WATER QUALITY REPORT 2004

TABLE OF CONTENTS

About 7.6% of Canada is covered by fresh water in lakes and rivers – 755,165 square kilometres.

1.0 BACKGROUND

On May 16, 2003, the Government of the Province of British Columbia passed the Drinking Water Protection Act and Regulations, replacing the ***Safe Drinking Water Regulation*** under the ***Health Act***. The Interior Health Authority (IHA) have advised the District 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 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."***

These provincial health officials will ensure water quality is maintained through operating permits developed specifically for each water system. The permits specify monitoring requirements for all substances of concern in a particular water system. In addition, the regulations require all water system operators to be certified under the "Environmental Operators Certification Program."

In August of 2004 the District received from Interior Health an outline of the proposed changes to the Districts Operating Permit that would be required to meet the Drinking Water Protection Act & Regulation standards. These include:

- A study to determine options to meet the minimum treatment/disinfections standards of:
    - 4 log (99.99%) inactivation of viruses
    - 3 log (99.9%) inactivation of Giardia
    - 2 log (99%) inactivation of Cryptosporidium
    - Less than 1 NTU turbidity, and
    - The use of two or more disinfection technologies acceptable to the Health Authority and develop a work/installation plan to implement the chosen option.
- Continuous monitoring of the water disinfection process.
- An audit of our Bacteriological monitoring program.
- An updating of the Emergency Response plan.
- A documented yearly maintenance program for the next five years.
- Development and implementation of a Cross Connection Control program.
- Implementation of a monthly and yearly reporting system.

1.0 BACKGROUND (continued)

The District will be setting up these programs and implementing the studies during 2005/2006.

2.0 WATER SYSTEM OVERVIEW

During the summer, about half of all treated water is sprayed onto lawns and gardens.

The municipal water system consists of two main raw water sources, treatment systems for the source waters and an extensive water pumping, distribution, and storage system. Our water supply is via three (3) sources, East Canoe Creek at Metford Dam, Shuswap Lake at Canoe Beach and a minor water supply from Rumball Creek for irrigation at the Mt. Ida Cemetery (Figure 1). Water treatment of the source waters (except Rumball Creek) is by primary disinfection with chlorine. The distribution system includes approximately 196 km of watermain varying in diameter from 100 mm to 600 mm. It also includes six different pressure zones, ten reservoirs, one dam and four pump stations. There was a major expansion in the northwest sector of the District to service the Adams Lake Band Reserve, Neskonlith Band Reserve and some lands in the Gleneden area. This extension adds 3 reservoirs, 1 pump station and 5600 meters of 300mm diameter water main to the water system. This work will be completed and commissioned during the spring of 2005.

Shuswap Lake is at a nominal elevation of about 346 m (1135 ft.) while the Metford Dam intake on East Canoe Creek is at elevation 567 m (1860 ft.). The Utilities Department 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
- high coliform counts, as those experienced in 2002, which caused the shutdown of the Metford Dam intake for several weeks and required the use of Shuswap Lake as the sole water source.

A 5-minute shower with a standard shower head uses 100 litres of water. A 5-minute shower with a low-flow shower head uses only 35 litres of water.

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2.0 WATER SYSTEM OVERVIEW (continued)

The distribution system is segregated into six (6) pressure zones. The storage reservoir in the highest pressure zone is at elevation 615 m (2020 ft.). Water has to be pumped over 269 m (885 ft.) in elevation from Shuswap Lake to the storage reservoir at the highest elevation.

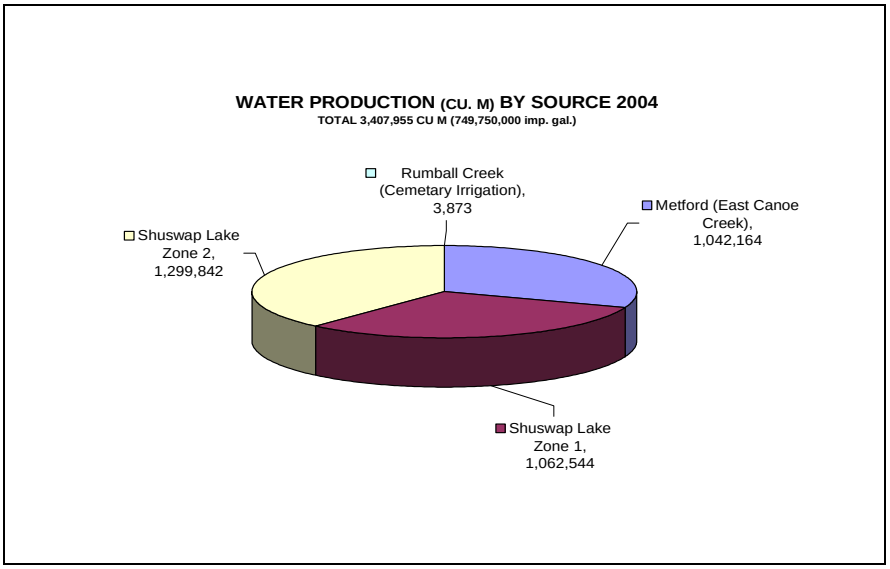


Figure 1 - Water Source Distribution

3.0 MONITORING PROGRAM

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

4.0 TESTING PARAMETERS

The District of Salmon Arm, as a purveyor of drinking water to a service population of approximately 13,800, 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 196 kilometres long.

To adequately represent all areas within our network, Interior Health has approved a program to test 16 samples per month (we sample eight sites on a bi-weekly basis, see Appendix 3). The water is regularly tested for its microbiological characteristics, specifically total coliforms, faecal coliforms, turbidity and pH.

4.0 TESTING PARAMETERS (continued)

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. The Biological testing program is under review and a revised testing protocol will be instituted in 2005.

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 (AOs) 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 AOs are exceeded.

4.1 Test Parameters

Total Coliforms
The presence of total coliforms in the water system is an indicator that the system is experiencing regrowth of bacteria, infiltration of contaminates has occurred, or that it has not been properly treated at the source. The MAC for total coliforms is 10 per 100 ml (see Section 11.0, Pg. 21). If the sample tests are shown to exceed the MAC, it is re-sampled to confirm the original result. If the second test result is above the MAC, the affected main is isolated, monitored, flushed, and tested again. The response to another unacceptable test result is to take the main out of service, chlorinate, flush, retest it, and keep it out of service until acceptable results are obtained.

Faecal coliforms
Faecal coliforms in drinking water may indicate the presence of faecal contamination. Escherichia coli, one species in the faecal coliform group and the one best known because of its link to the death of seven people and illness of over 2000 others in Walkerton, Ontario, in 2000, is a definite indicator of the presence of faeces in the distribution system. The MAC for faecal coliform is 0 per 100 ml.

Each year 3 to 4 million people die of waterborne diseases, including 2 million children who die of diarrhoea.

4.0 TESTING PARAMETERS (continued)

An unacceptable MAC test for faecal coliform triggers an immediate Boil Water Order by the Medical Health Officer which remains in effect until the problem is isolated, identified, resolved, and acceptable test results are obtained.

Heterotrophic Plate Count

The general bacterial population is estimated by means of a background colony count referred to as a heterotrophic plate count (HPC). Although not a significant health concern on its own, the presence of a background bacterial growth indicates that pathogenic bacteria could thrive in the system should they be able to enter it. Also, excessively high HPCs can hinder the detection of coliforms. The MAC for HPCs is 500 colonies per millilitre. If a test result indicates more than 500, the water is re-sampled and tested. Further test results indicating HPCs above 500 require the watermains to be flushed and monitored until a decreasing trend is observed.

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). The MAC for water at the source is one NTU and the AO within the system has been set at less than five (5) NTU at the point of consumption. The Metford Dam intake is automatically shut off when the turbidity level reaches three (3) NTU. The system is monitored and flushed, if necessary, when unacceptably high turbidity test results are recorded. Turbidity is continuously measured at both water supply sources (see Figure 2).

4.0 TESTING PARAMETERS (continued)

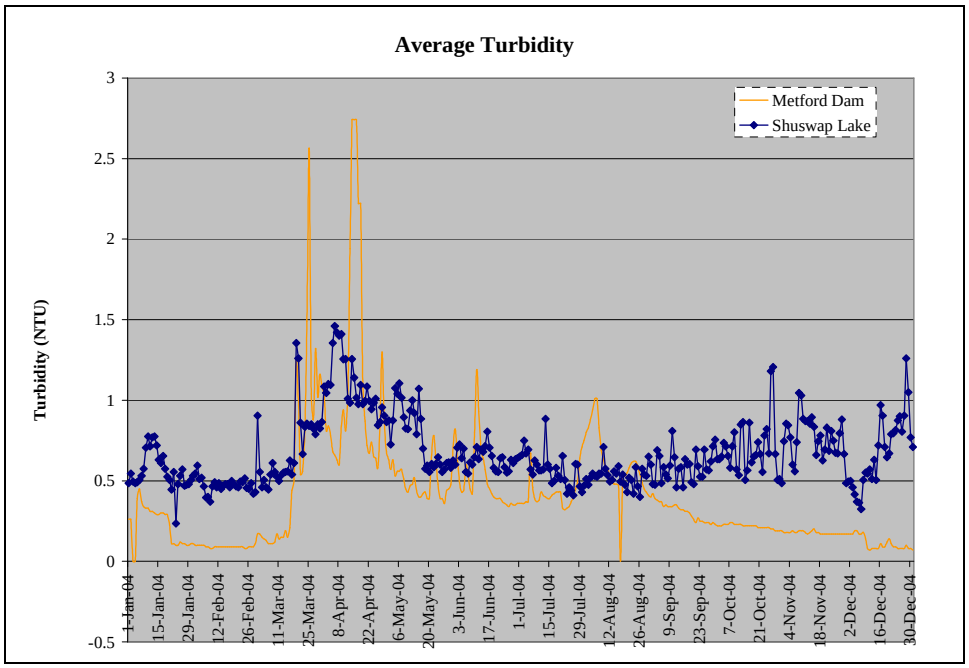


Figure 2 - Turbidity

Chemical Analysis

The Utilities Department takes samples on a yearly 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). To date no tests have shown any parameters outside the maximum values recommended in the guidelines.

5.0 TESTING PROGRAM

Water at the eight sampling sites is tested and sampled every second week 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 the local Health Office for testing at a certified laboratory in Kelowna. The water is tested for total coliform, and faecal coliform counts. All results are returned to Interior Health. If there is a positive test result, the local Health Office contacts the Director of Operations. Depending on the location and type of positive test result, the District will institute one or more of the following:

5.0 TESTING PROGRAM (continued)

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 District has instituted a weekly testing program of 17 additional sites that are 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.

Even though there is a tendency to use water as if our supplies are limitless, the truth is that there is a limit to this precious natural resource.

The health of our water system and public trust in it are things the District takes seriously. Our Utilities Department staff work closely with the Public Health Inspector so that a program is in place that ensures our citizens are provided with safe and healthy drinking water.

Figure 3 - Salmon Arm Water Utility Operator sampling water.

6.0 WATER DISTRIBUTION SYSTEM DETAILS

The public water system services an area of approximately 6322 hectares (see Appendix 2). The District distributes water in pipes made of a variety of materials. The first watermains were made of wood. These wooden mains have since been replaced with cast iron, ductile iron, PVC, polyethylene, steel, asbestos cement, spun concrete and some copper piping. The oldest mains still operating in the Salmon Arm water system inventory are cast iron pipes.

6.1 Watermains

Cast Iron Watermains
Approximately 0.5%, or 1.0 kilometre, of our watermain inventory is made of cast iron pipe. The majority of this pipe material was installed prior to 1978. The service life expectancy of cast iron pipe is between 50 and 100 years, depending on the soil type.

Ductile Iron Watermains
Approximately 10%, or 21 kilometres, of our water system is made of ductile iron pipe. Ductile iron is still used in some applications in Salmon Arm. The service life expectancy of ductile iron pipe can be up to 100 years.

PVC Watermains
Approximately 39%, or 69 kilometres, of our water system is made of PVC pipe. Most of this pipe material has been installed since 1979. Although the service life of PVC pipe is not yet known, it is anticipated that it is 70 years or greater.

Asbestos Cement Watermains
Approximately 53%, or 109 kilometres, of our watermain inventory is made of Asbestos Cement water pipe. Most of this pipe material was installed prior to 1978. The life expectancy of Asbestos Cement pipe is between 50 and 60 years, depending on water quality, soil type and installation conditions. The remaining service life of existing Asbestos Cement pipe is estimated at 1 to 50 years. The asbestos fibres in the pipe do not pose a health risk in this form. The fibres are entirely encased in a cement jacket where they pose no problem to human health. The Utilities Department crew employ special techniques to cut the pipe to ensure that the fibres cannot become airborne during the cutting process.

6.0 WATER DISTRIBUTION SYSTEM DETAILS (continued)

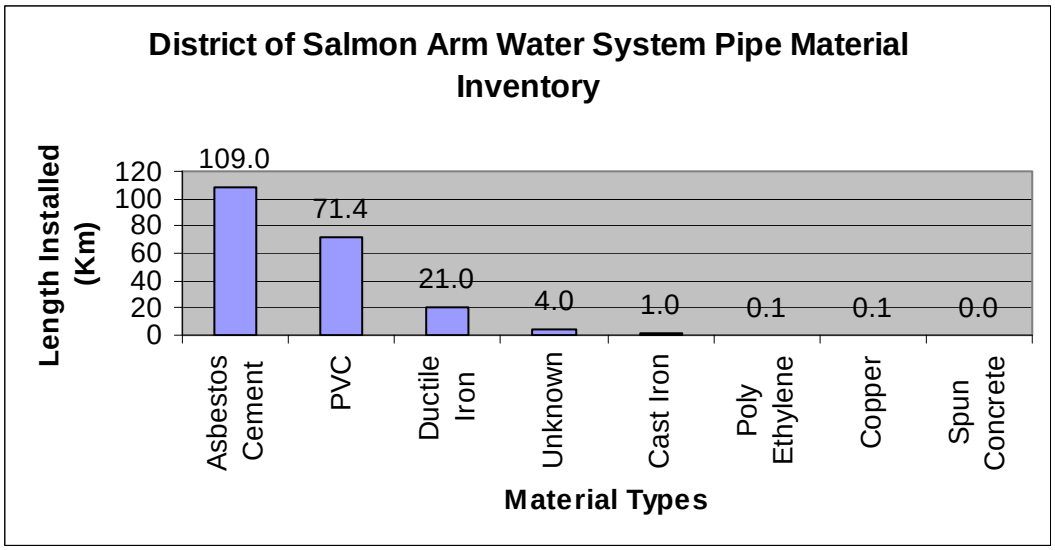


Figure 4 - Pipe inventory

High Density Polyethylene Watermains (HDPE)

Less than 1% of our water system is made of Polyethylene pipe. Up until now it has only been used in small diameters for water services or distribution to small numbers of houses. The recently upgraded intake pipe from Shuswap Lake to the Canoe Pump Station is a 1000mm diameter High Density Polyethylene pipe.

Spun Concrete Watermains

Less than 1.0 kilometre of Spun Concrete pipe remains in the District's water system. Due to leakage problems, the District instituted a replacement program for this pipe in conjunction with upgrading the Zone 1 transmission main. The last phase of concrete pipe replacement was completed on 20th Street NE in 2004. The final phase to upgrade the Zone 1 transmission main is scheduled for spring 2005.

6.2 Other Components

Water Pumping Stations

The municipal water system includes 11 water storage facilities and five 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 repaired. With our gravity feed from Metford Dam, water can be cascaded down through all the zones, with the exception of Zone 5.

6.0 WATER DISTRIBUTION SYSTEM DETAILS (continued)

The pump stations house a combined total of 15 pumps with a service life of approximately 40 to 50 years for each pump.

Every drop counts -- leaking taps and plumbing fixtures are pouring money down the drain! A dripping tap can waste up to 3,400 litres per month, and a leaking toilet can waste up to 7,800 litres per month.

Figure 5 - Zone 2 Pumping Station at Canoe Beach

Water Services

Salmon Arm has 4,638 connections supplying water from the main to the property line. As with the watermains, these pipes age and require replacement. If a service connection were to fail, water service to the affected home or business would be discontinued until repaired. Whenever possible, service connections older than 25 years are replaced by the developers in accordance with the Subdivision and Development Servicing Bylaw. Service pipe may also be replaced when the watermain is being upgraded as part of the Capital Expenditure Program.

Of the 4638 service pipes, approximately 90% are copper pipe. Based on a study by the Seattle Water Department, the average service life for copper service pipes installed in Seattle is 40 to 50 years. The corrosive nature of some soils will likely decrease the average service life of some connections.

6.0 WATER DISTRIBUTION SYSTEM DETAILS (continued)

The remaining 10% of service pipes are made of galvanized iron, cast iron, asbestos cement, ductile iron, PVC or polyethylene pipe. The older industrial service pipes are made of asbestos cement and cast iron pipe, while the newer industrial service pipes are made of ductile iron, PVC or polyethylene.

System Control – "SCADA" (Supervisory **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 these days by a comprehensive software program employed by the Utilities Department. Connected by telephone lines and/or radio 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 notifies Water Utilities Department staff.

When you water your lawn for 2 hours, about 2400 litres of water is consumed.

Water Storage Facilities
The District has ten (10) enclosed reservoirs and one (1) dam storing water for six pressure zones within the system. Each reservoir is sized to balance daily water consumption, as well as provide an emergency water supply for fire protection. The 10 reservoirs have a total storage capacity of 12,500 m^3 (2,750,000 gallons). In addition, the Metford Dam on East Canoe Creek has storage for 8200 m^3 (1,800,000 gallons).

Fire Hydrants
Salmon Arm has approximately 610 District and 114 private fire hydrants. Approximately 92% of the hydrant inventory is the older style, slide-gate hydrant and the remainder are the newer compression style hydrants.

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 170 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.

6.0 WATER DISTRIBUTION SYSTEM DETAILS (continued)

Flow Control (Gate) Valves

We have approximately 1600 flow control valves attached to the underground water pipe network. The valves are primarily used to control the direction of water flow and to isolate areas of the network for inspection or repair. The expected service life of a flow control valve is 40 to 50 years.

Pressure-Reducing Valve Stations

The maximum design water pressure for piping within the municipal water system is 1034 kPa (kilopascals)/150 psi. We have five 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 a large area of the community.

The Utilities Department currently overhauls the PRV stations every year 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.

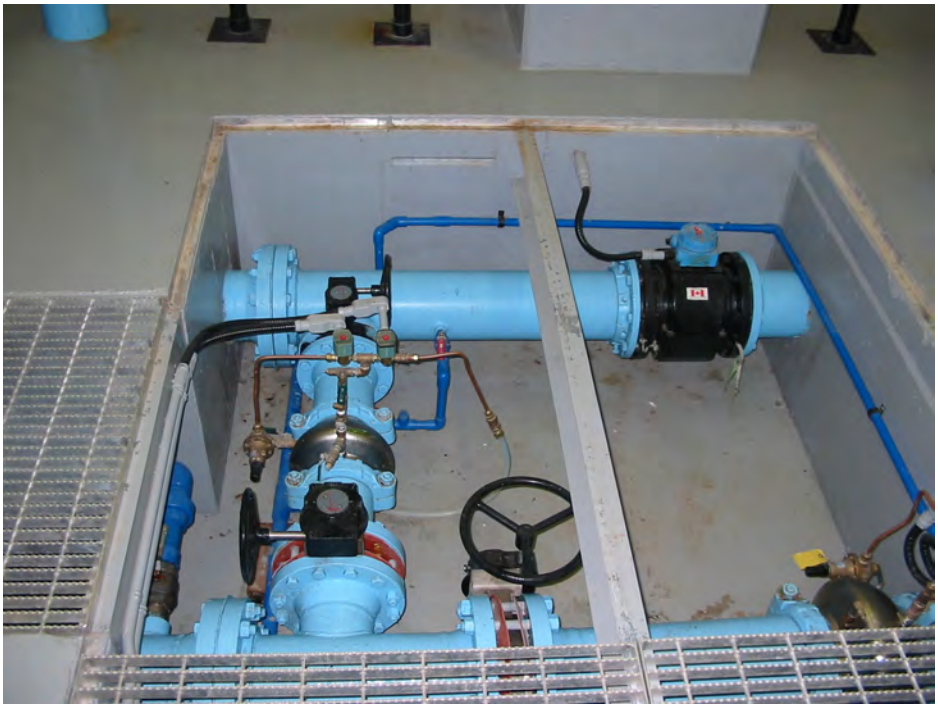


Figure 6 – Zone 4 Pump/Pressure Reducing Station on 30th Street NE

6.0 WATER DISTRIBUTION SYSTEM DETAILS (continued)

Water Meters

The District currently meters approximately 534 water services or only about 12% of all water connections to homes or businesses. As a water meter ages, its mechanisms tend to underestimate the water passing through it and consequently users may be undercharged for the actual water use. The normal service life of a water meter is approximately 15 years.

6.3 Water System Value

The total value of our primary water distribution system, as detailed in Figure 7 below, is approximately $51,100,000. We budgeted $1.58 million in 2004 or approximately 2.0%, 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
Watermains	195 km	$39,700,000
Reservoirs/Tanks	10 Reservoirs/1Dam	$6,600,000
Pumping Stations	4	$4,400,000
System Control	1	$400,000
TOTAL		**$51,100,000**

Figure 7 - Infrastructure replacement value

Don't leave the water running when you brush your teeth or shave. A tap runs at approximately 20 litres per minute. If it takes 10 minutes to shave in the morning and 3 to brush your teeth, that's about 260 litres of wasted water.

7.0 SYSTEM MAINTENANCE

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

1) Valves;
2) Watermains;
3) Hydrants; and,
4) Reservoirs.

7.0 SYSTEM MAINTENANCE (continued)

As replacement of the entire distribution grid is not affordable, system maintenance becomes a critical component in the management of the water infrastructure. The Annual Operation and Maintenance Budget for the water system is approximately $1.3 million.

7.1 Annual Maintenance Program

Valve Maintenance
Valves are interspersed along watermains and can be shut or opened to alter the flow of water or to isolate a portion of the water system for repair or maintenance. These valves can be inadvertently buried or left closed causing maintenance challenges by restricting water flow through the main. In response to these problems, Utilities Department staff began a valve exercising program. A District crew tries to inspect each valve annually, exposing buried valves, making repairs, and exercising every valve by turning it first to a closed position then back to open.

Watermains
Watermain maintenance involves both the upgrading of aging watermains and ensuring that existing watermains are operating effectively.

Watermain Upgrading
In addition to repairing watermains that break, aging watermains 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.

Capital Watermain Projects for 2004 were:

1) 20th Street NE – replaced the remaining portion of 300mm diameter spun concrete watermain with 593 metres of 600mm diameter PVC. In conjunction with this project Zone 2 was looped between 15th Avenue NE and 20th Ave NE with 600metres of 200mm diameter PVC watermain;
2) 27th Street SE - Zone 4 was looped with 100 metres of 200mm diameter PVC water main between the 400 and 500 Block through Okanagan Estates Park neighbourhood to provide better fire flows in the area;

Toilets use over 40% more water than needed.

7.0 SYSTEM MAINTENANCE (continued)

3) Okanagan Avenue East – Zone 2 was looped between 11th Street SE and the 1500 Block of Okanagan Avenue East with 256 metres of 200mm diameter PVC water main;
4) 24th Street NE (south of 20th Avenue NE) – 210 metres of 200mm diameter PVC watermain was installed to service the first phase of the Lakeview Meadows subdivision;
5) 37th Street and 10th Avenue SE – 320 metres of 150mm diameter PVC watermain was installed on 37th Street SE to service Phases 2, 3 and 4 of the Little Mountain Park Estates neighbourhood. In addition, 355 metres of 250mm diameter watermain was installed on 10th Avenue SE to loop Zone 5 between 33rd Street SE and 37th Street SE to provide sufficient fire flows to the new subdivision;
6) In May of 2004 construction started on the Neskonlith Indian Band, Adams Lake Indian Band and Gleneden Water System Improvements. The works are being constructed on Adams Lake Indian Band I.R. No. 6, Neskonlith Indian Band I.R. No. 3, and 1st Avenue SW in the District of Salmon Arm.

The project includes the construction of 3 - 1,000 cubic metre (660,000 gallons total) reservoirs, 1 - booster pump house and, the installation of 5,600 metres of 300 mm diameter water main.

The 3 new reservoirs will store drinking water for Adams Lake Indian Band, Neskonlith Indian Bands and part of Gleneden as well as provide balancing and storage capacity for water users in the southwest sector of Salmon Arm. These new reservoirs will also provide increased fire flow storage for the southwest sector of Salmon Arm.

There is the same amount of water on Earth today as there was 3 billion years ago.

Figure 8 – New Zone 1 Reservoir & Pump Station Gleneden Road

7.0 SYSTEM MAINTENANCE (continued)

The new water main will also potentially make municipal water service immediately available to existing residents along a section of 50th Street NW in Gleneden.

The District 20-year water utility capital plan identifies several water main upgrading projects for the southwest area. Neskonlith and Adams Lake Indian Bands will participate proportionately with the District in the funding for the upgrading of trunk mains west of 10th Street SW as well as future upgrades to the Canoe Pump Station, the Canoe Intake which was installed in 2003, and, the eventual construction of a water treatment facility.

The District of Salmon Arm will operate and maintain this water system infrastructure by way of a servicing agreement with the Adams Lake Indian Band and Neskonlith Indian Band.

The cost of this project is approximately 4.4 million dollars. Funding is being provided by the Adams Lake Indian Band, the Neskonlith Indian Band, Indian and Northern Affairs Canada and District of Salmon Arm.

The District of Salmon Arm received $420,000 for payments-in-lieu of Development Cost Charges and engineering and, contributed $295,000 to the project for that portion of the water system which benefits part of Gleneden and the southwest sector of the District of Salmon Arm.

Watermain 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 favourable environment for bacterial growth. In response to these concerns, the Utilities Department initiated a watermain 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 17 locations throughout the municipality referred to as “high maintenance areas” where water demand is low or where watermains terminate in a dead end. These areas are flushed as required, sometimes as often as every month during the summer.

7.0 SYSTEM MAINTENANCE (continued)

In repeated testing, Canadian drinking water has been found to be among the best in the world. However, there is no such thing as absolutely pure water. Water is an extremely good solvent; it will dissolve a certain amount of almost anything. In its natural state, water always contains some impurities. Many of the chemicals dissolved in water are not harmful, they may in fact, be good for you. For example, Calcium is essential for building healthy bones and teeth.

Figure 9 - Salmon Arm operator flushing watermain as part of regular maintenance

We also flush mains within 24 hours of receiving test results from the Interior Health that indicate bacteria levels outside the accepted provincial standard which are based on the “Guidelines for Canadian Drinking Water Quality”.

Hydrant Maintenance

Historically, fire hydrants were only serviced when requested by the Fire Department. 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 once each year.

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 days to complete before the reservoir can be brought back into service.

7.0 SYSTEM MAINTENANCE (continued)

Figure 10 - Metford Dam (August, 2003)

8.0 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.

"Whiskey is for drinking; water is for fighting over."

- Mark Twain

In 2004, our staff responded to and repaired only three watermain breaks. (Note: service connection or hydrant lead breaks are not included in this total).

Procedures for Watermain Repairs or Tie-ins

Watermains are disinfected whenever they are exposed to the atmosphere. To prevent a possible introduction of contamination, District crews try to maintain positive pressure in the system. This practice makes it more difficult to complete repairs and it may appear as though water is being wasted when conducting them, but it is a necessary safeguard to protect the integrity of the system.

8.0 WATERMAIN BREAKS (continued)

Repairs or tie-ins with no groundwater entry
These repairs are typically the result of electrolysis holes, cracks, or splits, and are repaired using repair clamps. Provided the watermain maintains positive pressure until District crews have excavated below the invert of the pipe, it is assumed that no contaminant can enter the system. The repair clamps and other materials required to complete the repairs are cleaned with a 6% chlorine solution. Upon completion of the repairs, the main is flushed and put back into service.

Repairs or tie-ins with groundwater entry
On occasion, watermain breaks have occurred where it is impossible to maintain positive pressure or to pump all groundwater below the invert of the watermain before throttling it down or shutting it off. In this case, disinfection, flushing, and residual testing procedures are followed prior to recommissioning the watermain.

Residential indoor water use in Canada: Toilet – 30%; Bathing and showering – 35%; Laundry – 20%; Kitchen and drinking – 10%; Cleaning – 5%.

The District adheres to the procedures set out in the American Water Works Association (AWWA) Standard C651-92 regarding watermain chlorination. This, in summary, requires that the main is completely isolated, that it is disinfected with a chlorine concentration of 200 milligrams per litre for a retention time of two hours, and that after two hours the chlorine residual level is a minimum of 100 milligrams per litre.

If this condition is not met, the main must be re-chlorinated using the same standard. After a successful result, the watermain is flushed continuously until the chlorine residual is less than one milligram per litre. When the desired residual level is achieved, the watermain is returned to service.

New Watermains
Disinfection of a new watermain is completed in accordance with AWWA C651, Continuous Feed Method which requires initial disinfection with a chlorine concentration of 25 milligrams per litre for a retention time of twenty-four hours. At the end of the disinfection period, the chlorine residual level is a minimum of 10 milligrams per litre. If this condition is not met, the main must be re-chlorinated using the same standard. After a successful result, the watermain is flushed continuously until the chlorine residual is less than one milligram per litre. When the desired residual level is achieved it is allowed to sit for 24 hours before test samples are sent to a certified laboratory for coliform tests. If the bacterial tests are clean, then the main is ready for connection to the system. If the samples are not clean, the whole process is repeated.

9.0 NOTIFICATION PROTOCOL

Normally, breaks or disruption to water service are caused by conditions that can be repaired and reinstated quickly, directly by District 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 District's water system.

10.0 WATER CONSUMPTION

Our community has an above average per capita water use amongst 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. The District commissioned a Water Use Efficiency Study and appointed a committee to review the findings and make recommendations to Council on the need for and the form of any water conservation measures. In 2003 the Water Use Efficiency Committee brought forward a Water Conservation policy which Council adopted (see Appendix 6).

The policy sets water consumption targets and calls for a two phase program. Phase 1 is a three year education and voluntary compliance program aimed at informing the residents of the need and benefits to the community if we change our water consumption habits to reduce wasting water. Phase 2, if implemented, would see a review of Phase 1 and implementation of possible regulatory measures including full water metering to achieve targeted water consumption goals.

10.0 WATER CONSUMPTION (continued)

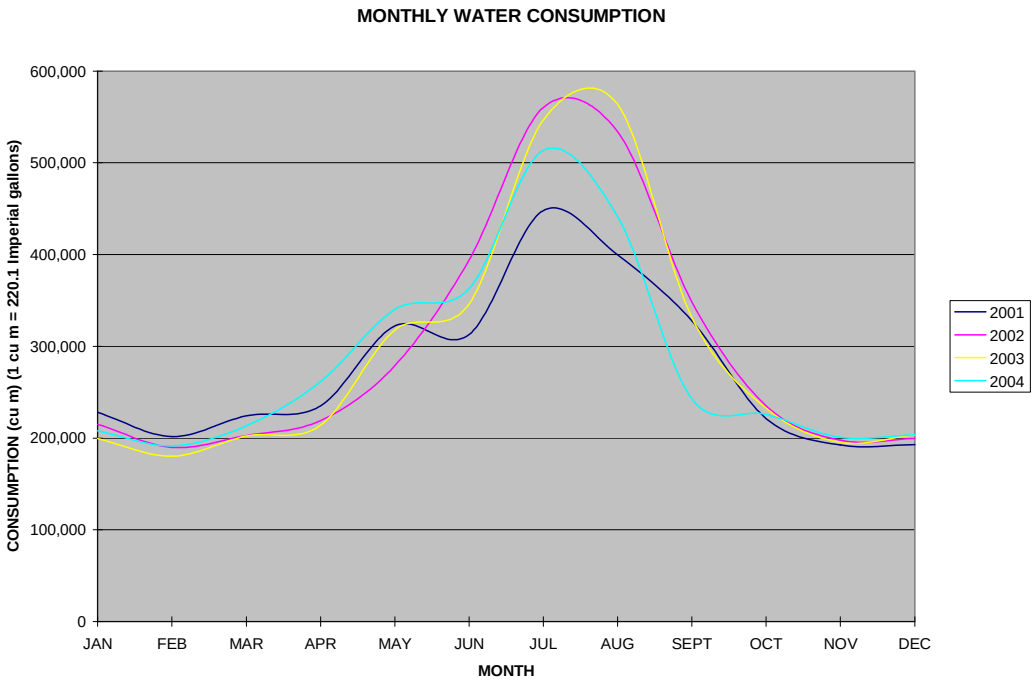


Figure - See Appendix 5

11.0 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 ten total coliform organisms per 100 ml, none of which should be faecal coliforms;
- 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.

Of the 208 samples analysed for microbiological criteria in 2004, zero faecal coliforms were detected and all sites indicated less than one for the presence of total coliforms.

12.0 2004 CHALLENGES TO DRINKING WATER QUALITY

2004 was a good year for the Utilities Department as we did not experience any challenges to drinking water quality.

13.0 CONCLUSION

Implementation of BC's Drinking Water Protection Act and Regulations will establish increased standards for Operator training, water sampling and system monitoring, emergency response plans, long range planning and public reporting. In many cases it will require only minor changes to what we already do. Still, we look forward to working with the staff at Interior Health to implement the new legislation, as it all works towards insuring the safety and reliability of the water we deliver to the residents of Salmon Arm.

The District of Salmon Arm staff welcomes the opportunity to present to our citizens the 2004 Annual Water Quality Report, detailing the health of our water system. We hope this report will provide some information about your drinking water and give you an insight into the way we operate the system. If you have any questions about the report or want more specific information about the water, please contact the Operations Department at 832-6021.

APPENDIX 1

DISTRICT OF SALMON ARM
SOURCE WATER CHEMICAL ANALYSIS
TEST RESULTS

WATER QUALITY REPORT
SHUSWAP LAKE INTAKE AT CANOE PUMP STATION

	pH (units)	Conductivity at 25 deg C (umhos/cm	Dissolved Solids (Total) mg/L	Suspended Solids mg/L	Hardness (Total) mg/L as CaCO3	Nitrate mg/L as N	Nitrite mg/L as N	Fluoride mg/L	Chloride mg/L	Sulphate mg/L	Total Coliform (Colonies/100mL)	Fecal Coliform (Colonies/100mL)	Arsenic (Total) mg/L	Barium (Total) mg/L	Boron (Total) mg/L	Cadmium (Total) mg/L	Calcium (Total) mg/L	Chromium (Total) mg/L	Copper (Total) mg/L	Iron (Total) mg/L	Lead (Total) mg/L	Magnesium (Total) mg/L	Manganese (Total) mg/L	Mercury (Total) mg/L	Selenium (Total) mg/L	Sodium (Total) mg/L	Zinc (Total) mg/L	Heterotrophic Plate Count (colonies/100mL)
01-Dec-94	6.51	120	58	2.5	46	0.1	0.1		0.8	8.9	3		<0.005	0.033	0.14	<0.002	14.3	<0.005	0.021	0.17	<0.005	2.5	<0.01	<0.0001	<0.005		0.04	
05-Dec-95	6.7	110	76	<1	37.5	0.06	0.06	<0.05	<2	8.2	4	<1	<0.005	0.007	0.16	<0.001	11.9	<0.005	0.004	1.6	<0.005	1.9	<0.005	<0.0001	<0.005	<1	0.01	
29-Mar-96	7.11	120	80	1	45.7	0.07	0.07	0.06	<2.0	7.2	<1	<1	0.02	<0.002	<0.05	<0.002	14	0.006	0.003	<0.01	<0.01	2.6	0.02	<0.0001	<0.01	2.2	0.01	
15-Jan-97	7.63	140	<5	100	60	<0.05	<0.05	<0.05	<2	8.4	<1	<1	<0.005	0.092	<0.05	<0.001	17.9	<0.005	0.005	0.06	<0.01	3.3	0.01	<0.0001	<0.005	3	0.01	
04-Feb-98	7.11	130	70	9	61	<0.05	<0.05	0.05	<2	<5	14	<1	<0.02	0.11	<0.05	0.001	18.8	<0.005	0.028	0.16	<0.01	3.4	<0.01	<0.0001	<0.005	4	<0.01	56
15-Dec-98	7.4	130	74	2	55.4	0.08	0.08	0.1	1	8	6	<1	<0.02	0.011	<0.01	<0.0005	17.7	<0.001	0.007	<0.003	<0.005	2.72	<0.0005	<0.0001	<0.01	2.23	0.002	12
08-Mar-99	7.59	130	94		48.7	0.102	<0.003	0.1	1	9	0	0	<0.001	<0.08	<0.01	<0.0005	15.4	<0.004	<0.005	<0.01	<0.01	2.9	<0.005	<0.05	<0.01	2.02	<0.002	
13-Jan-00	7.9	119	75	<1	57	0.11	<0.01	0.1	1.1	8.7	8	0	<0.01	0.01	<0.1	<0.0002	18	<0.01	<0.01	<0.03	<0.001	3	0.006	<0.00005	<0.0005	2.24	0.006	15
18-Jan-01	7.2	192	81	<1	60	0.11	<0.01	<0.1		8.3	0	0	<0.01	0.01	<0.1	<0.0002	19.3	<0.01	<0.01	<0.03	<0.001	2.8	<0.005	<0.00005	<0.001	2.12	0.008	12
09-Jan-02	7.6	111	67	<1	53	0.09	<0.01	<0.10	0.95	7.6	0	0	0.0002	0.01	<0.1	<0.0002	16.6	<0.01	<0.01	<0.03	<0.001	2.7	<0.005	<0.00005	<0.0005	2.03	0.007	26
14-Jan-03	7.3	119	58	<1	46	0.09	<0.01	<0.10	1.1	7.5	0	0	0.0002	<0.01	<0.1	<0.0002	14.5	<0.01	<0.01	0.03	<0.001	2.5	0.007	<0.00005	<0.001	2	<0.005	14
13-Jun-03	7.6	115	75	2	52	0.07	<0.01	0.1	1.25	8	0	0	<0.001	<0.02	<0.01	<0.0002	16.5	<0.002	<0.01	0.08	<0.001	2.6	0.003	<0.0002	<0.001	2	<0.05	
13-Jan-04	**7.5**	**110**	**68**	**<1**	**48**	**0.09**	**<0.01**	**0.15**	**0.9**	**6.8**	**0**	**0**	**<0.001**	**<0.02**	**<0.01**	**<0.0002**	**15.3**	**<0.002**	**<0.01**	**<0.03**	**0.002**	**2.28**	**0.003**	**<0.0002**	**<0.001**	**<2**	**<0.05**	**60**
CDWG - Canadian Drinking Water Quality Guidelines																												
*1		-				10.0	1.0	1.5			**	**	0.025	1.0	5.0	0.005	<250	0.05		0.3	0.01	-		0.001	0.01			
*2	6.5-8.5		<500		<500				<250	<500									<1.0				0.05			<200	<.05	

** Microbiological Characteristics:
For total coliform the maximum acceptable concentration is 0 colonies/100mL. However, due to uneven distribution in water:
1) No sample should contain more than 10 total coliform organisms per 100 mL none of which should be fecal coliforms.
2) No consecutive samples from the same site should show any coliforms
3) If any coliforms are detected, or if there are more than 200 background colonies on a toal coliform membrane filter per 100 100 mL, the site should be resampled, and if results confirmed, cause should be determined and remediation undertaken.

CDWG : Canadian Drinking Water Quality Guidelines

***1** Maximum acceptable concentration

***2** Aesthetic concentration

Notes: Hardness: 80-100 as CaCO3 preferred

>200 as CaCO3 poor but tolerated

>500 as CaCO3 normally unaccepted

WATER QUALITY REPORT
METFORD DAM INTAKE

	pH (units)	Conductivity at 25 deg C (umhos/cm)	Dissolved Solids (Total) mg/L	Suspended Solids mg/L	Hardness (Total) mg/L as CaCO3	Nitrate mg/L as N	Nitrite mg/L as N	Fluoride mg/L	Chloride mg/L	Sulphate mg/L	Total Coliform (Colonies/100mL)	Fecal Coliform (Colonies/100mL)	Arsenic (Total) mg/L	Barium (Total) mg/L	Boron (Total) mg/L	Cadmium (Total) mg/L	Calcium (Total) mg/L	Chromium (Total) mg/L	Copper (Total) mg/L	Iron (Total) mg/L	Lead (Total) mg/L	Magnesium (Total) mg/L	Manganese (Total) mg/L	Mercury (Total) mg/L	Selenium (Total) mg/L	Sodium (Total) mg/L	Zinc (Total) mg/L	Heterotrophic Plate Count (colonies/100mL)
01-Dec-94	7.8	400	190	1.2	204	<0.05	<0.05		<0.05	28.3	2		<0.005	0.044	0.16	<0.002	65.1	<0.005	0.003	0.03	<0.005	10.1	<0.01	<0.0001	<0.005		<0.01	
05-Dec-95	7.66	360	130	<1	161	<0.03	<0.03	0.06	<2	17	<1	<1	<0.0050	0.022	0.17	<0.001	55.1	<0.005	<0.002	0.07	<0.005	5.6	<0.005	<0.0001	<0.005	<1	<0.01	
29-Mar-96	Note: Resampled Shuswap Lake Source Only																											
15-Jan-97	8.08	370	200	<1	220	<0.05	<0.05	<0.05	<2	17.1	<1	<1	<0.005	0.11	<0.05	<0.001	72.9	<0.005	0.004	0.03	<0.01	8.6	<0.01	<0.0001	<0.005	2	<0.01	
04-Feb-98	7.31	410	250	<1	240	<0.05	<0.05	0.13	<2	28	12	<1	<0.02	0.13	<0.05	0.001	79.7	0.008	0.034	0.19	<0.01	10.9	<0.01	<0.0001	<0.005	4	<0.01	32
15-Dec-98	7.32	580	380	2	267.5	0.28	0.28	0.3	26	33	40	<1	<0.02	0.0509	<0.01	<0.0005	87	<0.001	0.011	0.098	<0.005	12.2	0.0173	<0.0001	<0.01	10.8	0.013	
08-Mar-99	8.08	445	273		192	<0.003	<0.003	0.2	<0.50	37	0	0	<0.001	0.08	<0.01	<0.0005	61	<0.004	<0.005	<0.01	<0.001	10.2	<0.005	<0.05	<0.01	2.78	<0.002	
13-Jan-00	8.4	380	241	<1	226	0.01	<0.01	0.2	0.6	20	7	0	<0.01	0.03	<0.1	<0.0002	75.6	<0.01	<0.01	<0.03	<0.001	9.1	<0.005	<0.00005	<0.0005	2.16	<0.005	19
18-Jan-01	7.9	390	267	<1	241	0.05	<0.01	0.2	0.6	33	1	0	<0.01	0.03	<0.1	<0.0002	77.3	<0.01	<0.01	<0.03	<0.001	11.7	<0.005	<0.00005	<0.001	2.92	<0.005	44
09-Jan-02	8.2	358	214	<1	184	<0.01	<0.01	<0.10	0.5	16.3	4	0	<0.0001	0.02	<0.1	<0.0002	60	<0.01	<0.01	<0.03	<0.001	8.3	<0.005	<0.00005	<0.0005	2.26	<0.005	68
14-Jan-03	8.1	409	232	<1	219	0.02	<0.01	<0.10	0.6	31	10	2	<0.0001	0.03	<0.1	<0.0002	68.6	<0.01	<0.01	<0.03	<0.001	11.7	<0.005	<0.00005	<0.001	3	<0.005	49
13-Jan-04	**7.9**	**396**	**254**	**<1**	**216**	**0.05**	**<0.01**	**0.25**	**0.45**	**31**	**1**	**1**	**<0.001**	**0.03**	**<0.1**	**<0.0002**	**69.4**	**<0.002**	**<0.01**	**<0.03**	**<0.001**	**10.3**	**0.003**	**<0.0002**	**<0.001**	**2.8**	**<0.05**	**200**
CDWG*1		**-**				**10.0**	**1.0**	**1.5**			******	******	**0.025**	**1.0**	**5.0**	**0.005**	**-**	**0.05**		**0.3**	**0.01**	**-**		**0.001**	**0.01**			**500**
CDWG*2	**6.5-8.5**		**<500**		**<500**					**<250**	**<500**								**<1.0**				**0.05**			**<200**	**<.05**	

** Microbiological Characteristics:
For total coliform the maximum acceptable concentration is 0 colonies/100mL. However, due to uneven distribution in water:
1) No sample should contain more than 10 total coliform organisms per 100 mL none of which should be fecal coliforms.
2) No consecutive samples from the same site should show any coliforms
3) If any coliforms are detected, or if there are more than 200 background colonies on a toal coliform membrane filter per 100 100 mL, the site should be resampled, and if results confirmed, cause should be determined and remediation undertaken.

CDWG - Canadian Drinking Water Quality Guidelines

***1** Maximum acceptable concentration

***2** Aesthetic concentration

Notes: Hardness: 80-100 as CaCO3 preferred

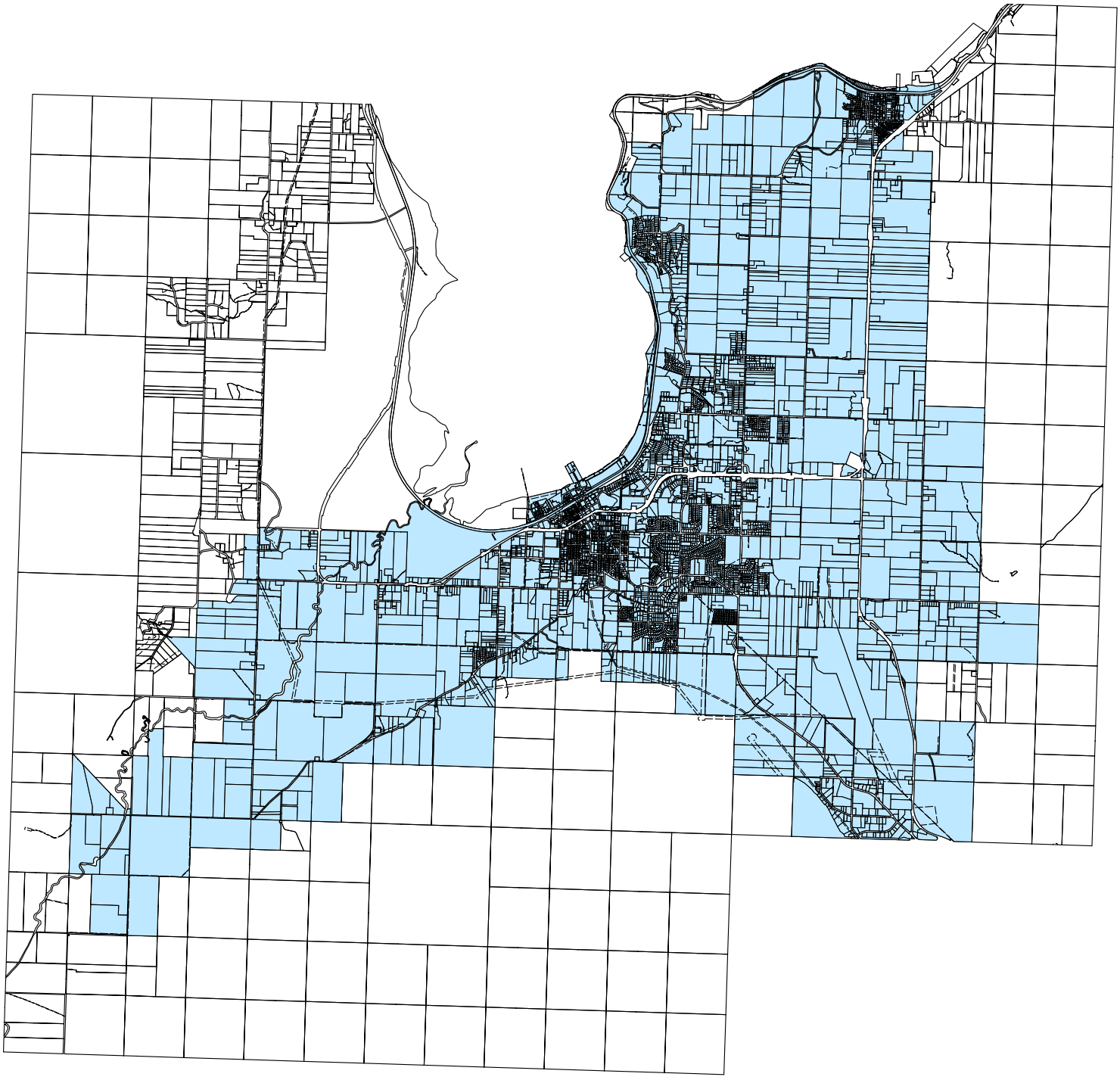
>200 as CaCO3 poor but tolerated

>500 as CaCO3 normally unaccepted

APPENDIX 2

DISTRICT OF SALMON ARM
WATER SERVICE AREA

DSA WATER SERVICE AREA



APPENDIX 3

INTERIOR HEALTH AUTHORITY
DISTRICT OF SALMON ARM
WATER SAMPLE SCHEDULE

IHA WATER SAMPLE SCHEDULE

First Monday Of Every Month	Metford Dam (raw) Ben's Towing North Canoe Elementary South Canoe Elementary
Second Monday Of Every Month	Canoe Pump Station (raw) Shuswap Christian School Country Kitchen IHA No. 4 – EHO Lab
Third Monday Of Every Month	Metford Dam (raw) Ben's Towing North Canoe Elementary South Canoe Elementary
Fourth Monday Of Every Month	Canoe Pump Station (raw) Shuswap Christian School Country Kitchen IHA No. 4 – EHO Lab

APPENDIX 4

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

District of Salmon Arm - Reporting Database

From: Jan 01 2004 To: Dec 31 2004

North Okanagan Health Unit
Lab Test Results - Coliform Counts

DATE		Canoe Pump Stn RAW			Metford Dam RAW			North Canoe Elementary			South Canoe Elementary			Interior Health Unit			Country Kitchen			Ben's Towing			Shuswap Christian		
		Total	Faecal	Over	Total	Faecal	Over	Total	Faecal	Over	Total	Faecal	Over	Total	Faecal	Over	Total	Faecal	Over	Total	Faecal	Over	Total	Faecal	Over
Jan 5	M				82	78	NO	L1	L1	NO	L1	L1	NO							L1	L1	NO			
Jan 12	M	<2	<2	NO													L1	L1	NO	L1	L1	NO	L1	L1	NO
Jan 19	M				100	100	NO	L1	L1	NO	L1	L1	NO												
Jan 21	W																L1	L1	NO						
Jan 26	M	<2	<2	NO																			L1	L1	NO
Jan 28	W													L1	L1	NO									
Feb 2	M				4	2	NO	L1	L1	NO	L1	L1	NO							L1	L1	NO			
Feb 9	M	<2	<2	NO													L1	L1	NO				L1	L1	NO
Feb 11	W													L1	L1	NO									
Feb 16	M				<2	<2	NO	L1	L1	NO	L1	L1	NO							L1	L1	NO			
Feb 23	M	<2	<2	NO													L1	L1	NO				L1	L1	NO
Mar 1	M				5	<2	NO	L1	L1	NO	L1	L1	NO							L1	L1	NO			
Mar 8	M	<2	<2	NO													L1	L1	NO				L1	L1	NO
Mar 9	T													L1	L1	NO									
Mar 15	M				<2	<2	NO	L1	L1	NO	L1	L1	NO												
Mar 22	M	<2	<2	NO													L1	L1	NO				L1	L1	NO
Mar 24	W													L1	L1	NO									
Apr 5	M				4	6	NO	L1	L1	NO	L1	L1	NO												
Apr 19	M				16	4	NO	L1	L1	NO	L1	L1	NO												
Apr 26	M	<2	<2	NO													L1	L1	NO				L1	L1	NO
May 3	M										L1	L1	NO												
May 4	T				7	6	NO	L1	L1	NO															
May 5	W													L1	L1	NO									
May 10	M	<2	<2	NO													L1	L1	NO				L1	L1	NO
May 17	M				L2	L2	NO	L1	L1	NO	L1	L1	NO												
May 24	M																L1	L1	NO				L1	L1	NO
May 25	T	2	<2	NO																					
Jun 6	S					<1		<1	<1					<1						<1	<1		<1	<1	
Jun 7	M				E22	6	NO	L1	L1	NO	L1	L1	NO												
Jun 14	M	<2	<2	NO													L1	L1	NO				L1	L1	NO
Jun 21	M		2		38	12	NO	L1	L1	NO	L1	L1	NO	L1	L1	NO									
Jun 22	T																								
Jun 28	M	1	<2	NO													<1	<1	NO				<1	<1	NO
Jul 5	M	2	<2	NO	vergrov	<2	YES	L1	L1	NO	L1	L1	NO												
Jul 9	F							L1	L1	NO															
Jul 12	M	6	7	NO													L1	L1	NO				L1	L1	NO
Jul 13	T													L1	L1	NO									
Jul 19	M		98		122	44	NO	L1	L1	NO	L1	L1	NO												
Jul 26	M	6	<2	NO													<1	<1	NO				<1	<1	NO
Jul 29	T																								
Aug 9	M	5	<2	NO	vergrov	92	YES				L1	L1	NO												
Aug 16	M							<1	<1	NO	L1	L1	NO							<1	<1		<1	<1	
Aug 30	M	2	<2	NO													L1	L1	NO				L1	L1	NO
Sep 13	M				36	L2	NO	<1	<1	NO	<1	<1	NO							<1	<1				
Sep 20	M	<2	<2	NO	36												<1	<1	NO				<1	<1	NO
Sep 21	T													L1	L1	NO									
Sep 27	M	<2	<2	NO													L1	L1	NO						
Oct 4	M				106	10	NO	<1	<1	NO	<1	<1	NO							<1	<1				
Oct 5	T													L1	L1	NO									
Oct 13	W													L1	L1	NO									
Oct 18	M				210	24	NO	L1	L1	NO	L1	L1	NO												
Oct 25	M	4	L2	NO													L1	L1	NO				L1	L1	NO
Oct 26	T																						L1	L1	NO
Nov 1	M				18	L2	NO	L1	L1	NO	L1	L1	NO												
Nov 8	M	6	L2	NO													L1	L1	NO				L1	L1	NO
Nov 15	M				14	6	NO	L1	L1	NO	L1	L1	NO												
Nov 22	M	4	2	NO													L1	L1	NO				L1	L1	NO
Dec 6	M				Est 14	2		<1	<1											<1	<1		<1	<1	
Dec 9	T													<1	<1	NO									
Dec 13	M	2	<2														<1	<1	NO				<1	<1	NO
Dec 20	M				6	<2		<1	<1	NO	<1	<1	NO							<1	<1				

APPENDIX 5

DAILY WATER CONSUMPTION 2001 TO 2004

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
January				
	2001	2002	2003	2004
01-Jan	8,684	8,989	5,632	5,655
02-Jan	7,353	6,571	6,484	7,633
03-Jan	7,145	6,701	6,467	5,673
04-Jan	8,089	6,908	6,965	6,754
05-Jan	8,112	6,537	5,461	7,360
06-Jan	8,569	7,069	7,509	8,194
07-Jan	8,026	6,950	5,568	7,624
08-Jan	7,280	6,294	7,013	7,378
09-Jan	6,850	6,651	7,004	6,928
10-Jan	7,093	6,686	5,922	8,030
11-Jan	7,066	6,704	6,618	6,915
12-Jan	7,024	5,854	5,996	7,267
13-Jan	7,480	7,400	6,837	5,996
14-Jan	7,196	6,187	6,865	6,866
15-Jan	7,186	8,590	6,308	6,625
16-Jan	7,218	7,970	6,025	7,474
17-Jan	6,868	5,998	6,561	6,525
18-Jan	7,074	6,723	6,116	6,519
19-Jan	7,900	7,082	6,409	6,857
20-Jan	6,437	7,082	6,431	6,907
21-Jan	7,390	7,082	7,090	6,527
22-Jan	7,183	7,082	6,348	6,728
23-Jan	7,231	7,082	6,209	6,752
24-Jan	7,349	8,315	6,157	6,609
25-Jan	7,444	6,014	6,927	6,195
26-Jan	7,127	6,631	6,620	7,083
27-Jan	7,360	6,184	6,310	2,933
28-Jan	7,145	7,613	6,010	6,475
29-Jan	7,140	6,795	6,670	6,933
30-Jan	6,841	6,691	7,064	6,198
31-Jan	7,073	6,392	5,697	6,243
TOTAL	227,934	214,827	199,292	207,855

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
February				
	2001	2002	2003	2004
01-Feb	7,033	7,329	7,101	7,325
02-Feb	7,499	6,870	5,850	6497.2
03-Feb	7,082	6,620	6,762	6384.4
04-Feb	7,044	7,272	6,529	7,248
05-Feb	7,229	6,723	6,027	6,410
06-Feb	9,443	6,550	6,686	6,813
07-Feb	7,427	6,824	6,010	6,379
08-Feb	8,025	6,919	6,657	7,131
09-Feb	6,447	6,824	6,431	7,182
10-Feb	7,572	6,846	6,280	6,686
11-Feb	5,071	7,387	6,820	6,493
12-Feb	7,314	6,318	6,281	6,958
13-Feb	7,244	6,811	6,795	7,021
14-Feb	6,943	6,728	5,552	6,351
15-Feb	6,819	6,379	6,746	6,748
16-Feb	7,665	6,970	6,318	7,092
17-Feb	6,864	7,469	6,930	6,841
18-Feb	7,355	6,374	5,983	7,045
19-Feb	7,393	6,739	6,412	6,490
20-Feb	7,815	7,493	6,790	5,718
21-Feb	7,292	5,827	6,338	6,606
22-Feb	7,064	7,253	6,392	7,001
23-Feb	7,063	6,301	6,361	7,101
24-Feb	7,232	6,631	6,298	7,234
25-Feb	7,268	6,675	6,809	8,342
26-Feb	6,759	6,544	5,952	6,572
27-Feb	6,595	6,581	6,508	6,992
28-Feb	7,055	6,534	6,607	6,776
29-Feb				7,226
TOTAL	201,615	189,791	180,223	198,664

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
March				
	2001	2002	2003	2004
01-Mar	6,849	7,077	6,330	6,594
02-Mar	7,202	5,862	6,425	7,185
03-Mar	7,452	7,147	6,268	6,021
04-Mar	7,086	6,528	6,728	7,490
05-Mar	7,599	5,868	5,662	6,743
06-Mar	7,919	6,801	6,693	7,043
07-Mar	6,693	6,045	6,850	6,412
08-Mar	7,478	7,245	6,076	6,615
09-Mar	6,944	5,985	6,432	6,897
10-Mar	7,067	6,544	7,492	6,724
11-Mar	7,036	6,696	5,711	6,845
12-Mar	7,550	6,396	7,076	6,127
13-Mar	7,364	7,168	5,608	7,077
14-Mar	7,186	5,773	6,929	6,470
15-Mar	6,733	6,663	6,344	6,193
16-Mar	7,104	6,546	6,368	7,484
17-Mar	6,923	6,268	6,734	6,272
18-Mar	7,927	6,472	6,152	7,292
19-Mar	6,902	6,665	6,922	6,337
20-Mar	7,436	6,458	6,831	6,959
21-Mar	7,424	6,880	6,031	7,681
22-Mar	7,228	6,887	6,321	6,831
23-Mar	7,023	6,164	6,344	7,465
24-Mar	6,849	7,339	7,116	6,464
25-Mar	7,357	6,246	6,353	7,188
26-Mar	8,308	6,889	6,445	7,031
27-Mar	7,307	6,061	7,113	6,483
28-Mar	7,417	7,008	5,999	7,507
29-Mar	6,351	6,518	6,917	7,300
30-Mar	8,018	6,451	7,171	7,463
31-Mar	6,496	6,087	6,757	7,037
TOTAL	224,225	202,736	202,197	213,226

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
April				
	2001	2002	2003	2004
01-Apr	7,256	7,262	7,595	7,572
02-Apr	7,365	6,679	5,996	6,967
03-Apr	6,240	6,958	6,692	7,625
04-Apr	7,392	7,001	6,791	8,424
05-Apr	6,816	6,417	6,767	8,016
06-Apr	7,298	7,242	6,932	8,838
07-Apr	7,297	7,088	7,179	9,772
08-Apr	7,919	7,716	7,487	8,439
09-Apr	7,775	6,286	6,905	8,611
10-Apr	7,722	6,968	7,395	9,085
11-Apr	7,642	6,519	7,612	8,964
12-Apr	7,351	7,752	6,704	10,396
13-Apr	6,585	6,001	8,001	9,287
14-Apr	7,433	6,781	6,786	6,894
15-Apr	7,554	6,661	6,378	7,832
16-Apr	8,555	6,906	6,526	7,736
17-Apr	6,994	7,253	7,182	6,865
18-Apr	8,104	6,848	6,811	8,241
19-Apr	7,366	6,501	6,908	8,036
20-Apr	8,619	7,806	7,043	7,605
21-Apr	7,965	7,657	7,940	7,673
22-Apr	8,618	7,029	7,892	9,010
23-Apr	8,620	6,688	7,633	8,351
24-Apr	8,159	6,602	7,657	9,047
25-Apr	8,925	7,509	6,777	10,739
26-Apr	9,972	7,355	6,948	9,586
27-Apr	9,689	8,067	6,860	8,717
28-Apr	8,182	10,072	7,820	10,177
29-Apr	8,062	9,996	7,573	11,733
30-Apr	7,617	9,353	7,217	11,177
TOTAL	235,091	218,969	214,003	261,414

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
May				
	2001	2002	2003	2004
01-May	8,437	12,012	9,378	12,368
02-May	8,113	10,505	7,584	12,265
03-May	7,070	9,914	7,600	11,344
04-May	8,326	8,620	7,411	11,382
05-May	7,669	8,531	7,137	10,003
06-May	9,115	7,235	6,925	10,281
07-May	8,338	8,092	8,354	11,812
08-May	8,610	7,774	7,561	11,241
09-May	9,091	8,728	7,639	9,463
10-May	10,129	9,568	8,625	10,499
11-May	10,062	10,537	8,262	9,857
12-May	10,878	11,308	6,583	9,310
13-May	12,930	11,592	8,960	10,571
14-May	9,305	7,884	10,584	10,610
15-May	8,619	10,496	12,180	11,737
16-May	8,655	9,862	11,230	13,836
17-May	7,703	9,139	8,497	12,844
18-May	9,083	9,092	8,583	15,191
19-May	8,977	10,026	10,193	15,535
20-May	9,525	9,345	9,609	14,872
21-May	12,673	8,028	10,465	13,168
22-May	14,318	7,641	8,733	9,599
23-May	15,376	7,430	9,330	9,052
24-May	14,000	7,356	11,256	10,175
25-May	16,724	7,191	8,763	10,297
26-May	16,466	7,911	8,305	9,367
27-May	9,712	5,959	15,041	8,940
28-May	10,619	8,114	19,675	9,590
29-May	9,117	9,930	22,776	8,618
30-May	10,300	10,124	21,389	8,800
31-May	12,254	8,870	9,166	7,494
TOTAL	322,191	278,814	317,793	340,119

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
June				
	2001	2002	2003	2004
01-Jun	10,986	8,702	8,925	8,658
02-Jun	9,369	10,868	10,279	9,002
03-Jun	8,568	11,824	11,207	10,486
04-Jun	5,012	12,431	13,379	12,367
05-Jun	13,923	11,831	14,519	10,942
06-Jun	9,519	9,729	15,318	8,704
07-Jun	9,012	8,254	16,645	9,159
08-Jun	9,911	8,078	15,987	10,759
09-Jun	9,122	8,726	9,684	12,116
10-Jun	8,339	11,056	10,123	9,872
11-Jun	7,812	13,409	9,939	8,781
12-Jun	7,920	14,789	11,113	8,381
13-Jun	8,016	16,263	9,674	9,110
14-Jun	7,971	17,524	9,637	8,598
15-Jun	7,996	16,651	10,161	8,420
16-Jun	8,240	15,247	11,663	10,659
17-Jun	8,414	14,671	15,740	11,421
18-Jun	9,585	9,896	14,026	12,657
19-Jun	13,061	10,207	12,378	14,645
20-Jun	12,537	11,420	9,579	14,477
21-Jun	13,810	14,878	8,973	13,317
22-Jun	14,262	16,376	7,178	17,521
23-Jun	14,820	16,857	9,275	18,088
24-Jun	13,781	17,784	9,501	18,082
25-Jun	13,600	17,927	9,852	17,539
26-Jun	12,550	19,923	11,367	15,423
27-Jun	10,686	16,471	11,906	11,345
28-Jun	9,115	11,038	13,960	11,398
29-Jun	11,848	11,362	13,370	15,335
30-Jun	13,098	9,877	10,657	15,649
TOTAL	312,883	394,066	346,014	362,909

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
July				
	2001	2002	2003	2004
01-Jul	13,262	11,716	13,763	14,611
02-Jul	15,653	13,693	11,156	13,770
03-Jul	17,706	15,596	12,174	15,271
04-Jul	18,625	13,644	11,812	15,357
05-Jul	18,937	11,774	11,878	15,152
06-Jul	18,937	14,373	14,307	13,311
07-Jul	17,799	17,561	12,177	13,456
08-Jul	17,131	11,915	14,628	11,909
09-Jul	20,931	13,355	15,975	13,612
10-Jul	20,684	17,383	16,960	13,199
11-Jul	22,283	19,017	17,564	10,790
12-Jul	19,739	20,084	17,863	10,593
13-Jul	17,900	16,721	17,014	15,231
14-Jul	17,830	15,256	14,396	15,577
15-Jul	13,719	19,290	18,287	16,750
16-Jul	10,778	19,889	19,711	17,691
17-Jul	9,826	20,785	19,704	19,475
18-Jul	9,168	19,953	18,615	19,398
19-Jul	8,914	21,180	19,560	15,198
20-Jul	9,322	19,664	18,201	16,943
21-Jul	9,766	20,118	16,515	17,142
22-Jul	11,019	23,080	21,364	17,142
23-Jul	8,108	21,892	22,452	19,213
24-Jul	10,971	23,915	22,350	20,398
25-Jul	12,055	22,937	21,141	19,758
26-Jul	15,689	23,172	21,974	16,960
27-Jul	15,161	21,220	21,080	20,787
28-Jul	12,719	19,824	17,643	21,045
29-Jul	10,838	19,869	22,009	21,177
30-Jul	11,338	17,643	22,731	21,007
31-Jul	11,142	13,677	21,600	21,593
TOTAL	447,952	560,195	546,602	513,513

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
August				
	2001	2002	2003	2004
01-Aug	12,554	15,562	21,800	19,752
02-Aug	13,000	14,551	21,855	17,705
03-Aug	13,000	14,887	19,723	19,957
04-Aug	13,500	12,411	16,458	17,571
05-Aug	13,000	13,275	20,706	11,368
06-Aug	12,000	13,532	20,431	12,379
07-Aug	12,500	16,574	19,013	10,863
08-Aug	12,000	17,682	19,663	13,027
09-Aug	12,000	17,895	19,785	10,956
10-Aug	12,000	16,259	18,792	17,382
11-Aug	12,000	18,067	12,886	17,581
12-Aug	11,000	19,079	18,272	17,506
13-Aug	12,437	20,049	19,118	19,373
14-Aug	12,353	20,309	18,461	19,717
15-Aug	12,609	18,260	19,141	18,013
16-Aug	17,043	17,573	19,336	14,700
17-Aug	17,727	16,031	18,588	17,694
18-Aug	15,706	16,692	15,075	18,542
19-Aug	15,690	18,295	18,931	17,664
20-Aug	15,520	17,435	19,699	17,758
21-Aug	13,204	18,533	18,309	15,171
22-Aug	10,673	18,585	18,369	10,871
23-Aug	9,780	19,776	17,830	10,211
24-Aug	10,090	18,426	16,602	11,083
25-Aug	9,850	18,162	12,999	9,132
26-Aug	11,504	17,103	16,540	9,348
27-Aug	12,302	18,529	17,694	9,436
28-Aug	13,111	18,155	16,983	10,019
29-Aug	13,979	18,137	16,976	8,695
30-Aug	13,550	17,732	17,539	8,244
31-Aug	13,838	16,534	16,215	9,584
TOTAL	399,517	534,089	563,789	441299

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
September				
	2001	2002	2003	2004
01-Sep	10,437	11,586	14,158	9,967
02-Sep	11,586	11,852	16,628	8,716
03-Sep	14,593	11,611	18,291	8,204
04-Sep	11,730	11,906	15,992	7,851
05-Sep	12,871	12,356	15,898	8,333
06-Sep	10,618	11,827	16,679	8,457
07-Sep	10,492	12,301	14,791	8,628
08-Sep	10,493	12,198	9,741	8,297
09-Sep	10,802	11,252	13,159	8,506
10-Sep	12,693	12,673	12,518	7,850
11-Sep	11,517	13,332	11,197	8,547
12-Sep	11,442	14,028	9,788	7,824
13-Sep	12,252	13,937	11,073	8,583
14-Sep	13,189	12,781	10,194	7,817
15-Sep	11,436	12,900	7,745	8,490
16-Sep	13,827	11,403	9,507	8,067
17-Sep	13,378	11,097	9,107	6,618
18-Sep	12,450	11,984	8,742	8,237
19-Sep	11,506	10,711	7,637	6,838
20-Sep	10,191	10,552	9,411	7,795
21-Sep	8,753	10,323	7,971	8,280
22-Sep	9,167	11,608	8,343	7,486
23-Sep	10,832	11,569	8,254	7,726
24-Sep	10,059	12,263	8,979	7,901
25-Sep	9,518	11,271	9,200	7,753
26-Sep	8,477	9,983	8,943	8,182
27-Sep	8,230	10,686	9,771	7,853
28-Sep	8,126	10,006	9,477	7,725
29-Sep	8,106	9,054	8,845	8,080
30-Sep	8,953	9,487	9,510	8,073
TOTAL	327,724	348,537	331,549	242,683

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
October				
	2001	2002	2003	2004
01-Oct	8,007	8,134	9,825	7,870
02-Oct	8,829	8,869	9,793	8,395
03-Oct	8,530	8,306	8,774	7,334
04-Oct	7,857	8,787	10,094	7,621
05-Oct	8,446	7,848	9,444	8,390
06-Oct	7,766	8,971	8,112	7,530
07-Oct	7,733	8,359	8,687	8,129
08-Oct	7,851	8,409	7,331	7,901
09-Oct	7,554	7,309	8,432	8,071
10-Oct	7,995	7,655	7,579	6,467
11-Oct	6,813	7,130	7,381	7,914
12-Oct	6,430	8,500	6,984	7,142
13-Oct	7,861	6,591	6,689	7,391
14-Oct	6,911	8,161	7,981	7,651
15-Oct	7,437	7,979	6,651	7,358
16-Oct	7,075	7,588	6,901	6,553
17-Oct	6,562	7,605	6,886	7,367
18-Oct	6,844	7,408	6,318	6,833
19-Oct	6,632	7,471	6,543	7,308
20-Oct	6,631	7,014	7,508	6,241
21-Oct	7,016	6,768	6,099	7,232
22-Oct	6,642	7,940	6,833	7,061
23-Oct	6,065	7,509	6,690	6,989
24-Oct	7,141	6,881	6,399	6,129
25-Oct	6,123	7,297	7,918	7,450
26-Oct	6,472	6,620	6,793	6,756
27-Oct	6,237	6,942	6,172	6,651
28-Oct	5,537	6,844	5,330	6,688
29-Oct	6,093	7,059	8,297	6,823
30-Oct	7,459	6,529	7,076	7,021
31-Oct	6,581	6,617	7,012	7,519
TOTAL	221,129	235,098	232,530	225,785

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
November				
	2001	2002	2003	2004
01-Nov	6,159	6,616	6,044	6,587
02-Nov	6,103	6,783	6,341	6,901
03-Nov	6,729	6,545	6,878	7,140
04-Nov	6,803	7,092	6,390	6,483
05-Nov	6,657	6,203	6,831	6,468
06-Nov	6,369	6,608	6,480	7,123
07-Nov	7,357	6,945	6,293	6,495
08-Nov	6,734	6,402	6,116	6,826
09-Nov	6,659	6,489	5,978	7,016
10-Nov	7,179	6,605	6,543	6,276
11-Nov	5,833	6,461	6,709	6,249
12-Nov	6,426	6,811	6,572	7,203
13-Nov	7,134	6,558	6,972	5,992
14-Nov	5,929	7,059	6,395	6,685
15-Nov	6,245	6,265	6,170	6,632
16-Nov	6,702	6,394	6,045	7,083
17-Nov	6,307	6,806	6,489	6,624
18-Nov	5,977	6,939	7,247	6,638
19-Nov	7,647	6,608	6,886	6,865
20-Nov	7,568	6,491	6,261	7,143
21-Nov	5,753	6,929	6,534	6,874
22-Nov	6,108	6,302	5,342	6,061
23-Nov	5,994	6,074	6,537	6,914
24-Nov	0	6,360	7,219	7,020
25-Nov	9,122	6,231	6,254	6,657
26-Nov	6,244	6,968	7,117	6,439
27-Nov	6,240	6,681	6,595	6,453
28-Nov	7,400	6,341	6,607	6,556
29-Nov	6,139	6,862	6,768	7,242
30-Nov	6,782	6,066	6,679	5,999
TOTAL	192,298	197,494	195,291	200,641

DISTRICT OF SALMON ARM				
DAILY WATER CONSUMPTION FOR 2001 TO 2004				
(Volume in Cubic Meters, 1 cu m = 220.1 gallons)				
December				
	2001	2002	2003	2004
01-Dec	5,573	6,625	6,883	6,548
02-Dec	7,224	6,864	6,443	6,627
03-Dec	6,461	5,767	6,462	6,229
04-Dec	3,143	6,160	6,471	6,505
05-Dec	6,528	7,239	6,528	6,470
06-Dec	5,058	6,151	5,670	6,598
07-Dec	8,345	5,874	6,214	5,698
08-Dec	6,691	6,502	7,604	7,593
09-Dec	6,291	6,246	6,113	6,080
10-Dec	6,515	6,536	6,729	6,127
11-Dec	6,344	6,277	6,486	6,260
12-Dec	6,451	6,890	6,348	6,836
13-Dec	6,053	6,622	5,509	7,283
14-Dec	6,427	5,473	6,645	6,585
15-Dec	6,187	6,265	7,079	7,377
16-Dec	6,800	6,771	6,679	6,276
17-Dec	6,711	6,743	6,517	7,185
18-Dec	6,998	6,745	6,749	6,156
19-Dec	0	6,054	6,407	6,534
20-Dec	8,046	6,459	6,393	6,697
21-Dec	6,435	7,162	6,791	6,280
22-Dec	6,543	5,722	6,752	6,454
23-Dec	5,194	7,518	7,360	7,662
24-Dec	6,829	6,133	6,614	6,584
25-Dec	5,842	6,303	6,091	5,967
26-Dec	5,594	6,005	6,005	5,996
27-Dec	7,454	6,324	6,829	6,571
28-Dec	6,015	6,723	6,473	6,390
29-Dec	6,451	6,525	7,403	6,412
30-Dec	7,309	5,402	6,839	6,777
31-Dec	7,170	7,548	6,515	6,734
TOTAL	192,681	199,627	203,600	203,488

APPENDIX 6

WATER CONSERVATION POLICY

DISTRICT OF SALMON ARM **POLICY NO. 5.16**

TOPIC: To establish District water reduction goals and a water use efficiency program

PURPOSE:

1. to effectively defer the need for water & sewage system capacity improvements and the resultant other associated infrastructure costs;
2. to reduce operating / maintenance (o & m) costs;
3. to establish a more fair and equitable water rates structure;
4. to contribute directly or indirectly to the reduction of impact on the environment;
5. to have in place a District water conservation strategy so as to qualify for senior government funding programs.

POLICY
(**GOALS**) Goals: Years 2003, 2004 and 2005 (3 years)

1. Develop and deliver a public awareness & education program for VOLUNTARY water use efficiencies to achieve
   a. a reduction of PEAK daily use by 20% (Factor of 1:5)
   b. a reduction of AVERAGE daily use by 14% (Factor of 1:7)

   There shall be a report back to Council in 2005 / 2006.

POLICY
(IMPLEMENTATION) Implementation Strategy – Goals

1. Formalize the rationale in support of deferral of infrastructure and related costs in relation to peak daily demand.
2. Formalize the rationale in support of reduction in average daily demand.
3. Approach the goals on three fronts:
   a. Public use (leakage & public land sprinkling).
   b. Business use: water audits and / or inventory of use.
   c. Residential use: conservation by education.
4. Review the water user fee rates (i.e. metered vs non-metered).
5. Review commercial, industrial, institutional and multi-family metered accounts to ensure consistency.

6. Adopt a Bylaw requiring "ultra-low" flush toilets.
7. Develop a Water Efficiency Program using internal resources (staff) and external resources (consultant or others), funded through the Water Management budget; such program to include, at minimum, the following elements:
    a. Water efficiency theme, logo, or slogan for purposes of branding and imaging of objectives.
    b. Education materials for multi-media communication purposes, such materials to clearly present the goals, rationale and strategies being pursued in the interests of conservation.
    c. Establish media partnerships, as appropriate, with newspaper, radio, television and internet services for short and long-term use of multi-media communication with water users.
    d. Establish business partnerships, as appropriate, with suppliers, service businesses and others to facilitate and encourage more efficient water management in and around the home and business.
    e. As appropriate from year to year, engage the resources of third party agencies to supplement the primary efforts of the District in public education.

8. Amend Bylaw No. 1274 to effectively convert permissible outdoor sprinkling from the current "alternate odd/even days" which results in potential 50% peak daily demand to a "three-day cycle" which results in a potential 33% peak daily demand.
9. Develop and implement an evaluation process to monitor the success of the Water Efficiency Program, the results of which shall be made public at intervals as part of the public education process.

Prepared by: Director of Operations	Date: March 15, 2003
Approved by Council	Date: March 24, 2003
Amended:	