

WATER QUALITY REPORT 2010



Salmon Creek



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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 understandable 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 [Drinking Water Protection Act and Regulations](http://www.qp.gov.bc.ca/statreg/stat/D/01009_01.htm) passed May 16, 2003 (http://www.qp.gov.bc.ca/statreg/stat/D/01009_01.htm) by the Province of BC and the [Guidelines for Canadian Drinking Water Quality](http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html), 2006 edition (http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html).

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 insure consistent safe drinking water for the growing population of Salmon Arm and to meet new potable water regulations.

3.0 WATER SYSTEM OVERVIEW

The municipal water supply is via three (3) sources, East Canoe Creek at Metford Dam, Shuswap Lake at Canoe Beach and a minor water supply from Rumble Creek for irrigation at the Mt. Ida Cemetery (Figure 1). Water treatment for the system consists of a new water treatment plant for the Shuswap lake intake and chlorine treatment system for the Metford Dam intake. The treatment plant has a design capacity of 40 MLD and this capacity was reached during a warm spell during the 2009 summer. From the Water Plant, water is pumped into 12 reservoirs in different locations throughout the city and also water is supplied to fill the Adams lake Band reservoir. There are 3 booster pump stations and 7 different pressure zones due to elevation changes in the city of Salmon Arm. The distribution system includes approximately 204 km of water main varying in diameter from 100 mm to 1000 mm. It also includes eight (8) different pressure zones, thirteen (13) reservoirs, one dam and six pump stations.

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; Canada'
- 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

The public water system services an area of approximately 7,290 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	0.5 km	Majority installed prior to 1978
Ductile Iron	18.9 km	Ductile iron is still used in some applications in Salmon Arm
PVC	90.5 km	Most pipe installed since 1979 has been PVC
Asbestos Cement	93 km	Majority installed prior to 1978
High Density Polyethylene	0.8 km	Used for specialized applications

Figure 2 - Pipe materials in service in Salmon Arm

3.0 WATER SYSTEM OVERVIEW *(continued)*

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

Benjamin Franklin

Shuswap Lake is at a nominal elevation of about 347 m (1135 ft.) Geodetic Survey of Canada (GSC) datum while the Medford 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.

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;
- peak summer water demands that exceed the low natural summer flows in the creek; and
- intermittent high coli form counts, which cause the shutdown of the Metford Dam intake and required the use of Shuswap Lake as the sole water source.

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 (2020 ft.) GSC above sea level. Water has to be pumped over 269 m (885 ft.) in elevation from Shuswap Lake to the storage reservoir at the highest elevation.

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.

2010 Water Production (CU.M.) by Source
Total 3,491,511 CU. M

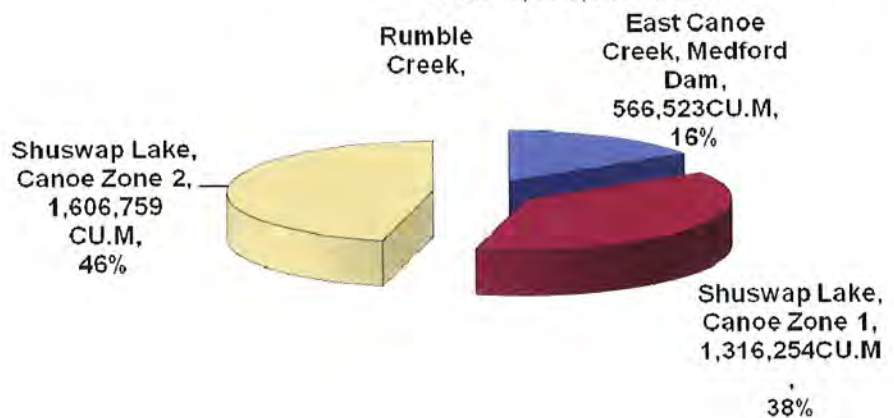


Figure 3 - Water Source Distribution

3.0 WATER SYSTEM OVERVIEW *(continued)*

Water treatment Plant

The New Water Plant was put on line May 12th, 2009 and the water quality has improved dramatically for the city residents. Process involves coagulation, filtration, UV treatment and disinfection with added disinfection contact time in the new onsite reservoir. Intake piping changes have taken place to draw water from the new water plant instead of directly from the lake. The current structure remains the same although plans are in place to add extra high lift pumps to improve pumping capacity and flow consistency.

Water Pumping Stations

The municipal water system includes 14 water storage facilities and six 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 discontinued 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 21 pumps with a service life of approximately 40 to 50 years for each pump.

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

Loran Easley
(Anthropologist),
The Immense
Journey, 1957



Figure 4 - Zone 1 Pumping Station Canoe

3.0 WATER SYSTEM OVERVIEW *(continued)*

System Control – “SCADA” (Supervisory Control And Data Acquisition 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 is notified.

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**

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 valve stations containing one Pressure-reducing valve (PRV) each. 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 overhauls 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.



Figure 5 – Zone 4 Pump/Pressure Reducing Station on 30th Street NE

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

Author unknown

3.1 Water System Value

The total value of our primary water distribution system, as detailed in Figure 6 below, is approximately \$80,160,000. We budgeted \$4,650,000 in 2010 or approximately 6.0%, on water infrastructure replacement. 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.

System Components	Quantity in Use in Salmon Arm	Approximate Replacement Cost
Water mains	204 km	\$ 50,500,000
Treatment Plant	1	\$ 16,000,000
Reservoirs/Tanks	13 Reservoirs/ 1 Dam	\$ 8,700,000
Pumping Stations	6	\$ 6,000,000
System Control	1	\$ 460,000
Total		\$ 80,660,000

Figure 6 - Infrastructure replacement value

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.

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

4.0 STAFFING (continued)

Between 1972 and 1991, Canada's withdrawal of freshwater resources increased from 24 billion cubic meters/year to over 45 cubic meters/year – a rise of 80%: in the same period, the population increased only 3%.

watercan.com

Utilities Division	
<p>Roger Parks <i>Utilities Supervisor</i></p> <ul style="list-style-type: none"> • Level I - Wastewater Collection • Level II - Water Distribution 	<p>John Kalinczuk <i>Chief Operator/Manager</i></p> <ul style="list-style-type: none"> • Level II - Water Treatment • Level II – Wastewater Treatment • Level III - Water Distribution
<p>Ray Muller</p> <ul style="list-style-type: none"> • Level I – Water Distribution • Level I - Wastewater Collection 	<p>Marcus Miller</p> <ul style="list-style-type: none"> • Level I - Water Treatment
<p>Larry Kipp</p> <ul style="list-style-type: none"> • Level I - Wastewater Collection • Level II – Water Distribution 	<p>Rick Webb</p> <ul style="list-style-type: none"> • Level II - Wastewater Collection • Level II – Water Distribution • Level I - Water Treatment
<p>Mike Stremel</p> <ul style="list-style-type: none"> • Level I – Water Distribution • Level I - Wastewater Collection 	
<p>Merv Arvay</p> <ul style="list-style-type: none"> • Level II – Water Distribution • Level I - Wastewater Collection 	

Figure 7 - 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, monitoring after treatment, and monitoring in the distribution system.

5.1 TESTING PARAMETERS

Testing of our water systems is undertaken at both the water treatment plant and throughout our distribution system.

At the water treatment plant, the water plant employees document over 94 daily plant checks, lab testing of 24 different parameters and samples are also sent out to an independent lab for additional bacteria, mineral, UV transmittance and THM. Also plant personnel document monthly, bi-monthly and yearly checks to insure plant is sustained in good functioning order.

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.

Throughout the distribution system, the City of Salmon Arm, as a purveyor of drinking water to a service population of approximately 15,000, is required to test at least 14 samples per month as outlined in the *Guidelines for Canadian Drinking Water Quality, Sixth Edition*. Our water distribution network is approximately 204 kilometres in length.

At the time of sampling, the Water Utility Operator also checks the water temperature and chlorine residual to ensure the water continuously has disinfection capability. As it is not economically feasible to test for all pathogens in drinking water, the microbiological guidelines are based on these indicator tests.

A Maximum Acceptable Concentration (MAC) level has been established by Health Canada for microbiological criteria. Each MAC has been designed to safeguard human health, assuming a lifelong consumption of drinking water containing the substances at the maximum concentration level.

Aesthetic Objectives (AO's) apply to characteristics of drinking water that can affect its acceptance by consumers. These would include items such as taste, odour, and appearance. However, there are constituents that could pose a health risk in some individuals (i.e. compromised immunity, etc.) if the allowable AO's are exceeded.

For more information regarding testing parameters and MAC levels, please visit Health Canada's website at www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/water-eau/sum_guide-res_recom/summary-sommaire-eng.pdf

5.1 TESTING PARAMETERS *(continued)*

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.

Excessive turbidity not only detracts from the appearance and taste of water, it can also serve as a source of nutrients for waterborne bacteria. As our supply source is surficial, and therefore subject to changes in quality due to weather changes, the water is sometimes discoloured and may taste different when it rains heavily after a long dry spell. Excessively high turbidity can also have a negative effect on disinfection techniques. The unit of measurement is the nephelometric turbidity unit (NTU). Turbidity, at the point of consumption, 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 Metford Dam intake is automatically shut off when the turbidity level reaches one (1) NTU. The system is monitored and flushed, when unacceptably high turbidity test results are recorded. Turbidity is continuously measured at both water supply sources.

"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

Chemical Analysis

The Utilities Division takes samples on a bi-annual basis from both 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).

5.2 TESTING PROGRAM

Water at the nine sampling sites is tested and sampled every second week (see Appendix 3) by our Water Utility Operator, see Appendix 4. Samples are tested on-site for temperature and chlorine residual, and the results are recorded. Samples are taken in accordance with the *20th Edition of Standard Methods for the Examination of Water and Wastewater*, placed in a sterile bottle, sealed, identified by location with time of day noted, placed in a cooler, and delivered to a certified laboratory for testing (Caro Environmental Services in Kelowna). The water is tested for total coliform, and E. Coli counts. All results are returned to Interior Health. If there is a positive test result, the local Health Office contacts the Director of Engineering & Public Works. Depending on the location and type of positive test result, the City will institute one or more of the following:

5.1 TESTING PARAMETERS (continued)

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.

Supplementary to the Interior Health requirement for the bi-weekly testing of water within the distribution system, the City has instituted an additional testing program. Random sites are periodically tested for temperature and chlorine residual. 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. Where either of these parameters reaches 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, Continuous Feed Method. If the samples are not clean, the whole process is repeated.

6.0 WATERMAIN BREAKS

Many Canadians lose more water from leaky taps than they need for cooking and drinking.

watercan.com

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 2010, our staff responded to and repaired 3 water main breaks. (Note: service connection or hydrant lead 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 C651-92 regarding water main chlorination prior to re-commissioning of the main.

7.0 NOTIFICATION PROTOCOL

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

Jacques Cousteau

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 impact the City's water system.

8.0 Capital Works Projects

Water main Upgrading

In addition to repairing water mains that break, 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.

"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

Water Supply and Distribution System Upgrading

Capital Projects completed in 2010
<ul style="list-style-type: none"> Numerous water main replacements throughout the City. Replacements are typically added to the Capital plan because of age, material, break history, or fire flow requirements.
<ul style="list-style-type: none"> Continuation of the Cities water meter program
<ul style="list-style-type: none"> Design and construction of the twinning of Homely Reservoir
<ul style="list-style-type: none"> Hydrant infill program
<ul style="list-style-type: none"> Mainline valve installation program

Figure 10 – Capital Projects

9.0 WATER CONSUMPTION

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.

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

Our community has an above average per capita water use when compared to other Canadian municipalities. Some possible causes of this excessively high per capita consumption may include undetected system leaks, illegal connections, high residential summer irrigation demand, and inaccurate metering. In 2003 the Water Use Efficiency Committee brought forward a Water Conservation policy which Council adopted (see Appendix 9).

The City of Salmon Arm had a Water Audit conducted in 2007 by Hetek Solutions. The objective of the study was to identify sources of water loss from the municipal system. The results of the report will be key in planning future water works and upgrades.

It is evident that leakage within the system combined with actual consumption (as well as unauthorized use) creates somewhat skewed municipal water consumption data. Regardless of potential losses in the system, production data can be used to illustrate consumption trends and is therefore useful in identifying areas where conservation measures can be implemented.

See Appendix 6 and 7 for further total consumption data.

10.0 TEST RESULTS

The *Guidelines for Canadian Drinking Water Quality, Sixth Edition* and the *British Columbia Safe Drinking Water 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 m.

11.0 2010 CHALLENGES TO DRINKING WATER QUALITY

There were no periods in 2010, where the source water on East Canoe Creek was showing high turbidity (above 1NTU). No Public Water Quality Advisory Notices were required during 2010 operating season.

12.0 CONCLUSION

Can I make a difference?

Yes, you can...

- *Wait till 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 4 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 of Salmon Arm has made a lot of progress in the implementation of BC's Drinking Water Protection Act and Regulations. While there is always ongoing work to do, City staff continues 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 2010 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.