

Operations and Management Tools

A. 'Hard' Conservation Measures

I. Federal and Provincial Initiatives

1. Operations and Management Tools

"Hard" conservation measures are those initiatives which are more demanding or restrictive in their approach to water use efficiency. Hard measures include legal, economic and financial tools, as well as operations and management tools.

"Operations and Management Tools" presented in this, and the following two sections includes: supply and demand studies, best management practices, cost/benefit analyses, treatment plants, xeriscaping, metering, backflow and cross connection control programs, recovery/reclamation/reuse/recycle programs, supply (quantity and quality) improvement projects water audits, low flow fixture and retrofit programs, metering programs, leak detection programs, watershed protection projects, consumption and and conservation potential studies, and emergency response plans.

Agriculture, Food and Fisheries, Ministry of

Best Management Practices

- **The Okanagan Valley Water Supply and Demand Management Study**

In 1989, the Provincial Government commissioned a comprehensive study that assessed the potential for domestic and irrigation water conservation in the Okanagan Valley. The study identified mechanisms available for implementation of demand-side management in order to encourage more effective use of existing water resources. The comprehensive report made several conclusions regarding the costs and benefits of implementing an integrated program including:

1. universal metering for service connections;
2. a water rate structure based on a "user pays" philosophy; and
3. possible public education avenues.

The Summary Report was distributed throughout Canada, receiving wide recognition as a state-of-the-art study on a practical approach to water conservation. Details of the study are given below.

British Columbia Buildings Corporation (BCBC)

Xeriscaping

In spring 1997 the corporation adopted technical standards which require increased efficiencies in irrigation and landscaping for all BCBC owned and operated buildings.

- Section 9.1 of the standards states "landscapes should be designed to minimize the effect they will have on the surrounding area by giving preference to regionally native plant species and the use of water conserving landscaping techniques such as xeriscaping.

Climate Comfort System

BCBC has endorsed the installation of timers and sensors in landscaped areas:

- the fountain located adjacent to the legislative buildings has been equipped with a sensor which stops water flow to the fountain when winds reach 25 kilometres per hour
- other "climate comfort system" sensors, which turn sprinklers off when it rains
- a water efficient government health building has been constructed in Sooke

Federal Government

Study — Water Conservation as a Means to Improve Wastewater Treatment and Reduce Costs

- A Fraser River Action Plan (FRAP) study examined the relationship between water conservation and improved performance of waste treatment plants; "Study of Water Conservation as a Means to Improve Wastewater Treatment and Reduce Treatment Costs", by AGRA Earth and Environmental and Hydromantis Inc. This study used a simulation model of the waste treatment system in the City of Vernon to show that the wastewater flow reductions achieved by Vernon's water conservation program would improve the reduction of BOD and suspended solids by 10% and 25% respectively.

Community, Aboriginal and Women's Services, Ministry of

Low-Flow Fixtures

- The B.C. Building and Plumbing Code was amended to include the following specifications in September 1995:

1. Restricted flows were set for supply water to fixtures in *new construction for group residential, office and mercantile* type construction.
2. Maximum flush cycles of 13.25 litres for toilets and 5.7 litres for urinals were established. These specifications pertain only to installation occurring in new construction.

Municipal Water Reduction Branch

Water Recovery, Reclamation, Re-use, and Recycle Programs

- The proposed "Municipal Sewage Regulations" are encouraging the use of reclaimed water to address the issues of water shortages. The use of reclaimed water will decrease supply needs from, and discharges to fish bearing streams.
- The Branch has identified a potential water savings of 35% with the implementation of water reclamation and reuse technologies.

Water Supply Improvement Projects

- The Ministry has identified that it is important for new water supply or treatment projects to include water conservation objectives in project planning.

II. Regional and Municipal Initiatives

2. Operations and Management Tools

Hard" conservation measures are those initiatives which are more demanding or restrictive in their approach to water use efficiency. Hard measures include legal, economic and financial tools, as well as operations and management tools.

"Operations and Management Tools" presented in this, the preceding and following sections includes: supply and demand studies, best management practices, cost/benefit analyses, treatment plants, xeriscaping, metering, backflow and cross connection control programs, recovery/reclamation/reuse/recycle programs, supply (quantity and quality) improvement projects, water audits, low flow fixture and retrofit programs, metering programs, leak detection programs, watershed protection projects, consumption and and conservation potential studies, and emergency response plans.

100 Mile House, District of

Metering

- Commercial connections are metered. In addition, residences with swimming pools are also metered.
- **Costs/Savings:** A loss is incurred by metering, through inspection and maintenance costs in the low volume usage areas. Metering calculations frequently fall below flat rate objectives, however, the minimum flat rate is charged.

Alberni — Clayoquot, Regional District of

Metering

- The customers of Alberni—Clayoquot's four small water districts are metered, keeping wastage down.

Anmore, Village of

Metering — Residential Metering

- A residential metering program was put into operation January 1, 1998

Bulkley — Nechako, Regional District of

Metering

- Is in the planning stages

Capital Regional District — Water Department

Water Audits

- Outdoor water use audits were made available to priority customers in 1997. It was determined that the City Gardens' outdoor water use contributed significantly to total and summer water use statistics for the Department. Audits were also offered in high-use neighbourhoods to homeowners free of charge.
- **Costs:** \$35,000

Metering — Residential, Commercial/Industrial, and Agricultural/Irrigation

- Customer metering has been in place for decades.
- In 1994 a retail meter replacement program was initiated with the goal of reducing unaccounted water.

Low-flow Fixture or Retrofit Programs

- Costs: \$50,000
- Actual Water Savings 5% for retrofitted homeSavings:

Xeriscaping

- Costs: \$30,000

Sector Demand Study or Pilot Project

- Costs: \$5,000

Water Supply Improvement Projects

- **System Maintenance**
 - The Capital Regional District Western Communities retail water distribution system (formerly the Greater Victoria Water District system) consists of about 25 pumped systems and nine storage reservoirs.
 - In the spring of 1997, the District began a 'uni-directional flushing' program to address water quality problems (loss of chlorine residual) in system extremities and reservoirs. A series of maps overlaid with step-by-step instructions for closing specific valves, opening specific flushes or hydrants, dechlorination, water course protection, and warnings for potential property damage mitigation were developed for use by the flushing crews.

Castlegar, City of

Metering — Commercial and Industrial Metering

- Water metering for new commercial establishments is the only conservation technique used in Castlegar.

Chase, Village of

Other

- **Meter Horns for New Installations**
 - Meter horns are installed in new buildings and houses to enable possible water metering in the future.

Chilliwack, District of

Water Audits

- As the District is 100% metered, we do yearly internal audits.
- The District has three wells and two surface sources. Each of these five sources have *mag* meters on them, to track how much water is produced. With each service being metered and read every two months, it is easy to see how much water is lost. The District's yearly amount of unaccounted for water is approximately 10% of its production.

Best Management Practices

The District of Chilliwack is currently implementing a groundwater management plan to help protect the District's groundwater sources. The following is a list of studies that the District has undertaken to help manage its water distribution system in the last few years.

1. Groundwater Protection Plan, Golder Associates Ltd., 1997
2. Enhanced Groundwater Flow Model, Emerson Groundwater Consultants Inc., 1997
3. Review of Geotechnical Aspects of Seismic Performance of Municipal Infrastructure, AGRA, 1996
4. Waterworks Emergency Response Plan, Stanley Associates, 1995

Metering

- The District of Chilliwack purchased the water system from the Elk Creek Water Company in 1980.
- When the company was privately held, the Board of Directors initiated a program of installing water meters to cut down on wasted water. This program started in 1963, and within six months water production had decreased by 25%. By the end of the second year of installing meters to all their customers, the Elk Creek Water Company had succeeded in reducing water consumption by 46%.
- Today the District has radio read meters on some of its more sparse and hard to read routes. The cost per read these meters is approximately \$0.22.

Water Supply Improvement Projects

- The District keeps records of every watermain break and the condition of the pipe. If it is shown that the area requires replacement, and there is a cost benefit, the main will be replaced.

Watershed Protection

- Most of the land that comprises the watershed for the District's surface water sources is held by private parties. If the land falls within the District, it is placed within a "Development Permit Area". Prior to any development — i.e. clearing or road building — District permission must be granted.

Coldstream, District of

Metering — Residential, Commercial/Industrial, Agricultural/Irrigation

- Metering since incorporation in 1905

Comox — Strathcona, Regional District of

Metering — Residential

- Keys to Success: meters are placed at the property line in pits
- Costs: \$300,000
- Actual Water Savings: 363,680,000 litres

Metering — Commercial and Industrial

- Meter deposit rates are as follows:

• 5/8 — \$36.38	• 2 — \$254.10
• 3/4 — \$78.58	• 3 — \$386.15
• 1 — \$102.79	• 4 — \$635.25
• 1 1/2 — \$194.04	

Low-flow Fixture or Retrofit Programs

- PowerSmart Program

Leak-Detection Programs/Practices

- Leak detection is carried out prior to construction upgrades.

Water Supply Improvement Projects

- New well
- Cost: \$320,000

Other

- **Water Supply Study**
- Cost: \$14,000

Granisle, Village of

- Due to the following programs and improvements, in conjunction with summertime watering restrictions, the Village has reduced water consumption significantly. Previous consumption rates were approximately 190,000 gallons per day. Currently the Village averages 90,000 gallons per day with a peak in the summer of approximately 130,000 gallons per day.

Leak-detection Programs/Practices

- Leaks have been repaired in the main line

Water Supply Improvement Projects

- New pump system
- New water tower (the old tower was made of wood and lost a significant amount of water)

Greater Vancouver Regional District — Water District**Low-flow Fixture or Retrofit Programs**

- Pilot programs in the single and multiple family residential sectors have been conducted to examine the costs and benefits associated with retrofitting fixtures with low-flow models ("BC Gas Apartment Water Savers" and "Home\$mart").

Regional Water Demand, by Sector

- In 1997 a Sector Demand Study was completed which quantified use in each municipality by the various customer classes (residential, commercial, institutional, industrial, agricultural). The study also included an analysis of consumption in the industrial, commercial and institutional water use sectors, by Standard Industrial Classification code.

Pilot ICI Sector Programs

- A pilot project is currently in progress to better understand water consumption and conservation potential in the region's hotel industry. The pilot project includes three comprehensive water audits and 23 water use inventories.
- A pilot project will be initiated in 1998 to better understand water consumption and conservation potential in the region's restaurant industry. The pilot project will include at least three water audits and a number of water use inventories.

Invermere, District of

Metering

- Commercial and residential metering has been completed. Meters are yet to be installed for summer cabins and agricultural irrigation connections. One of the goals of the metering program is to defer the necessity of a new water treatment plant.
- Costs: \$350,000
- Potential Water Savings: 1,200,000 litres

Watershed Protection

- A committee has been formed, including municipal and provincial representatives, to look into Goldie Creek and its watershed. The committee will explore potential risks (e.g. waterborne disease), remediation, and the costs of a new water treatment plant.

Kamloops, City of

Water Audits

- Costs: \$5,000
- Constraints: Audits are expensive and time consuming to conduct.

Metering — Residential

- Residential connections are not metered at present; there is an annual flat rate charge of approximately \$249 per household.
- Even if universal water metering and rate structuring become a reality in Kamloops, the need for a water conservation program will still exist, in order to work with utility subscribers in using the resource wisely.

Metering — Industrial, Commercial, and Irrigation

- ICI metering was in place before the water conservation program.

- In the future, water meters will be installed in parks to make the City's water use as efficient as possible and improve public perception of City irrigation practices.
- Commercial and industrial customers are charged a metered rate of \$0.229 per cubic metre.

Low-flow Fixtures or Retrofit Programs

- The City purchased shower heads which were sold by schools as a fundraising project.

Leak Detection Programs/Practices

- As a new initiative, two data loggers were purchased. These devices will be used to monitor water use for businesses and facilities where water leaks are suspected, to determine if leaks exist.

Xeriscaping

- Given the emphasis on reducing summer water use, it follows that a key focus of the WaterSmart program is water use in the landscape.
- A xeriscape demonstration garden was designed and built on McArthur Island.
- The City contributed to the addition of a xeriscape and composting demonstration area at the Kamloops Wildlife Park.
- Costs: \$270,000 (for building two demonstration gardens)

Sector Demand Study or Pilot Project

- Kamloops is undertaking more thorough analysis of water use records to determine variations in water use habits in different parts of the community.

Water Recovery, Reclamation, Reuse, and Recycle Programs

- \$12,000 for study

Climate Comfort System

- Is under consideration for City parks
- An underground irrigation emitter test area was established at the median on Columbia Street near Sahali Terrace. If this system works well, it could be used to replace existing irrigation systems in areas where overspray or vandalism is a problem.

Water Supply Improvement Projects

- are ongoing

Computer Upgrades

- are ongoing

Watershed Protection

- Costs: \$5,000/yr for monitoring turbidity

Kelowna, City of

Metering — Residential

- In 1996 the City entered into a partnership agreement with Schlumberger Canada Ltd. facilitating the installation of all unmetered dwellings. The metering requirement existed previously for multi-family and commercial construction. Presently, 98% of the structures served by the City of Kelowna Utility are metered. (The City of Kelowna Utility serves approximately 60% of Kelowna's population.)
- Costs: \$2,800,000

Other

- **The City of Kelowna's Water Management Strategy**

The Water Management Strategy that was developed for the City of Kelowna in 1992—1993 has been described by the Ministry of Municipal Affairs as a model for other municipalities to follow in order to eliminate wasteful water use, and treat consumers fairly and equitably.

The City is at the forefront of B.C. municipalities in terms of its innovation and sophistication in moving forward step-by-step with a multi-pronged program to improve water-use efficiency. The Kelowna experience provides insight into a "big city" approach, in part because Kelowna has contracted the Cities of Edmonton and Winnipeg as technical advisors for program implementation.

Keremeos, Village of

Metering — Commercial and Industrial

- Costs: \$3,500
- Keys to Success: monitoring
- There are a few industries in the Village that have the potential for high water use. The Village has started to install water meters at these businesses for the purpose of monitoring.

Water Supply Improvement Projects

- Costs: \$35,000

Emergency Response Plan

- Costs: \$1,000

Langley, City of

Metering — Residential, Commercial and Industrial

- Metering has been in place since 1973.

Water Supply Improvement Projects

- New reservoir cost \$1,713,185

Logan Lake, District of

Leak-detection Programs/Practices

- 1998 is the pilot year for the District's leak-detection program.
- Keys to Success: consistency, positive reaction
- Costs: \$5,000

Water Supply Improvement Projects

- An aquifer study is currently in progress in which the aquifer will be assessed in relation to possible future growth and expansion in the district.
- Costs: \$50,000

Lumby, Village of

Low-flow and Retrofit Programs

- Water saving devices were installed in the newly constructed Village office.

Merritt, City of

Other

- A summer student is hired to coordinate the water conservation program, put together radio/ newspaper ads, and conduct interviews. The student will aid in enforcement when restrictions are in place using a bike patrol.

Montrose, Village of

Other

- West Kootenay Power provides the Village with a lock-out timer for peak electricity consumption periods (on the water pumps), and provides an annual \$450 rebate. The pumps also have capacitors to reduce costs.

Nakusp, Village of

Leak Detection Programs/Practices

- Keys to Success: competent contractor
- Costs: \$5,500
- Actual Water Savings: 10 — 13%

Nakusp, Village of

Metering — Universal

- The City has been fully metered since 1978. Metering, in conjunction with an expanding block rate fee structure has been central to water conservation in Nanaimo.

Watershed Protection

- The watershed is protected; access is restricted. The public does not have access. Only a few hunters, and loggers (on privately owned lands) are permitted access.

Nanaimo, Regional District of

Metering

- Universal metering was completed for the regional district's five water systems in April, 1995.

North Okanagan, Regional District of

Low-flow Fixture or Retrofit Programs

- As of July 1, 1999, all new residential construction must install six litre per flush toilets, low-flow shower heads, and aerators.
- Keys to Success: mandatory bylaw; inspections by Building Inspector

Xeriscaping

- Constraints: annual maintenance money for demonstration gardens

North Vancouver, District of

Operations and Management Tools

- Most aspects of operations and management are conducted in conjunction with the Greater Vancouver Water District.

Pilot Programs — Rain Barrels

- Keys to Success: the program raises awareness for overall water conservation
- Costs: \$2,000

Parksville, City of

Metering — Residential and Commercial/Industrial

- Costs: \$32,000 (costs for reading only are \$28,360)

Leak-detection Programs and Practices

- Costs: \$10,000

Water Supply Improvement Projects

- A new dam was built
- Costs: \$4,000,000

Residential Technologies and Programs

- Private water audits
- Costs: \$11,000

Port Alberni , City of

Approximately 6,000 meters (primarily residential) have recently been installed. As metering has just been completed, Port Alberni has not switched to a metered billing rate yet. A metered rate is planned for 1999.

Residential Metering

- Keys to Success: provincial and federal cost sharing
- Costs: \$2.1 million
- Potential Savings: \$50 million (new source cost)

Commercial and Industrial Metering

- Costs: \$500,000

Leak Detection Programs and Practices

Costs: \$10,000/yr

Watershed Protection

- Costs: \$25,000

Port Hardy, District of

Metering — Residential

- A metering pilot project has been carried out; residential metering is not in place at this time.

Metering — Commercial and Industrial

- Currently only high rate users are metered.

Low-flow Fixture or Retrofit Programs (planned)

- Costs: \$250,000 — \$500,000
- Potential Water Savings: this program could lead to a 15 — 30% saving in water consumption

Other

- **Water Conservation Study**
The District of Port Hardy's engineering firm, Associated Engineering (B.C.) Ltd., completed a Water Conservation Study as of January, 1998. The measures

recommended in the study have yet to be endorsed by Mayor and Council. Based in part on the results of this study, the District is planning to implement a water conservation program this year.

Port Moody, City of

Metering

- Both commercial and industrial metering has been implemented.
- In 1997 the Greater Vancouver Water District commissioned a region-wide report on residential water metering to determine the feasibility and cost implications of implementing such a program. If residential meters are introduced within the Greater Vancouver Region, then Port Moody's residential customers would likely see a 25% increase in the cost of water.

Prince George, City of

Residential Metering

- As part of Stage 3 of the policy approval process, residential metering will be under consideration in 1998.

Commercial and Industrial Metering

- In 1996 all commercial and industrial water users were reviewed to ensure that water use was metered. In cases where no meters existed they were installed. This action occurred during *Stage 1* of Prince George's three stage policy approval process.

Low-flow Fixture or Retrofit Programs

- A program for implementing water conserving fixtures may be developed in 1998.

Qualicum Beach, Town of

Metering

- Water meters are in place in Qualicum Beach for all residential and commercial services, and are read twice yearly.

Rosland, City of

Water Supply Improvement Projects

- **New Water Treatment Plant**

The new water treatment plant, costing \$4 million, was officially opened on October 4, 1997.

The City obtains its water supply by gravity from the Star Gulch Reservoir. Prior to construction of the water treatment plant, the only treatment practiced was chlorination. Chlorination is not effective in protecting the public from waterborne diseases such as *giardiasis* and *cryptosporidiosis*.

The new water treatment process incorporates a chemical free filtration process known as slow sand filtration. Primary disinfection and protection against giardia and cryptosporidium is provided by disinfection using ozone. To provide further protection of the water in the distribution system, a secondary disinfectant known as chloramine is utilized. Chloramines are more stable and longer lasting than using chlorine alone as a secondary disinfectant. Because chloramines are more persistent, care must be taken when using water in aquariums and dialysis machines. Pet stores carry dechlorinating agents for aquariums. Dialysis machines must be equipped with special filters to remove chloramines. Rossland has a state-of-the-art water treatment facility which incorporates slow sand filtration, ozonation, and chloramine disinfection. The new plant is the largest slow sand water treatment plant in British Columbia and the first to incorporate ozonation.

Emergency Response Plan

- Emergency procedure response to the release of chlorinated or chloraminated water to the environment.

Other

- The City is currently developing a model which describes water flow/pressure in their distribution system. The goal of the project is to re-distribute the water such that consistent flows, at appropriate pressures, are achieved.

Revelstoke, City of

Other

- A water-use efficiency study (Dayton and Knight) is almost complete.

Salmon Arm, District of

Metering

- In addition to commercial and industrial metering, the District also meters institutional and multifamily connections.

Sidney, Town of**Leak Detection Programs/Practices**

- compare bulk purchase with retail sales

Xeriscaping

- recommend planting native species in new landscaping

Water Supply Improvement Projects

- in annual budget

Smithers, Town of**Metering — Commercial and Industrial**

- Commercial and industrial metering is in place, billing is based on a flat rate charge

Sunshine Coast Regional District**Metering — Commercial/Industrial and Agricultural/Irrigation**

- Water consumers are charged a meter rate in accordance with Schedule "B" of SCRD Bylaw 422.2

Low-flow Fixture or Retrofit Programs

- Constraints: B.C. Building Code — Water Conservation Amendment, also in effect for RAPP Grants
- Effective for all building permits dated on or after September 1, 1995, all installations of new plumbing fixtures must be in accordance with Subsection 6.4 of the B.C. Plumbing Code. All water conservation fixtures and fittings must be identified as such and include the flow rate in the marking. The maximum flow rates for plumbing fixtures in Groups C (residential), D (office), and E (mercantile) occupancies are:

- (a) Lavatory faucet 8.3 L/min
- (b) Kitchen faucet 8.3 L/min
- (c) Shower head 9.5 L/min
- (d) Water closet 13.25 L per flush cycle whether tank type or flush valve
- (e) Urinal 5.7 L per flush cycle whether tank type or flush valve

Tumbler Ridge, District of

Water Recovery, Reclamation, Reuse, and Recycle Programs

- A wastewater reuse program is ongoing in Tumbler Ridge. The golf course does not use domestic water for irrigation, but instead uses the municipality's treated effluent. This water conservation program has also resulted in a reduction of the quantity of fertilizer applied to the golf course.

Ucluelet, District of

Metering — Residential

- New subdivisions are ready, but not checked.

Metering — Commercial and Industrial Metering

- Cost is borne by the clients.

Water Supply Improvement Projects

- New projects are underway
- Costs: \$800,000

Emergency Response Plan

- Through the Provincial Emergency Plan
- Costs: \$3,000

Watershed Protection

- By referral with Regional District and Provincial Agencies

Industrial and Commercial Technologies and Programs

- Various activities to help ICI users reduce costs.

Vancouver, City of

Water Audits

- The city has been working closely with the Park Board on water consumption issues. In 1995 the city funded an irrigation audit of Van Dusen Gardens and Jericho Playing Fields. This was followed by an irrigation workshop, using information gathered from the audit, for those employees involved in irrigation.

Xeriscaping

- The planting of native vegetation is promoted through the Greenways and other City projects
- Guidelines are being put together for the reclamation and storage of plants from construction sites, for use on City projects.
- With funding obtained from Environment Canada, the City undertook the construction of a low irrigation (Xeriscape) demonstration garden at City Farmer (at 6th and Maple).
- Costs: \$20,000

Water Recovery, Reclamation, Re-se, and Recycle Programs

- **Use of Storm Water**

A number of streams that were maintained with potable water are presently being reconstructed to use storm water (Tatlow Park, Langara Golf Course). Sewers is also working to bring storm water to Jericho Ponds, which are presently topped up with potable water, and Trout Lake will be using storm water once the sewer system has been separated.

- **Bloedel Conservatory**

The Park Board submitted a business case to replace the Bloedel Conservatory's non-recycling cooling system with a refrigeration unit which would reduce Park Board consumption by about 26.5 million Imperial gallons per year (1997 rates).

Water Supply Improvement Projects

- Through the Greater Vancouver Regional District

Watershed Protection

- Through the Greater Vancouver Regional District

Vanderhoof, District of

Residential Metering

- Installation of meters began approximately two years ago. There are 648 residential connections.
- Keys to Success: total implementation of program
- Costs: \$400,000
- Potential Water Savings: 1,500 m³/d
- Constraints: summer use

Commercial and Industrial Metering

- Installation of meters began approximately two years ago. There are 171 commercial/industrial connections.
- Keys to Success: total implementation of program
- Costs: \$100,000
- Potential Water Savings: 100 m³/d
- Constraints: summer use

Low-flow Fixture or Retrofit Programs

- Costs: \$13,000
- Potential Water Savings: 1,000 m³/d

Leak Detection Programs/Practices

- Implementation Costs: \$6,000
- Potential Water Savings: 50 m³/d

Vernon, City of

Water Audits

- During the summer of 1997 Environmental Youth Team members reviewed a number of commercial and industrial accounts in terms of their water consumption, prioritized the accounts from lowest to highest use and made visits to the high priority facilities. During the visits audits were conducted and recommendations made regarding potential improvements to use efficiency.

Metering — Residential

- Since metering was implemented in 1992 residential consumption has dropped by 34%
- 5,000 homes were metered

Low-flow Fixture or Retrofit Programs

- Vernon just completed a *pilot toilet replacement program* involving 100 homes. Homeowners paid \$75 and the City paid the remaining \$125 for removal of the existing toilet and its replacement with a new 6 litre per flush unit. The program is expected to expand to full scale in 1999.
- In conjunction with universal metering (1992), Vernon adopted a *conservation product installation program* during which 7,307 toilet tank water savers, 3,379 low-flow shower heads, 6,540 low-flow bathroom aerators, and 3,899 low-flow kitchen aerators, were installed.

Water Recovery, Reclamation, Reuse, and Recycle Programs

- **Water Reuse Program**

In 1977 the City implemented the area's first full-scale water reuse program. As a result, there has been almost no direct discharge of treated wastewater from Vernon and Coldstream to Okanagan Lake since May, 1977. In 1984 and 1985, one small discharge per year went into Vernon Creek (which flows into Okanagan Lake) lasting for five weeks each. In February 1998 the first direct discharge began, as a result of a wet summer during which the recycled water could not be used to irrigate. The 1998 discharge represents the first use of the deep lake outfall which was built in 1987.

During the 125 day irrigation season which commences in early May, the City's entire yearly waste water flow is treated and applied to irrigation fields.

Currently, 2,700 acres of agriculture, forestry and recreational lands participate in the "water reuse" program. Agriculture operations participating in the program include cattle and horse grazing as well as hay production. Participating silviculture operations include a forestry nursery, a seed orchard and experimental tree plantations. Recreational lands currently involved in the irrigation program include golf courses and playing fields.

- **"Wildland Renovation Project"**

The City has entered it's fifth year of the "Wildland Renovation Project". The project reclaims phosphorous rich water which is subsequently applied to marginally productive wildland areas at rates in excess of normal irrigation practices. The phosphorous is removed by the soil column and renovated tailwater with 96% of the phosphorous removed flows to adjacent water bodies.

Other

- To reduce water consumption and resulting wastewater in all area schools, automatic flush urinals were installed with a solenoid valve on the water line leading to the urinal tank. The valve is wired into the bathroom light switch so that the tank only fills during the day, when washroom lights are on. Millions of gallons are estimated to be saved per year as a result.

West Vancouver, District of

Residential Metering

- Keys to Success: costs borne by developers

Water Supply Improvement Projects

- Keys to Success: regular capital program

White Rock, City of

Metering

- The water system has been fully metered for many years.
- White Rock Utilities Limited views metering as the only way in which water utilities can have any real control over consumption. Over the years, the population of White Rock has increased, but per capita water usage has decreased - a result of metering and keeping water conservation information before users.
- Water usage is 78 gallons per person per day.
- As of January 1, 1996 there was a total of 4,270 water meters connected as follows:
 - (a) 3,798 single family connections;
 - (b) 258 multifamily connections; and
 - (c) 214 commercial connections.

Water Supply Improvement Projects

- Merklin Street Pump Station (1989)
- New Well (1991) for back-up and high demand periods
- All wells and pumps serviced between 1988 and 1993
- Since 1989 have replaced five Deep Well Pumps
- Set-up a seven year well and pump maintenance schedule which commenced in 1993

- A five year water main replacement program for old galvanized water mains
- Twice yearly flushing program

Computer Upgrades

- Installed a computer billing system in June, 1991

Other

- **Backflow and Cross Connection Control Program**
 - All new and replacement water meters have dual check backflow prevention devices installed to protect the water supply.

III. Irrigation and Improvement Districts' Initiatives

3. Operations and Management Tools

"Hard" conservation measures are those initiatives which are more demanding or restrictive in their approach to water use efficiency. Hard measures include legal, economic and financial tools, as well as operations and management tools.

"Operations and Management Tools" presented in this, and the preceding two sections includes: supply and demand studies, best management practices, cost/benefit analyses, treatment plants, xeriscaping, metering, backflow and cross connection control programs, recovery/reclamation/reuse/recycle programs, supply (quantity and quality) improvement projects, water audits, low flow fixture and retrofit programs, metering programs, leak detection programs, watershed protection projects, consumption and conservation potential studies, and emergency response plans.

Black Mountain Irrigation District

Metering — Residential

- Multifamily dwellings only

Lakeview Irrigation District

Lakeview Irrigation District

Metering — Industrial and Commercial

- In advance of a comprehensive metering program, a pilot project is underway in the industrial park.

Water Supply Improvements

- **New dam constructed**
 - A new large storage dam was recently built, which doubles capacity.

Water Quality Improvement Project

- In the fall of 1997, a siphon pipe was installed over the Rose Valley Dam. By reducing the reservoir's anaerobic zone, algae growth can be restricted, resulting in reduced copper sulphate treatments late in the summer months. Before the consultant could test the 1997 anaerobic level, the lake turned over. The effect of the siphon pipe will be monitored in 1998.

Royston Improvement District

- Royston purchases bulk potable water from the Village of Cumberland. The current purchase price is \$0.8790/1,000 gallons.

Metering — Universal

- In 1993 the District decided to implement a universal metering program:
 1. to ensure a fair and equitable billing system,
 2. to eliminate or postpone civic works by the District to a future date where the cost would be shared by a greater number of users,
 3. to increase the storage capacity of the water distribution system, and
 4. to eliminate waste due to leaky taps, fixtures, etc.
- The project met with much opposition, resulting in a referendum, in which the proposal was defeated. During the next three years the District installed several "test" meters, gathered consumption data, and began an education program via quarterly newsletters. In 1996 the District went back to the landowners with the meter proposal, and this time was successful.
- Installation of the meters took approximately eight months during a one year time frame. The total cost to install 800 touch read meters was approximately \$265,000, including software, computer, and meter reading equipment. The meters went "on line" October 1, 1997.
- Total consumption for all services for the period October 1 to December 31, 1997 was 47,433 cubic meters (10,435,260 gallons). The amount billed to the District by the Village of Cumberland for the same period was 59,145 cubic meters (13,012,000 gallons). An estimated 2 million gallons of unaccounted for water during this period

represents possible leaks within the system. The installation of meters has assisted in finding MANY leaks during the past year.

- Keys to Success: public relations and education
- Costs: \$265,000

Rutland Waterworks District

Other

- PowerSmart program
- Automatic controls

South East Kelowna Irrigation District

Metering — Agricultural

- Through funds provided under the federal 'Green Plan' the District embarked on a metering program in February of 1994, which resulted in the installation of 400 irrigation meters.
- Constraints centered around resistance to agricultural meters by the landowners in the District. Initial public relations were not effective and there was considerable opposition to the metering program when it was first implemented. Continued public relations through newsletters, field days, and print media appear to have softened this opposition to some extent.
- Keys to Success: public relations and education
- Constraints: resistance from landowners
- Costs: \$265,000
- Potential Savings*: \$450,000
- Potential Water Savings*: 1,300 AF

*The assessment period ends in 1999. The potential savings are based on an anticipated savings of 10% and are considered to be conservative. The dollar figure for potential savings assumes that water rights for water saved through metering were sold to new users and is net of implementation costs (i.e. total revenue of \$1,150,000).

Computer Upgrades

- With the data provided from the meters, the project has evolved into software development. Version 2.0 of the software program "Lands" was recently released. The

software performs a comprehensive analysis of irrigation schedules and identifies periods of inefficient use based on variables such as weather, and soil conditions. (For more information on this software, contact Ted Van der Gulik, Ministry of Agriculture, phone: 604-556-3112.)

Other

- **Water Use Study**
 - Recently, a 20 year study on water use in the District was completed. Findings showed that per capita and per acre consumption had decreased significantly while the total irrigated land area has increased by an estimated 17%.

Westbank Irrigation District

Metering — Agricultural/Irrigation

- Flow control valves (dole valves) are used on all connections.