply source at Metford Dam, water can be cascaded down through all the zones, with the exception of Zone 5.

The pump stations house a combined total of 25 pumps with a service life of approximately 40 to 50 years for each pump. Relocating the existing Zone 5 Booster Station has been successfully completed. The Zone 2 Pump Station design is now complete. We are proceeding with the financing process to secure the necessary funds to commence construction.

Figure 4 - Zone 1 Pumping Station Canoe

The following illustrates how many gallons of water it takes to make some everyday items.

Apple	*16*
Orange	*22*
Egg	*85*
Loaf of Bread	*150*
Pound of Steel	*270*
Sunday Paper	*280*
Pound of Aluminum	*1000*
Pound of cotton	*1300*
Pound of Beef	*3000*

Laura McDonald, Freshwater Society

System Control – "SCADA" (**S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition software)

Maintaining reservoir water levels, operating pumps, monitoring quality control equipment and maintaining a historical data file of the water systems operations is made easier by a comprehensive software program employed by the Utilities Department. Connected by wireless links, the SCADA software is able to monitor sensors at all the reservoirs and pump stations. Interpreting the data received, it then automatically turns pumps on and off to keep the system flowing smoothly. When trouble is detected within the system, the software issues alarms and the Utilities Division staff are notified.

Pressure-Reducing Valve Stations

The maximum design water pressure for piping within the majority of the municipal water system is 1034 kPa (150 psi). We have two Pressure reducing stations which contain Pressure reducing valves. Pressure reducing valves are used to control the pressure in the water system by creating head losses that prevent pressures from exceeding the design maximum. The failure of a PRV could disrupt flows and mainline pressures to large areas within the community.

The Utilities Division currently maintains and upgrades the PRV stations as required, in an effort to extend their service life. Most individual premises also have secondary PRV's as fluctuating pressures can place excessive stress on internal plumbing systems and fixtures.

3.1 Water System Value

The total value of our primary water distribution system, as detailed in Figure 5 below, is approximately $243,300,000. The City budgeted $9,155,604 in 2023 on water infrastructure replacement (actual expenditures may vary), operations, maintenance, and upgrade/new capital projects. $6.9 Million of the budget was for two pump station replacement/upgrade projects (Zone 2 and Zone 5). The replacement program is designed to address some of these previously discussed replacement components and other general deficiencies within the system on a priority basis; however, a thorough and comprehensive maintenance program also helps to extend the life expectancy of a majority of these water infrastructure elements.

"Throughout the history of literature, the guy who poisons the well has been the worst of all villains..."

Author unknown

System Components	Quantity in Use in Salmon Arm	Approximate Replacement Cost
Water mains	205 km	$ 148,000,000
Fire Hydrants	864	$ 8,800,000
Treatment Plant	2	$ 48,700,000
Reservoirs/Tanks	14 Reservoirs/ 1 Dam	$ 23,100,000
Pumping Stations	8	$ 13,100,000
System Control	1	$ 1,600,000
Total		**$ 243,300,000**

Figure 5 - Infrastructure replacement value

4.0 STAFFING

The City of Salmon Arm Engineering and Public Works Department is responsible for this municipal function. The Utilities Division is responsible for the operation and maintenance of the water supply and distribution system.

Staff Overview:

Engineering and Public Works
Robert Niewenhuizen, A.Sc.T., Director of Engineering and Public Works
Jennifer Wilson, P. Eng., City Engineer
Gerry Rasmuson, B.Sc., Manager of Utilities

Did you know …?

- *In Canada, there is more water underground than on the surface.*
- *Canadians are among the biggest water users in the world.*
- *Annually, Canada's rivers discharge 7% of the world's renewable water supply.*
- *40% of Canada's boundary with the United States is composed of water.*

Utilities Division	
Mervin Arvay ***Utilities Supervisor*** • Level II - Wastewater Collection • Level III – Water Distribution	**Rick Webb** ***Water Treatment and Distribution Chief Operator*** • Level III - Water Treatment • Level II – Wastewater Collection • Level III Water Distribution
Jason Philps • Level II – Water Distribution Level I – Wastewater Collection	**Marcus Miller** • Level IV - Water Treatment • Level IV - Water Distribution
Josh Yurkowski • Level II – Water Distribution • Level II – Wastewater Collection	**Devon Tulak** • Level II – Water Distribution • Level I – Wastewater Collection • Level II - Water Treatment
Corey Hockman • Level I – Water Distribution • Level I – Wastewater Collection	**Brent Romyn** • Level III – Water Treatment • Level I – Wastewater Treatment • Level III - Water Distribution
Jason Baker • Level II – Water Distribution • Level I – Wastewater Collection	**Ray Muller** • Level III -Water Distribution • Level I – Wastewater Collection • Level I - Water Treatment • Level I – Wastewater Treatment

Figure 6 - Staff Overview

5.0 MONITORING PROGRAM

Drinking water quality is a function of source water quality, water treatment, and water quality changes after treatment. As a result the monitoring of drinking water quality consists of three components: source (raw) water monitoring, treatment process monitoring, and monitoring in the distribution system.

Did you know ...?

- *Up to 60% of the human body is water.*
- *The brain is composed of 70% water.*
- *Blood is 82% water.*
- *The lungs are nearly 90% water.*

5.1 TESTING PARAMETERS

The water treatment plant has continuous online monitoring for treated water turbidity, particle counts, pH, temperature, chlorine residual, and UV transmittance. These parameters are trended and monitored daily by the operators for abnormal conditions and corrective actions are taken as needed. Frequent grab samples are collected and analyzed to confirm the operation of the online instrumentation.

The City of Salmon Arm is required to collect a minimum of 18 bacteriological samples per month as outlined in the BC Drinking Water Protection Regulation. These samples are collected from representative points throughout the distribution system.

Turbidity

Turbidity measurements relate to the optical properties of water. Poor turbidity is caused by suspended matter such as clay, silt, finely divided organic and inorganic matter, soluble coloured organic compounds, plankton, and other microscopic organisms.

"Anyone who can solve the problems of water will be worthy of two Nobel prizes - one for peace and one for science."

John F. Kennedy

Excessive turbidity not only detracts from the appearance and taste of water, it can shield organisms from disinfection methods. The unit of measurement is the nephelometric turbidity unit (NTU). Turbidity from the treatment plant shall be less than or equal to 0.3 NTU in at least 95% of the measurements made, or at least 95% of the time each calendar month, and shall not exceed 1.0 NTU at any time. The unfiltered East Canoe Creek source automatically shuts down at a turbidity of 1 NTU. The system is then flushed until the turbidity is within the acceptable range (<1 NTU). Turbidity is continuously measured at both water supply sources.

Chemical Analysis

The Water Treatment Plant Operators takes samples on a bi-annual basis from raw water sources for a chemical analysis of common minerals and other chemical parameters (such as hardness). Results are checked against the *Guidelines for Canadian Drinking Water Quality* (see Appendix 1). Samples are also collected bi-annually from representative points throughout the distribution system and analyzed for disinfection by-products

5.2 TESTING PROGRAM

Treated water at the nine sampling sites is tested and sampled every week (see Appendix 3) by the water treatment plant operators, and one (1) sample each from our raw water sources at the water plant and the Metford dam site are also sampled and tested every week. Field tests are performed for temperature, pH, free and total chlorine, and turbidity. Samples are taken in accordance with the *20th Edition of Standard Methods for the Examination of Water and Wastewater*, and delivered to a certified laboratory for testing (ALS Environmental in Kamloops). The water is tested for total coliforms and E. Coli. All results are submitted to the Utilities Manager and Water Treatment/Distribution Chief Operator. In the event of a positive sample, the City of Salmon Arm and ALS will notify the IHA Drinking Water Officer. Depending on the location and type of positive test result, the City and Health Authority will institute one or more of the following responses in accordance with the Emergency Response Plan:

Did you know...?

- *You can refill an 8-oz glass of water approximately 15,000 times for the same cost as a six pack of soda.*
- *If all the world's water were fit into a gallon jug, the fresh water available for us to use would equal only about one tablespoon.*
- *There is the same amount of water on Earth as there was when the Earth was formed. The water from your faucet could contain molecules that dinosaurs drank.*

a) further testing to confirm the previous test results;
b) main flushing to remove stagnant water;
c) disinfection, if it appears to have contamination from an outside source; and
d) Boil Water Advisory, if there is a health risk to users.

The City has instituted an additional testing program. Random sites are periodically tested for pH, temperature, free and total chlorine, and turbidity. These sites are located in key locations on the extremities of the system known to have low flow or stagnant water conditions. This ensures that no biological re-growth is occurring within the system. When any of these parameters reach the set limits, flushing to refresh the water supply is instituted.

The health of our water system and public trust in it are issues the City takes seriously. Our Utilities Division staff work closely with Interior Health so that a program is in place that ensures our citizens are provided with safe and healthy drinking water.

New Water mains

Disinfection of a new water main is completed in accordance with AWWA C651-05. If the samples are not clean, the entire process is repeated.

"We forget that the water cycle and the life cycle are one"

Jacques Cousteau

6.0 CROSS CONNECTION CONTROL

Provincial legislation requires water suppliers to ensure that provisions are in place for the elimination and prevention of contamination between their potable water and any non-potable sources. The City of Salmon Arm adopted Cross Connection Control Bylaw No. 3934 the 22 day of October 2012 to assist with these requirements.

The City of Salmon Arm commenced work on the Cross Connection Control Program at the beginning of 2013 and the first properties were inspected in March 2013. Reports are issued to the property owners informing them of any cross connections and their obligations for compliance with the bylaw. Since 2013 a total of 264 properties have been surveyed and 296 are now compliant with the requirements of the bylaw.

Data from new inspections and existing Backflow Prevention Devices are being tracked using "FAST Online" software, by MTS. We are currently tracking 799 backflow devices on 395 properties.

There are currently 18 properties that have been surveyed that are not compliant and we hope to have most fully compliant by the end of 2024. We plan to survey between 10 and 20 additional properties this year, which we aim to have compliant by the end of 2024.

"Man - despite his artistic pretensions, his sophistication, and his many accomplishments - owes his existence to a six inch layer of topsoil and the fact that it rains."

Unknown author

7.0 WATERMAIN BREAKS

Most water utilities frequently experience minor disruptions. Pipes break, valves stick, hydrants leak and power outages occur. Although these are not anticipated, the problems experienced can usually be corrected with minimal disruption, and regular service can be quickly restored.

In 2023, our staff responded to and repaired two significant watermain breaks whereby the affected areas were isolated and the line repaired. (Note, service connections or hydrant breaks are

not included in this total).
In cases of water main breaks, the City adheres to the procedures set out in the American Water Works Association (AWWA) Standard C651-05 regarding water main chlorination prior to re-commissioning of the main.

Did you know ...?

- *The value of the in-ground assets of Canadian municipal water supply and wastewater systems totals over $100 billion.*
- *About 82% of Canadians (1994 data) are served by wastewater treatment plants, compared with 75% Americans, 86.5% Germans, and 99% Swedes.*
- *Less than 3% of the water produced at a large municipal water treatment plant is used for drinking purposes; during the summer, about half of all treated water is sprayed onto lawns and gardens.*

8.0 NOTIFICATION PROTOCOL

Normally, breaks or disruption to water service are caused by conditions that can be repaired and reinstated quickly, directly by City forces without risk to the public health. Sometimes however, situations arise that require extra care to guarantee that the integrity of our water infrastructure has not been compromised. The Utilities Department endeavours to keep the Medical Health Officer apprised of any extraordinary situations that may adversely affect the City's water system.

9.0 CAPITAL WORKS PROJECTS

Water main Upgrading

In addition to repairing water main breaks, aging water mains must be replaced. An ongoing replacement/preventative measures program is in place, targeting areas with older piping materials in susceptible condition and areas identified with inadequate fire flow. Future development is also factored into the overall plan.

Water Supply and Distribution System Upgrading

The following illustrates how many gallons of water it takes to do some everyday Things.

Brush Teeth	*2*
Flush Toilet	*2 to 7*
Run Dishwasher	*9 to 12*
Wash Dishes by Hand	*20*
Clothes Washer	*50*
10 Min Shower	*25 to 50*
Bath	*25 to 50*

Capital Projects and Studies and Assessments completed in 2023

- SCADA Replacement
- Fire Hydrant Infill Program
- Main Line Valve Installation Program
- WTP (Shuswap Lake)- Plant Improvements
- WTP (Shuswap Lake)- Particle Counters
- WTP (Shuswap Lake)- UV Hydraulic Cylinder
- WTP & Zone 1 PS Air Break/Pole
- Ross Street Underpass Water Upgrade
- TCH Watermain Upgrade
- Continued Zone 5 Booster Station Construction
- Continued Water Meter Implementation Plan
- Continue Source Protection Control Plan

Figure 7 – Capital Projects

10.0 WATER CONSUMPTION

Our community has an above average per capita water use when compared to other Canadian municipalities. City Council adopted Water Conservation Policy No. 519 in 2021 and were presented a draft Water Conservation Plan that was finalized in early 2022. The draft Water Conservation Plan showed reasonable water usage per capita for household use throughout the winter and shoulder seasons, but excessive usage throughout the summer season. Water Conservation recommendations have therefore been centred on reducing peak demand and irrigation usage.

Can I make a difference?

Yes, you can…

- *Wait until you have a full load before running the dishwasher or doing laundry.*
- *When brushing your teeth, turn the water off while brushing rather than leaving it running.*
- *Place a jug of water or a plastic insert (available at hardware stores) into the water tank of your toilet. This can save 45,000L in a household of four per year.*
- *Keep your lawn healthy and maintain at a height of 6.5cm. Taller grass holds water better, and a healthy lawn will choke out weeds.*
- *Clean sidewalks and driveways with a broom, not a hose.*
- *Avoid the use of pesticides and hazardous materials in your garden and yard.*

The City introduced staged water restrictions in 2023 to help achieve water conservation objectives, to minimize strain on the City's water system and for emergency preparedness. Due to the severe drought and nearby wildfires, the City implemented all stages (1-4) of the new water restrictions. Public compliance was excellent with an approximately 40% water reduction during Stage 4. Minor amendments to the water restrictions will be implemented in 2024 to address community concerns.

The City continued progress with other water conservation initiatives in 2023 including working on a Universal Metering Implementation Plan, continued public outreach and education and the excessive user program targeting high quantity water users for targeted education and enforcement.

See Appendix 5 and 6 for further total consumption data.

11.0 TEST RESULTS

The Guidelines for Canadian Drinking Water Quality, and the *British Columbia Drinking Water Protection Regulation* have established the following microbiological criteria:

- No sample should contain more than one total coliform organisms per 100 ml, none of which should be E. Coli;
- No two consecutive samples from the same site should show the presence of coliform organisms; and
- At least 90% of the samples must have zero total coliforms per 100 mL.

12.0 2023 CHALLENGES TO DRINKING WATER QUALITY

No Public Water Quality Advisory Notices were required during 2023, although the City of Salmon Arm did encounter some operational challenges in regards to our drinking water supply due to mechanical failures and unanticipated power outages.

The East Canoe Creek water source was unavailable for a longer than normal duration of the year due to the province wide draught conditions that were prevalent from June through to the fall.

13.0 SOURCE PROTECTION PLAN

The City is completing a Source Protection Plan and anticipates the report to be finalized in 2024.

14.0 CONCLUSION

The City of Salmon Arm has made significant progress in the implementation of BC's Drinking Water Protection Act and Regulations. While there is always ongoing work to do, City staff continue to work hard to maximize the safety and reliability of the water we deliver to our customers.

The City of Salmon Arm is pleased to present the 2023 Annual Water Quality Report, detailing the health and direction of our water system. If you have any questions about this report or want more information about water consumption and production, please contact the Engineering & Public Works Department at 803-4000.

CITY OF SALMON ARM

APPENDIX 1

CITY OF SALMON ARM
SOURCE WATER CHEMICAL ANALYSIS TEST RESULTS

Results Summary KS2302374

Project	THM/HAA/IHA Testing
Report To	Gerry Rasmuson, City of Salmon Arm
Date Received	04-Jul-2023 14:40
Issue Date	20-Jul-2023 11:02
Amendment	0
	Guideline Category:

Client Sample ID				Zone 5 Sample Stn. 4750 40th Ave. SE	Mt Ida Sample Stn. 7380 50th Ave SW	Metford Dam (Raw) 7101 10th Ave SE	Water Treatment Plant (Raw) 3751 Canoe Beach Dr NE
Date Sampled				04-Jul-2023	04-Jul-2023	04-Jul-2023	04-Jul-2023
Time Sampled				08:05	08:30	07:45	07:00
ALS Sample ID				KS2302374-001	KS2302374-002	KS2302374-003	KS2302374-004
Analyte	Guideline Limit	Lowest Detection Limit	Units	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water
Physical Tests (Matrix: Water)							
Conductivity		2.0	µS/cm			387	126
Absorbance, UV (@ 254nm), unfiltered		0.0050	AU/cm			0.0390	0.0600
Alkalinity, bicarbonate (as CaCO3)		1.0	mg/L			178	50.9
Alkalinity, carbonate (as CaCO3)		1.0	mg/L			5.6	<1.0
Alkalinity, hydroxide (as CaCO3)		1.0	mg/L			<1.0	<1.0
Alkalinity, phenolphthalein (as CaCO3)		1.0	mg/L			2.8	<1.0
Alkalinity, total (as CaCO3)		1.0	mg/L			184	50.9
Colour, true		5.0	CU			<5.0	<5.0
Hardness (as CaCO3), from total Ca/Mg		0.60	mg/L			194	54.6
Langelier index (@ 4°C)		0.010	-			0.807	-0.868
Solids, total dissolved [TDS]		10	mg/L			244	74
Turbidity		0.10	NTU			0.20	0.81
pH		0.10	pH units			8.40	7.78
Langelier index (@ 15°C)		0.010	-			0.981	-0.691
Transmittance, UV (@ 254nm), unfiltered		1.0	% T/cm			91.4	87.1
Langelier index (@ 20°C)		0.010	-			1.05	-0.616
Langelier index (@ 25°C)		0.010	-			1.12	-0.543
Langelier index (@ 60°C)		0.010	-			1.56	-0.092
Langelier index (@ 77°C)		0.010	-			1.76	0.111

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Anions and Nutrients (Matrix: Water)						
Ammonia, total (as N)		0.0050	mg/L		0.0131	0.0059
Chloride		0.50	mg/L		<0.50	1.42
Fluoride		0.020	mg/L		0.117	0.066
Kjeldahl nitrogen, total [TKN]		0.050	mg/L		<0.050	0.069
Nitrate (as N)		0.0050	mg/L		<0.0050	0.128
Nitrite (as N)		0.0010	mg/L		<0.0010	<0.0010
Nitrogen, total organic		0.050	mg/L		<0.050	0.063
Phosphorus, total		0.0020	mg/L		0.0025	0.0069
Sulfate (as SO4)		0.30	mg/L		23.0	8.12
Cyanides (Matrix: Water)						
Cyanide, strong acid dissociable (Total)		0.0050	mg/L		<0.0050	<0.0050
Organic / Inorganic Carbon (Matrix: Water)						
Carbon, total organic [TOC]		0.50	mg/L		1.86	2.15
Total Metals (Matrix: Water)						
Aluminum, total		0.0030	mg/L		0.0039	0.0321
Antimony, total		0.00010	mg/L		<0.00010	<0.00010
Arsenic, total		0.00010	mg/L		0.00020	0.00023
Barium, total		0.00010	mg/L		0.0309	0.0114
Beryllium, total		0.000100	mg/L		<0.000100	<0.000100
Bismuth, total		0.000050	mg/L		<0.000050	<0.000050
Boron, total		0.010	mg/L		<0.010	<0.010
Cadmium, total		0.0000050	mg/L		<0.0000050	<0.0000050
Calcium, total		0.050	mg/L		63.6	16.9
Cesium, total		0.000010	mg/L		<0.000010	<0.000010
Chromium, total		0.00050	mg/L		<0.00050	<0.00050
Cobalt, total		0.00010	mg/L		<0.00010	<0.00010
Copper, total		0.00050	mg/L		<0.00050	0.00161
Iron, total		0.010	mg/L		0.029	0.045
Lead, total		0.000050	mg/L		<0.000050	<0.000050
Lithium, total		0.0010	mg/L		0.0020	<0.0010
Magnesium, total		0.0050	mg/L		8.49	3.00
Manganese, total		0.00010	mg/L		0.00613	0.00563
Mercury, total		0.0000050	mg/L		<0.0000050	<0.0000050
Molybdenum, total		0.000050	mg/L		0.00118	0.000764

Nickel, total		0.00050	mg/L			<0.00050	<0.00050
Phosphorus, total		0.050	mg/L			<0.050	<0.050
Potassium, total		0.050	mg/L			1.71	1.18
Rubidium, total		0.00020	mg/L			0.00083	0.00131
Selenium, total		0.000050	mg/L			0.000202	0.000245
Silicon, total		0.10	mg/L			7.76	3.83
Silver, total		0.000010	mg/L			<0.000010	<0.000010
Sodium, total		0.050	mg/L			2.42	2.60
Strontium, total		0.00020	mg/L			0.448	0.112
Sulfur, total		0.50	mg/L			7.60	2.93
Tellurium, total		0.00020	mg/L			<0.00020	<0.00020
Thallium, total		0.000010	mg/L			<0.000010	<0.000010
Thorium, total		0.00010	mg/L			<0.00010	<0.00010
Tin, total		0.00010	mg/L			<0.00010	<0.00010
Titanium, total		0.00030	mg/L			<0.00030	0.00122
Tungsten, total		0.00010	mg/L			<0.00010	<0.00010
Uranium, total		0.000010	mg/L			0.000838	0.000477
Vanadium, total		0.00050	mg/L			<0.00050	0.00053
Zinc, total		0.0030	mg/L			<0.0030	0.0032
Zirconium, total		0.00020	mg/L			<0.00020	<0.00020
Volatile Organic Compounds [THMs] (Matrix: Water)							
Bromodichloromethane		1.0	µg/L	3.1	1.9		
Bromoform		1.0	µg/L	<1.0	<1.0		
Chloroform		1.0	µg/L	49.4	37.6		
Dibromochloromethane		1.0	µg/L	<1.0	<1.0		
Trihalomethanes [THMs], total		2.0	µg/L	52.5	39.5		
Volatile Organic Compounds [THMs] Surrogates (Matrix: Water)							
Bromofluorobenzene, 4-		1.0	%	99.3	97.0		
Difluorobenzene, 1,4-		1.0	%	98.5	98.1		
Haloacetic Acids (Matrix: Water)							
Bromochloroacetic acid		1.00	µg/L	<1.00	<1.00		
Dibromoacetic acid		1.00	µg/L	<1.00	<1.00		
Dichloroacetic acid		1.00	µg/L	14.4	11.0		
Monobromoacetic acid		1.00	µg/L	<1.00	<1.00		
Monochloroacetic acid		1.00	µg/L	1.48	1.53		

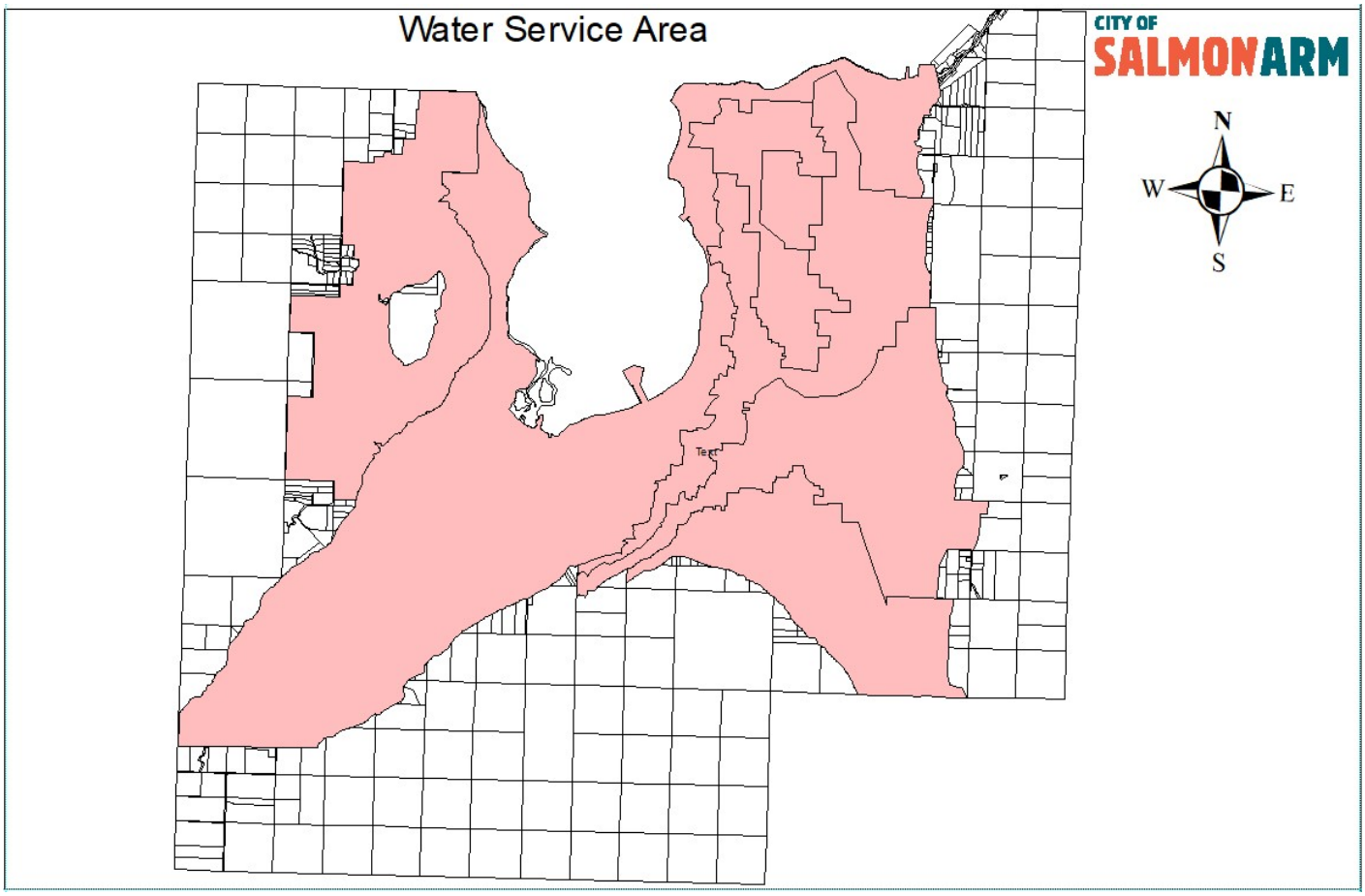
Trichloroacetic acid	1.00	µg/L	16.5	17.8		
Haloacetic acids, total [HAA5]	5.00	µg/L	32.4	30.3		
Organochlorine Pesticides (Matrix: Water)						
Aldrin	0.0080	µg/L				<0.0080
Chlordane, cis- (alpha)	0.0080	µg/L				<0.0080
Chlordane, total	0.011	µg/L				<0.011
Chlordane, trans- (gamma)	0.0080	µg/L				<0.0080
DDT + metabolites, total	0.010	µg/L				<0.010
DDT, 2,4'-	0.0040	µg/L				<0.0040
DDT, 4,4'-	0.0040	µg/L				<0.0040
DDT, total	0.0060	µg/L				<0.0060
Dieldrin	0.0080	µg/L				<0.0080
Endosulfan sulfate	0.0070	µg/L				<0.0070
Endosulfan, alpha-	0.0070	µg/L				<0.0070
Endosulfan, beta-	0.0070	µg/L				<0.0070
Endosulfan, total	0.010	µg/L				<0.010
Endrin	0.010	µg/L				<0.010
Endrin aldehyde	0.010	µg/L				<0.010
Heptachlor	0.0080	µg/L				<0.0080
Heptachlor epoxide	0.0080	µg/L				<0.0080
Hexachlorocyclohexane, alpha-	0.0080	µg/L				<0.0080
Hexachlorocyclohexane, beta-	0.0080	µg/L				<0.0080
Hexachlorocyclohexane, delta-	0.0080	µg/L				<0.0080
Hexachlorocyclohexane, gamma-	0.0080	µg/L				<0.0080
Hexachlorocyclohexane, total	0.016	µg/L				<0.016
Methoxychlor	0.0080	µg/L				<0.0080
Pentachloronitrobenzene	0.010	µg/L				<0.010
Aldrin + Dieldrin	0.011	µg/L				<0.011
Heptachlor + Heptachlor epoxide	0.011	µg/L				<0.011
Organochlorine Pesticides Surrogates (Matrix: Water)						
Decachlorobiphenyl	0.10	%				105
Tetrachloro-m-xylene	0.10	%				102
Herbicides (Matrix: Water)						
Bromacil	0.10	µg/L				<0.10
Bromoxynil	0.050	µg/L				<0.050

Linuron		0.10	µg/L				<0.10
Herbicides Surrogates (Matrix: Water)							
Dichlorophenylacetic acid, 2,4-		1.0	%				86.9
Pesticides (Matrix: Water)							
Alachlor		0.10	µg/L				<0.10
Atrazine		0.10	µg/L				<0.10
Atrazine + N-dealkylated metabolites		0.20	µg/L				<0.20
Atrazine-desethyl		0.10	µg/L				<0.10
Azinphos-methyl		0.10	µg/L				<0.10
Chlorpyrifos		0.10	µg/L				<0.10
Cyanazine		0.10	µg/L				<0.10
Diazinon		0.10	µg/L				<0.10
Diclofop-methyl		0.10	µg/L				<0.10
Dimethoate		0.10	µg/L				<0.10
Malathion		0.10	µg/L				<0.10
Metolachlor		0.10	µg/L				<0.10
Metribuzin		0.10	µg/L				<0.10
Parathion		0.10	µg/L				<0.10
Parathion-methyl		0.10	µg/L				<0.10
Phorate		0.10	µg/L				<0.10
Prometon		0.10	µg/L				<0.10
Prometryn		0.10	µg/L				<0.10
Simazine		0.10	µg/L				<0.10
Temephos		1.0	µg/L				<1.0
Terbufos		0.10	µg/L				<0.10
Triallate		0.10	µg/L				<0.10
Trifluralin		0.10	µg/L				<0.10
Diuron		0.050	µg/L				<0.050
Tebuthiuron		0.010	µg/L				<0.010
Pesticides Surrogates (Matrix: Water)							
Fluorobiphenyl, 2-		0.10	%				78.2
Terphenyl-d14, p-		0.10	%				95.9
(L) = Lower Limit							
(U) = Upper Limit							

CITY OF SALMON ARM

APPENDIX 2

CITY OF SALMON ARM
WATER SERVICE AREA


Water Service Area
CITY OF
SALMONARM
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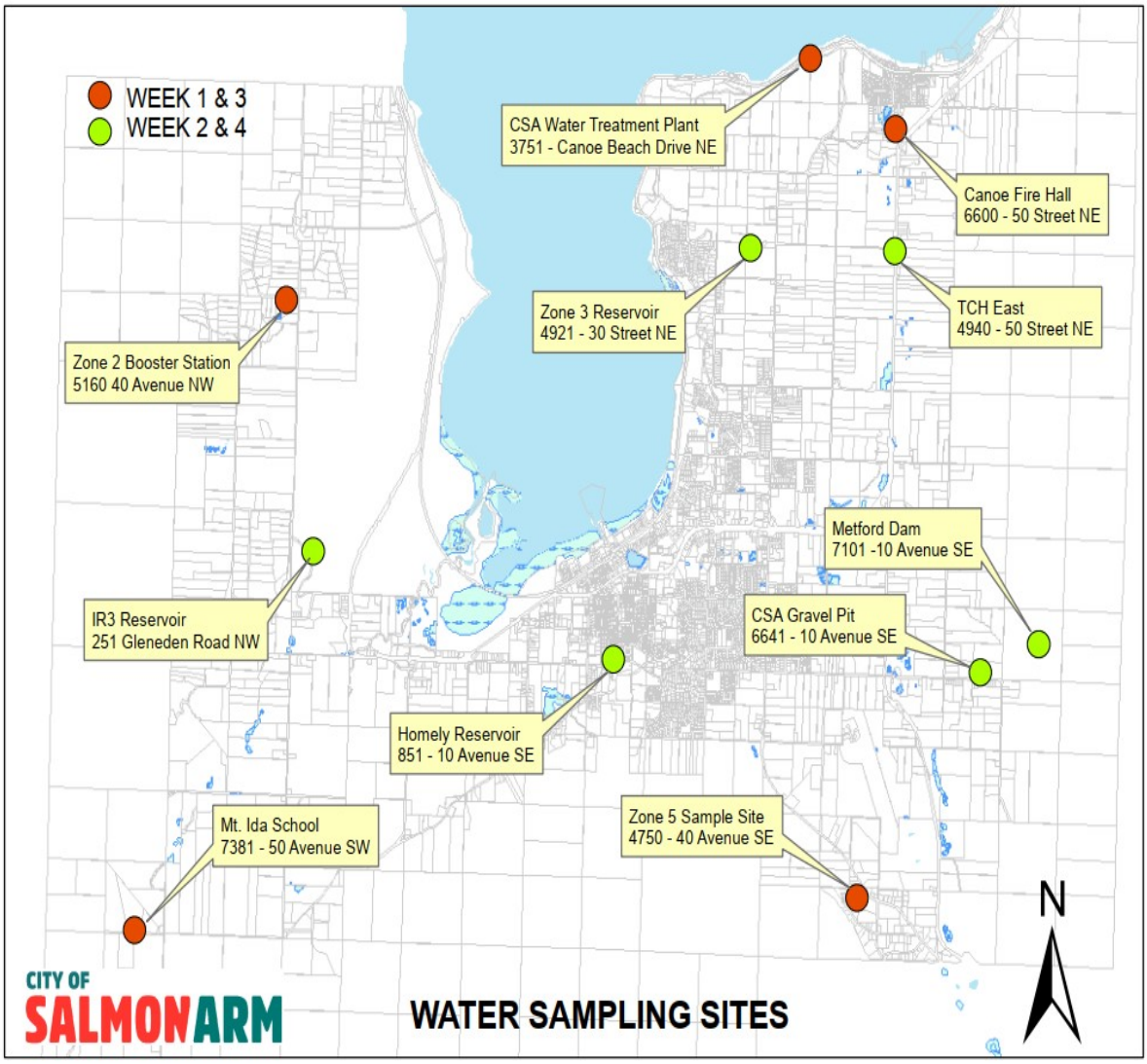
CITY OF SALMON ARM

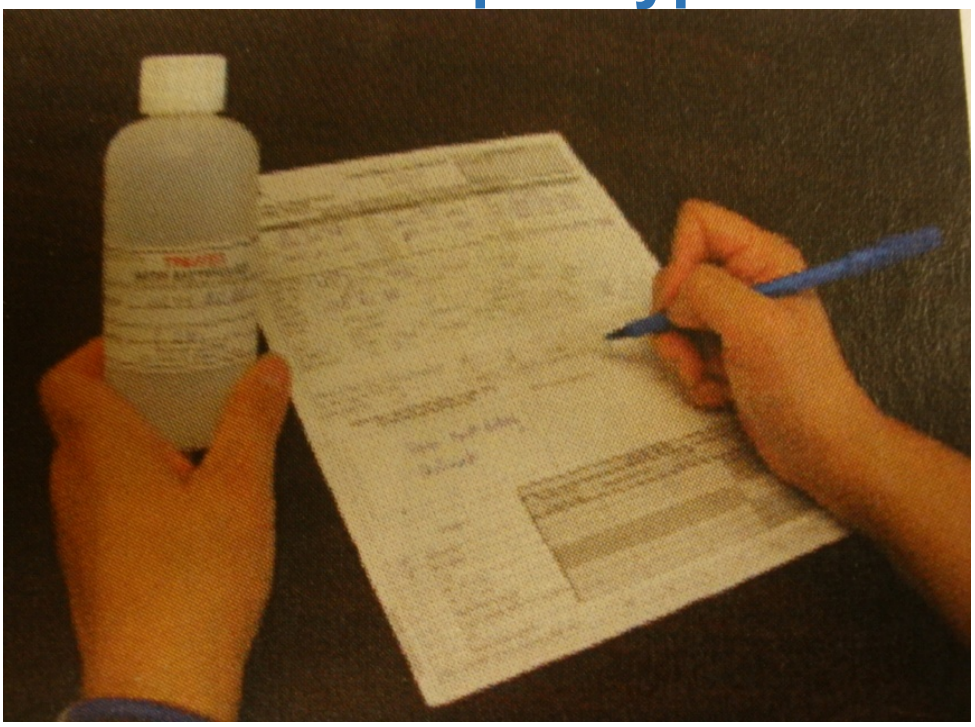
APPENDIX 3

INTERIOR HEALTH AUTHORITY
CITY OF SALMON ARM
WATER SAMPLE SCHEDULE


WEEK 1 & 3
WEEK 2 & 4
CSA Water Treatment Plant
3751 - Canoe Beach Drive NE
Canoe Fire Hall
6600 - 50 Street NE
Zone 3 Reservoir
4921 - 30 Street NE
TCH East
4940 - 50 Street NE
Zone 2 Booster Station
5160 40 Avenue NW
Metford Dam
7101 -10 Avenue SE
IR3 Reservoir
251 Gleneden Road NW
CSA Gravel Pit
6641 - 10 Avenue SE
Homely Reservoir
851 - 10 Avenue SE
Mt. Ida School
7381 - 50 Avenue SW
Zone 5 Sample Site
4750 - 40 Avenue SE
N
CITY OF
SALMONARM
WATER SAMPLING SITES

Subject: Water Samples	Effective Date: Feb 10 2011	Revision Due Date: June 2023	
Department: Water Services			
Author: Rick Webb			

City of Salmon Arm
Water Sample
Site Locations / Sample Procedures and Sample Types



3751 Canoe Beach Drive
Salmon Arm BC
VOE 1K0
250.832.2780

S.O.P. #: 007
Revision #: 7

Document History

Document Location

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

Directory Path to Document:
Intranet:\Safety\SOP's \Water\SOP 007 – Water Sample Procedure and Sites.docx

Revision History

Date of this revision: May 29 2014	Name: Rick Webb
Date of this revision: Nov 15/2015	Name: Rick Webb
Date of this revision: Jan 2017	Name Rick Webb
Date of this revision: Feb 25/2019	Name: Rick Webb
Date of this revision: Nov 26 2019	Name: Rick Webb
Date of this revision: Feb 24 2021	Name Rick Webb
Date of this revision: June 8 2023	Name Rick Webb

Approvals

This document requires following approvals:

Name:	Title:	Signature:
Gerry Rasmuson	Utilities Manager	
Robert Niewenhuisen	Director of Engineering/PW	

Distribution

This document has been distributed to:

Name:	Title:

Rick Webb	WTP Chief Operator lll
Marcus Miller	Water Treatment Plant Operator IV
Joe Reidford	Water Treatment Plant Operator IV
Cody Dube	Water Treatment Plant Operator IV
Devon Tulak	Water Treatment Plant Operator I
Brent Romyn	Water Treatment Plant lll

CITY OF SALMON ARM
WATER SAMPLING and REPORTING PLAN

- Testing of the City water system is done in accordance with the BC Ministry of Health regulations in agreement with the Interior Health Authority, Thompson Cariboo Shuswap Region.

- The frequency and quantity of water sample testing is determined on the basis of the number of water users on the system. Under the *Safe Drinking Water Regulation*, it is up to the medical officer in each region to establish the testing protocol, frequency and location of samples. As per the *Canadian Drinking Water Guidelines,* where the population is served 5,000 to 90,000 the number of samples per month is 1 per 1,000 population. (see page 5)

- The water sample test sites are at various locations within the Municipality that are furthest from the raw water sources/disinfection point and at present there are nine (9) test sites for treated water as well as two (2) sites for source water. The City of Salmon Arm's Water Quality Staff collects Samples from two sets of Sample sites on a four week rotation so that each site is tested twice a month. The week one set is comprised of five sample sites and the weeks two set is comprised of six sample sites. Each week from the appropriate site Samples are taken and tested for Total Coliform and Fecal Coliform (*E.Coli*).

- As directed by the *Drinking Water Protection Act and Regulations* a water supplier is required to have their bacteriological water monitoring analysis completed by an accredited laboratory that is approved by the Provincial Health Officer. The Bacteriological testing, as well as any other required water testing that the City needs, is at present is done by ALS Environmental Laboratories, 2B-1445 McGill Rd., Kamloops BC .

The company is a "*Certified Laboratory*" and approved by the BC Ministry of Health. The water samples are collected by the City Water Quality Staff, who are trained in the handling, sampling, storage and transportation of water samples as per the guidelines.

- Field Testing PH Instrument is calibrated each week before any sampling is done.

- Once a year both Raw Water Sources have a Comprehensive Chemical/Mineral Water Analysis done which is compared to the Canadian Drinking Water Guidelines. We also do Beach Samples from three locations at Canoe Beach during the summer months of June thru to September. Twice a year samples are taken from Zone Five Sample Stn. And the Mt. Ida Sample Stn. and tested for Trihalomethanes and Haloacetic Acids. Once a year in July we take a sample from the Water Treatment Plant and have a Pesticide test conducted.
- A list of the Water Sample Sites, Locations and the Water Sample Test Schedule and Procedures are listed starting on page 7.

Schedule A
Water Quality Standards for Potable Water

Parameter:	Standard:
Fecal coliform bacteria	No detectable fecal coliform bacteria per 100 ml
Escherichia coli	No detectable *Escherichia coli* 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

Schedule B
Frequency of Monitoring Samples for Prescribed Water Supply Systems

Population Served by the Prescribed Water Supply System:	Number of Samples Per Month:
less than 5 000	4
5 000 to 90 000	1 per 1 000 of population
more than 90 000	90 plus 1 per 10 000 of population in excess of 90 000

Important Notes

- Care must be taken not to contaminate lid or the top of the bottle when taking sample. Sanitize your hands before handling the bottles.

- Samples must be delivered to the top shop before 10 AM in order for the courier to deliver to Kamloops that day.

- Allow water to run approx. five (5) minutes to allow the standing water to be flushed out of the line and then a good representative sample can be collected.

- Fill all sampling containers to the appropriate levels and store in cooler with ice packs.

- Sample containers supplied by ALS may contain preservatives (if applicable). Use caution as the preservatives are *Corrosive. Do not dump* as they are necessary to ensure accurate results.

- Do not walk on the ice. Use an alternate sample location (upstream weir) when Metford Dam is frozen over.

Equipment Needed

- Appropriate PPE
- Cooler with 2 Ice Packs per Cooler
- ALS Chain - of - Custody (COC) Form for the sample week & Zip Lock-Bag
- Water Quality Site Form
- Colorimeter
- Turbidity Meter
- pH Meter
- Thermometer

Sample Types

- Bacteriological - Collected Weekly (Every Tuesday on a 4 week rotation – no samples on a week 5)
- Mineral - Collected Bi-annually (January & July)
- Beach Samples - Collected May, June, July, August And September
- Pesticides - Collected at the WTP once a year
- THM & HAA – collected Bi-annually (January & July)

Sample Types

Yearly Beach Sampling – Samples are to taken from the beach at the East end, Center, and West End. The samples are to be taken in June, July, August and September of each year. Samples should be taken at the point in the water where bathers would be wading, usually thigh deep. The actual sample should be taken at 15 to 30cm in depth. The bottle should be pushed ahead, underwater, and not be completely filled, to allow for the specimen to be shaken during testing. Sampling is best undertaken when the beach is in use, with many bathers present. This will present a worst-case scenario, and mirror the risk to which the bathers are exposed. Experience has indicated the time of sampling can influence results. That is, samples taken in the early morning, when the water is calm and there are no swimmers, will result in low bacterial counts. Samples taken later in the day when the wind is blowing and/or bathers are present will result in higher numbers. Send these tests to Interior health for shipping. We are a "Low Risk Hazard" swimming area. Refer to sampling SOP attached.

Mineral samples - Samples are to be taken from both raw water sources. We will sample in January and July of each year. Bottles will be provided by CARO services.

THM and HAA Samples – Samples are to be taken from the furthest point of use (Mt Ida sample site) and twice per year in January and July. Temperature affects results. When Metford Dam is on line we will grab a set of these samples from Zone 5 sample site as well. Refer to sampling SOP attached.

Pesticides – Sample will be taken once per year from the Water Treatment Plant raw water sample pump located in the lab.

Bacteriological Sample Schedule

Treated Sample Site Names		Sample Site Address
Week 1 & 3	Canoe Fire Hall	6600 – 50th Street NE (Salmon Arm)
Week 1 & 3	Mt Ida. School	7381 – 50th Avenue SW (Salmon Arm)
Week 1 & 3	Zone 5 Sample Site	4750 – 40th Avenue SE (Salmon Arm)
Week 1 & 3	Zone 2b Booster Stn.	5160 40th Ave NW (Salmon Arm)
Week 2 & 4	TCH East	4040 50th Street NE (Salmon Arm)
Week 2 & 4	IR3 Reservoir	251 Gleneden Road NW (Salmon Arm)
Week 2 & 4	Zone 3 Reservoir	4921 – 30th Street NE (Salmon Arm)
Week 2 & 4	DSA Gravel Pit (Alternate)*	6641 10th Avenue SE (Salmon Arm)
Week 2 & 4	Homely Reservoir	851 – 10th Avenue SE (Salmon Arm)

Raw Water Sample Site		Sample Site Address
Week 1 & 3	City of Salmon Arm WTP	3751 – Canoe Beach Drive NE (Salmon Arm)
Week 2 & 4 *	Metford Dam	7101 – 10th Avenue SE (Salmon Arm)

City of Salmon Arm gravel pit is an alternate site when Metford Dam is not in use.

Sample Site Locations

Water Treatment Plant

3751 Canoe Beach Dr NE

Fire Hall #1

6600 50th St NE

TCH EAST

4940 50th St NE

CSA Gravel Pit

6641 10th Ave SE

Metford Dam

7101 10th Ave SE

Zone 5 Sample Station

4750 40th Ave SE

Mt. Ida Sample Station

7380 50th Ave. SW

Zone #3 Reservoir

4921 30th St NE

Zone 2B Booster Stn.
5160 40th Ave. NW

IR #3 Reservoir
251 Gleneden Road

Homely Reservoir
851 10th Ave SE

Sampling Procedure for Bacteriological Sampling

1. Water samples are collected once per week, typically every Tuesday on a four (4) week rotation. Use only the bottles provided by the Lab (ALS) that are specifically for coliform testing.

2. The day prior to sample day, prepare the Chain of Custody (COC) Form on the computer and print. After sanitizing your hands, and taking care not to handle the bottles by the lid or neck, fill in the information label on the sample bottles for each site.

3. On sample day proceed to each site and flush the water for two (2) to five (5) minutes. **Do not rinse the bottles or open them until ready to take the sample. The bottles are sterile.** The sample bottles contain a chemical that destroys any residual chlorine in the water which would otherwise kill any bacteria in the water sample, yielding incorrect results.

4. Make sure that there is no aerator or swivel at the sample point. A good practice would be to torch any sample ports exposed to the elements.

5. After sanitizing your hands, record the current time on the bottle. Holding the bottle near the base, fill with water to a point between the shoulder and the neck of the bottle. Immediately replace the lid snuggly and place the sample bottle in the cooler with the ice packs. Record the time on the COC Form.

6. Using separate sample water, test the water for chlorine (free and total), pH, temperature and turbidity and record on the Water Quality Site Form.

7. When all sites have been sampled, tested and the information recorded on the COC Form, fold the COC form and place in the zip-lock bag. Place COC form in the cooler with the sample bottles.

8. Advise the Purchaser that water samples are ready to go out. Deliver the cooler to the Top Shop before 10 AM.

9. Make a copy of the Water Quality Site Form. Keep the original to file at the water plant and give the copy to the receptionist for the Utilities Manager.

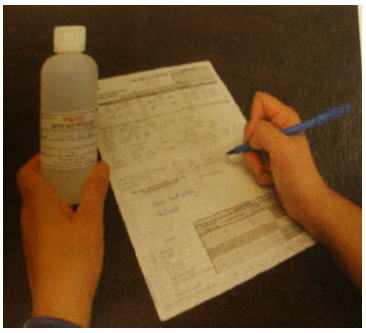
Sample Procedure for Mineral Samples

1. Mineral samples are taken twice a year, once in January and once in July.
2. Use the bottles supplied by ALS for mineral samples. Set of 4 bottles used, see picture of bottles at right.

3. Samples are to be taken from the Water Treatment Plant Raw Water Line and from the reservoir at Metford Dam.
4. On the day prior to sampling, enter the data on the Chain of Custody (COC) Form on the computer and print. Fill in the information label on the sample bottles for each site.
5. On sample day, open the Raw Water sample valve at the WTP and let run for at least five (5) minutes.
6. Record the current time on the bottle, fill to the neck of the bottle, replace the lid snuggly and place the sample bottles in the cooler with the ice packs.
7. Proceed to Metford Dam and record the time on the bottles. Dip the bottles in the reservoir to collect the samples. Place bottles in the cooler with the WTP raw water samples.
    * *If reservoir is frozen over, collect sample from the upstream weir.*

Sample Procedure for Beach Samples

1. Beach samples are taken once a month for the months of June, July, August and September.
2. The day prior to sampling, complete the Requisition Form supplied by Interior Health for the appropriate month.

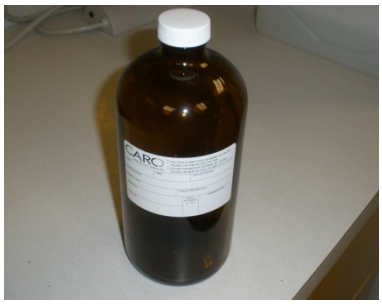


3. Using bottles supplied by Interior Health, complete the information label on the bottles. Record the time the sample is collected immediately prior to collecting the sample.
4. Beach samples are to be taken at a time when the Beach is in use (noon) and taken from three different points on the beach: west end, middle and east end. Samples must be taken in at least 30” of water and at a depth of 6” to 12” below the surface of the water. Replace lid and tighten snuggly.
5. Place the completed Requisition Form for the appropriate sample in a zip-loc bag and attach the sealed bag to its corresponding bottle with an elastic band
6. Place filled bottles in the cooler with the ice packs
7. Take the cooler with the bottles to the Interior Health Facility on corner of Tenth Ave. NE and 16th St. NE

Procedure for Pesticide Samples

1. Pesticide samples are taken once a year from the raw water line at the Water Treatment Plant.
2. The day prior to sampling, enter the data on the Chain of Custody (COC) Form on the computer print. Fill in the information label on the sample bottles.

3. On sample day, open the raw water sample valve and let run for five (5) minutes. Using the bottles supplied by ALS (2 – 1 liter amber bottles), record the time on the bottle, collect the samples filling to the shoulder of the bottle, replace lid, tighten snuggly and then place in cooler with the ice packs.



Procedure for THM & HAA Samples

1. THM & HAA samples are taken twice a year; once in January and once in July
2. The day prior to sampling, enter the data on the Chain of Custody (COC) Form on the computer and print. Fill in the information label on the sample bottles.
3. The samples are collected from the Zone Five Sample Stn. and the Mt. Ida Sample Stn.
4. The samples are collected in special bottles supplied by ALS. There are three bottles for each test. Check the preservative to confirm you have the right bottle.(see below)

Amber

THM
Preservative – Na2S2O3
Sodium Thiosulophate

Clear or Amber

HAA
Preservative – NaHSO4
Sodium Bisulphate

5. Let the water run for five (5) minutes before collecting the sample. Fill each bottle to overflowing so that there is a positive meniscus, place the bottle on a level surface and tighten the cap snuggly. Check the bottle to make sure that there is no air in it, if there is air

present in the bottle, remove the cap and top up the bottle and then replace the lid and check again for air. Repeat until all air is removed from the sample bottle.

6. Place sample in cooler with the ice packs.

CITY OF SALMON ARM

APPENDIX 4

INTERIOR HEALTH AUTHORITY
CITY OF SALMON ARM WATER SYSTEM
BIOLOGICAL MONITORING REPORTS

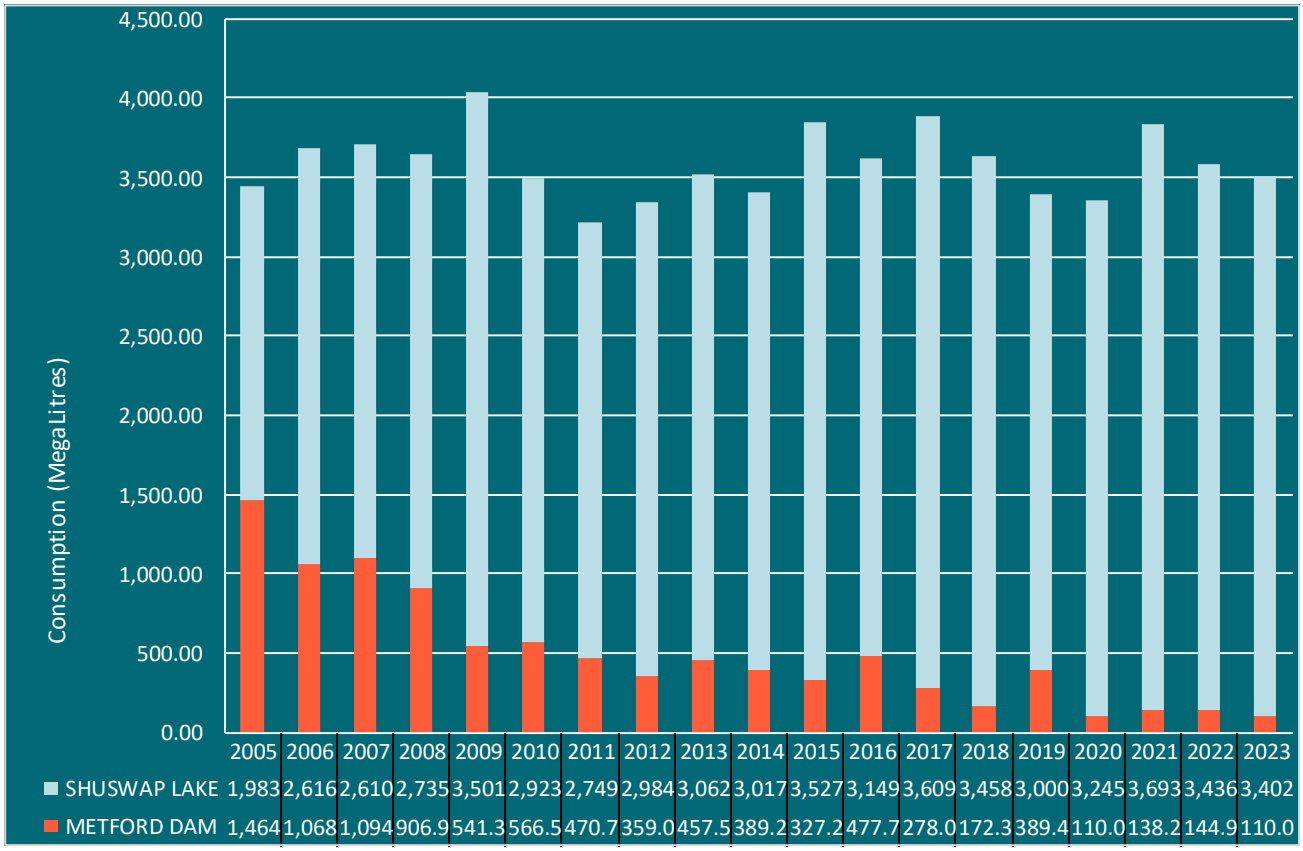
Date	Water Treatment Plant (raw)			Fire Hall #1			Zone 5 Sample Stn			Mt Ida Sample Stn			Zone 2B Pump Station			Sample Retests			Additional Samples		
2023	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over
3-Jan-23	<1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
17-Jan-23	<1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
7-Feb-23	1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
21-Feb-23	<1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
7-Mar-23	<1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
21-Mar-23	<1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
4-Apr-23	<1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
18-Apr-23	1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
2-May-23	<1	<1		<1	<1		<1	<1		<1	<1		<1	<1							
16-May-23	21	1		<1	<1		<1	<1		<1	<1		<1	<1							
6-Jun-23	55	1		<1	<1		<1	<1		<1	<1		<1	<1							
20-Jun-23	20	<1		<1	<1		<1	<1		<1	<1		<1	<1							
4-Jul-23	81	<1		<1	<1		<1	<1		<1	<1		<1	<1							
17-Jul-23	55	<1		<1	<1		<1	<1		<1	<1		<1	<1							
1-Aug-23	22	<1		<1	<1		<1	<1		<1	<1		<1	<1							
15-Aug-23	130	<1		<1	<1		<1	<1		<1	<1		<1	<1							
5-Sep-23	32	<1		<1	<1		<1	<1		<1	<1		<1	<1							
19-Sep-23	727	<1		<1	<1		<1	<1		<1	<1		<1	<1							
17-Oct-23	345	<1		<1	<1		<1	<1		<1	<1		<1	<1							
31-Oct-23	82	1		<1	<1		<1	<1		<1	<1		<1	<1							
14-Nov-23	86	<1		<1	<1		<1	<1		<1	<1		<1	<1							
28-Nov-23	2	<1		<1	<1		<1	<1		<1	<1		<1	<1							
12-Dec-23	6	<1		<1	<1		<1	<1		<1	<1		<1	<1							

Date	Zone # 3 Reservoir			TCH East			CSA Gravel Pit			Metford Dam (raw)			Homely Reservoir			IR #3 Reservoir			Sample Retests			Additional Samples		
2023	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over	Total	E.Coli	Over
11-Jan-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
24-Jan-23	<1	<1		<1	<1		<1	<1		16	<1		<1	<1		<1	<1							
14-Feb-23	<1	<1		<1	<1		<1	<1		22	<1		<1	<1		<1	<1							
28-Feb-23	<1	<1		<1	<1		<1	<1		10	1		<1	<1		<1	<1							
14-Mar-23	<1	<1		<1	<1		<1	<1		16	<1		<1	<1		<1	<1							
29-Mar-23	<1	<1		<1	<1		<1	<1		9	<1		<1	<1		<1	<1							
11-Apr-23	<1	<1		<1	<1		<1	<1		6	<1		<1	<1		<1	<1							
25-Apr-23	<1	<1		<1	<1		<1	<1		26	1		<1	<1		<1	<1							
9-May-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
16-May-23	<1	<1		<1	<1		<1	<1		120	<1		<1	<1		<1	<1							
13-Jun-23	<1	<1		<1	<1		<1	<1		131	<1		<1	<1		<1	<1					<1	<1	
27-Jun-23	<1	<1		<1	<1		<1	<1		102	1		<1	<1		<1	<1							
11-Jul-23	<1	<1		<1	<1		<1	<1		1380	17		<1	<1		<1	<1							
25-Jul-23	<1	<1		<1	<1		<1	<1		2420	23		<1	<1		<1	<1							
8-Aug-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
22-Aug-23	<1	<1		<1	<1		<1	<1		1730	<1		<1	<1		<1	<1							
12-Sep-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
26-Sep-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
10-Oct-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
24-Oct-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
7-Nov-23	<1	<1		<1	<1		<1	<1		n/a	n/a		<1	<1		<1	<1							
21-Nov-23	<1	<1		<1	<1		<1	<1		73	<1		<1	<1		<1	<1							
5-Dec-23	<1	<1		<1	<1		<1	<1		104	<1		<1	<1		<1	<1							
19-Dec-23	<1	<1		<1	<1		<1	<1		44	<1		<1	<1		<1	<1							

CITY OF SALMON ARM

APPENDIX 5

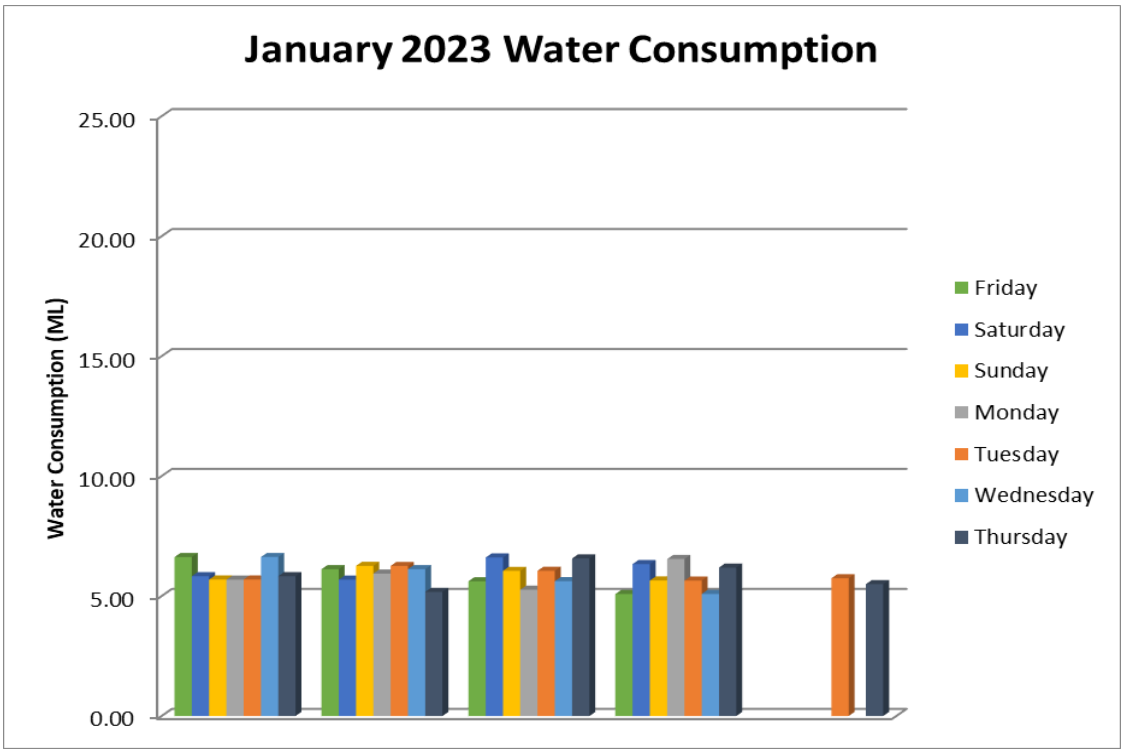
ANNUAL WATER CONSUMPTION 2005 TO 2023

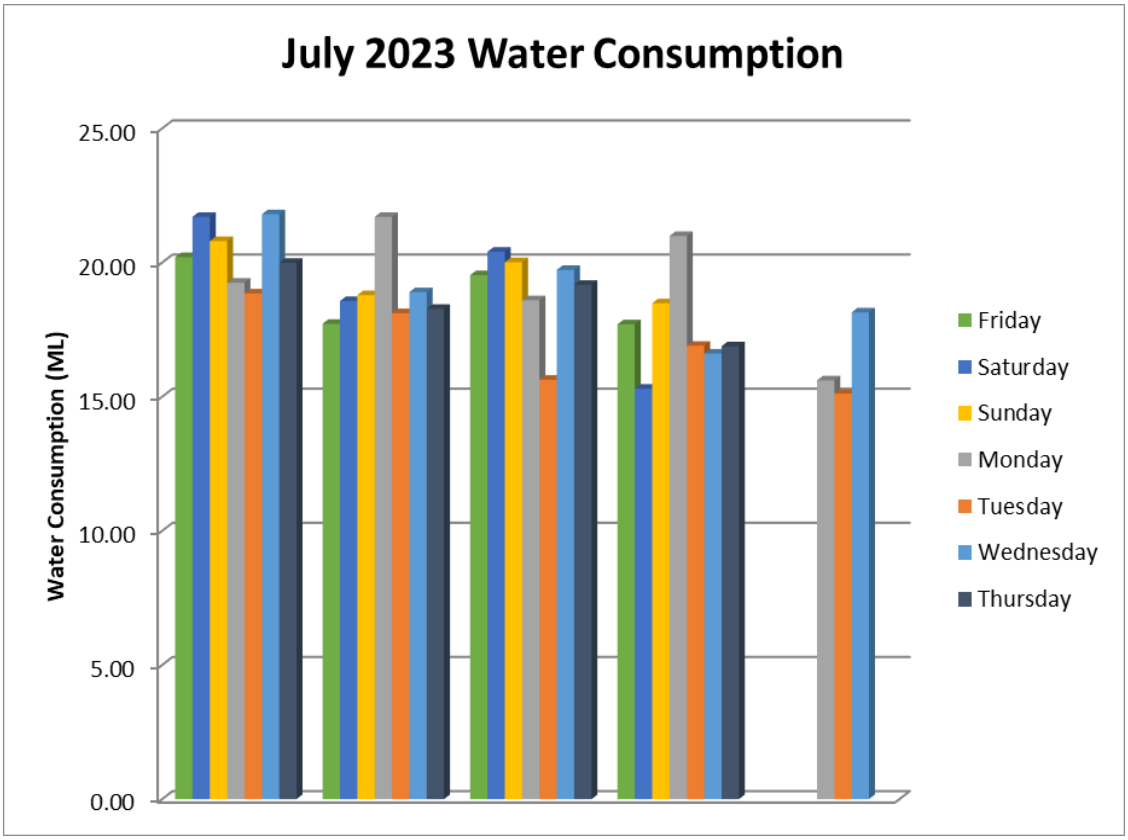

4,500.00
4,000.00
3,500.00
3,000.00
2,500.00
2,000.00
1,500.00
1,000.00
500.00
0.00
Consumption (Mega Litres)
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
SHUSWAP LAKE 1,983 2,616 2,610 2,735 3,501 2,923 2,749 2,984 3,062 3,017 3,527 3,149 3,609 3,458 3,000 3,245 3,693 3,436 3,402
METFORD DAM 1,464 1,068 1,094 906.9 541.3 566.5 470.7 359.0 457.5 389.2 327.2 477.7 278.0 172.3 389.4 110.0 138.2 144.9 110.0

CITY OF SALMON ARM

APPENDIX 6

JANUARY AND JULY WATER CONSUMPTION COMPARISON


January 2023 Water Consumption
Water Consumption (ML)
25.00
20.00
15.00
10.00
5.00
0.00
Friday
Saturday
Sunday
Monday
Tuesday
Wednesday
Thursday


July 2023 Water Consumption
Water Consumption (ML)
25.00
20.00
15.00
10.00
5.00
0.00
Friday
Saturday
Sunday
Monday
Tuesday
Wednesday
Thursday

CITY OF SALMON ARM

APPENDIX 7

MAINTENANCE PROGRAM

SYSTEM MAINTENANCE

Regular inspections, maintenance and water quality testing is performed by certified operators to ensure optimal operation of the City's water system.

To assist the operators of our water system, the City purchased a new, state of the art, maintenance management program in 2009.

Maintenance of the Salmon Arm water system involves five key programs:

1) Air Valves – servicing and upgrading.
2) Water mains – flushing, scouring for taste and odour control.
3) Hydrants – servicing, painting and upgrading.
4) Reservoirs – inspection and cleaning.
5) Clearing of trees and brush along City rights of ways

As replacement of the entire distribution grid is not financially viable, system maintenance becomes a critical component in the management of the water infrastructure.

ANNUAL MAINTENANCE PROGRAM

Air Valves
Turbulence created in the water as it flows through the system causes some of the dissolved air in the water to collect as bubbles in the pipes. These air bubbles collect at the high points in the system and restrict water flow. We have approximately 109 air valves installed in below-ground chambers that automatically bleed air from the pressurized piping system. If an air valve failed, negative pressures could allow groundwater to infiltrate and contaminate the water system. Air valves receive regular maintenance as required and are replaced at the end of their service life, which is approximately 20 years.

Water mains
Water main maintenance involves both the upgrading of aging water mains and ensuring that existing water mains are operating effectively.

Water Main Flushing

As water travels from the watersheds, it collects organic particles and transports them to the water system. As these particles travel to areas of the water system with lower flow velocities they settle out. Accumulated debris and stagnant water inhibit flow through mains, cause dirty water and potentially create a favorable environment for bacterial growth. In response to these concerns, the Utilities Department initiated a water main flushing program for identified problem areas. Each main is flushed annually during daytime hours. When flushing, a hydrant is opened and the water stream is used to expel the contents of the main. There are approximately 47 locations throughout the municipality referred to as “high maintenance areas” where water demand is low or where water mains terminate in a dead end. These areas are flushed as required, sometimes as often as every month during the summer.

Hydrant Maintenance

To ensure proper fire protection, Salmon Arm implemented a fire hydrant maintenance program. The program requires staff to check the pressure on each hydrant before it is serviced and dismantles each hydrant, renewing worn parts as necessary. The hydrant is then lubricated and reassembled. All hydrants get an overhaul biannually.

Reservoir Maintenance

Debris can accumulate in reservoirs and bacteria and algae can grow on the walls. Each year, the Utilities Department staff cleans and services two different reservoirs. The program involves decommissioning the reservoir, draining it, removing any sediment, repairing leaks, and disinfection. The reservoir is then refilled, chlorinated and tested for water quality. This program requires approximately two to four days to complete before the reservoir can be brought back into service.

CITY OF SALMON ARM

APPENDIX 8

WATER CONSERVATION POLICY

CITY OF SALMON ARM POLICY NO. 519
TOPIC: Water Conservation

POLICY: The City of Salmon Arm Water Conservation Policy

PURPOSE: To establish the basic direction, philosophies, and values for the conservation of water within the City of Salmon Arm, in order to enable the achievement of the City's vision and goals as stated in the Official Community Plan.

Scope

i. This policy applies to all City departments and other entities that manage or influence water service delivery.
ii. This policy applies to all city assets involved in water service delivery, which means all items, things, or entities which have actual or potential value to the organization. This includes but is not limited to infrastructure, staff, knowledge, data and information, and finances.
iii. This policy applies to all properties and residents receiving domestic water supply from the City's water supply network.

Principles

1. **Responsible and Risk-based:**
   The City recognizes that responsible municipal water management is necessary for effective and efficient development, operations, and delivery of potable water resources. The City will manage the risks and benefits associated with attaining water conservation goals by focusing resources, expenditures, and priorities based upon risk assessments and the corresponding cost/benefit recognizing that public safety is the priority.

2. **Long Term Sustainability:** The City believes that services and assets should be socio-culturally, environmentally, and economically sustainable into the long term. This will involve triple bottom line considerations where appropriate, long-term planning, climate change awareness, and implementing resiliency actions. The City will make appropriate long-term decisions and provisions to better enable our assets to meet the challenges of customer expectations, legislative requirements, climate change impacts, and future generations.

3. **Ecologically Positive:**
   The City takes protection of the environment seriously and will hold our water conservation practices to ecologically positive concepts. Drinking water is one of the most needed and important resources in the world, one that is only truly renewable if it is effectively managed and used wisely. The City values and promotes a water conservation lifestyle to help ensure a safe and reliable water supply for the present and future needs of the community.

Policy

1. **Water Conservation Planning**
   The City will create and maintain a *Water Conservation Plan* that embodies the Principles listed in this Policy. The plan will be updated at minimum every five (5) years and will outline the City's current Water Conservation Goals along with a draft work plan outline for achieving the goals.

2. **Water Conservation Awareness**
   The City will promote awareness of water conservation goals, challenges and successes to the community. Public engagement, education and awareness is key to the success of water conservation initiatives.

3. **Sustainable Service Delivery**
   Water conservation is a powerful tool for overall sustainable *Asset* service delivery. Water conservation strategies shall be identified and prioritized in conjunction with the City's *Asset Management* practices to delay infrastructure upgrades, reduce system risks and deliver sustainable water service to the community.

4. **Emergency Preparedness**
   The City will use water conservation programs to help ensure water demand is available for unforeseen emergencies such as a major service disruption and firefighting.

5. **Environmental Awareness**
   The City shall consider climate change impacts and system resiliency when evaluating water conservation strategies.

RELATED POLICIES AND DOCUMENTS

- The City of Salmon Arm Official Community Plan
- The City of Salmon Arm Water Conservation Plan

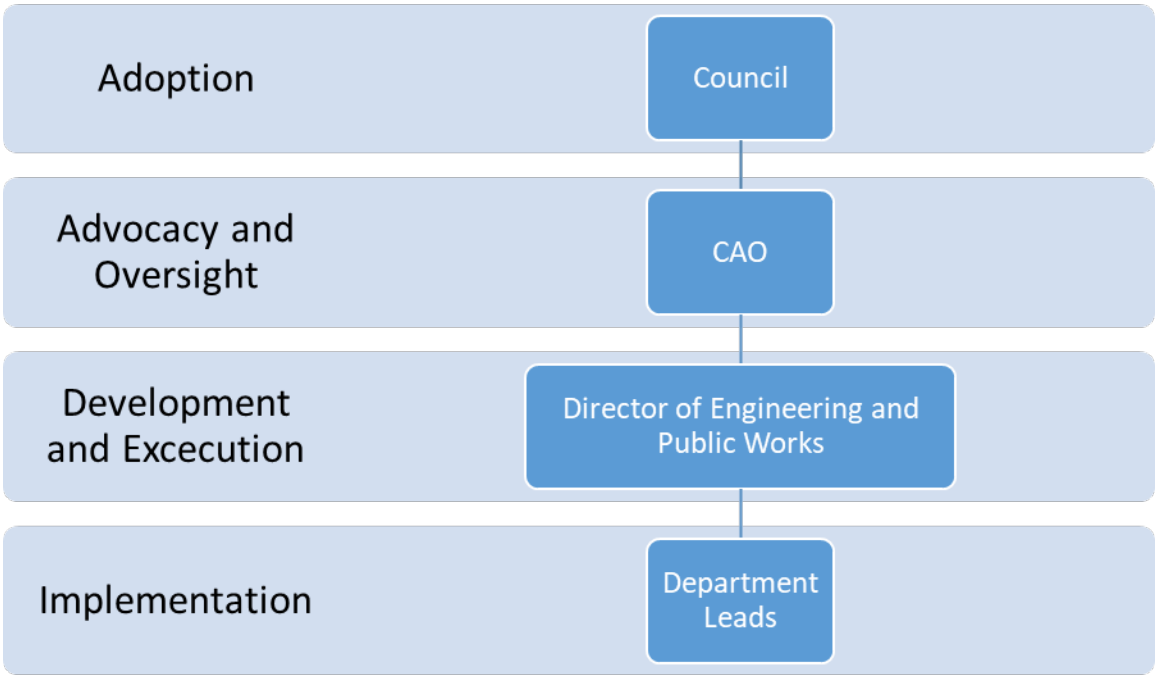
ROLES AND RESPONSIBILITIES

City Council is responsible for adopting the Water Conservation Policy and allocating resources for the implementation of the Water Conservation Program.

CAO is responsible for advocacy and oversight of the implementation of the Water Conservation Program.

Director of Engineering and Public Works is responsible for creating and maintaining the *Water Conservation Plan* and implementing and maintaining water conservation programs within their service area as identified within the *Water Conservation Plan*.

Department Leads are responsible for ensuring implementation of water conservation programs as identified within the *Water Conservation Plan* within their service area.



TERMS AND DEFINITIONS

Asset is an item, thing or entity that has potential or actual value to an organization. The value can be tangible or intangible, and financial or non-financial.

Asset management (AM) is an integrated approach, involving all municipal departments, to choosing and managing existing and new assets. The intent is to maximize benefits, reduce risks, and provide satisfactory levels of service to the community in a sustainable manner. Good AM practices are fundamental to achieving sustainable and resilient communities.

Water Conservation Plan is documentation that identified specific water conservation goals and objectives. The plan also specifies the activities, Resources, and time scales required to achieve the organization's water conservation objectives. A *Water Conservation Plan* should define the activities to be undertaken with regard to water conservation, and should have specific and measurable objectives (e.g., time frames and the resources to be used).

Prepared By: City Engineer	Date: August 16, 2021
Approved by Council	Date: August 23, 2021
Amended or replaced by Council	Date: