

Drinking Water Safety in Newfoundland and Labrador



Annual Report 2004



GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR
Department of Environment and Conservation

Message from the Minister



As the Minister of Environment and Conservation, I am pleased to release the third annual report on Drinking Water Safety in Newfoundland and Labrador. The report covers the fiscal period from April 1, 2003 to March 31, 2004. It outlines the many activities under the Multi-Barrier Strategic Action Plan that help to ensure safe drinking water and the progress made in safeguarding drinking water for Newfoundlanders and Labradorians.

A key objective in government's Blueprint is to prevent the contamination of our water resources and work to restore the wholesomeness of water where quality concerns may exist. This commitment remains a priority for government. We are working diligently to continue to improve drinking water quality by taking the appropriate action on many fronts that ensures safe, clean and secure drinking water in our province. Because water must pass through many steps from the time it is obtained from its source until it is delivered to the consumer at the tap, there are many challenges that this precious resource faces, therefore it is our duty to put the proper safeguards in place at each stage of the water supply system.

Water quality is extremely important to Newfoundlanders and Labradorians and it is truly important to government. The people of this province can be assured that government will continue to build on progress made under the Multi-Barrier Strategic Action Plan and implement the necessary measures to ensure a reliable and safe source of drinking water for the future.

Indeed, protecting water quality in our province takes a collaborative effort. To this end, I extend thanks to the staff of the Water Resources Management Division of my department for their hard work and commitment to drinking water safety. I would also like to recognize the efforts of the management and front-line staff of the Departments of Health and Community Services, Government Services and Municipal and Provincial Affairs, as well as the Health and Community Services Boards, municipal governments, and the Newfoundland and Labrador Federation of Municipalities for their role in the implementation of the Multi-Barrier Strategic Action Plan for drinking water safety. I also commend members of the Drinking Water Safety Technical Working Group for their valuable work on drinking water issues.

Government pledges to continue to work hard on behalf of the people of Newfoundland and Labrador to keep our drinking water safe and help build healthier and stronger communities in which to live.

Tom Osborne
Minister

Executive Summary

This third annual report on drinking water safety in Newfoundland and Labrador outlines accomplishments and activities for 2003-04 under the Multi-Barrier Strategic Action Plan (MBSAP) for drinking water safety.

Source water, whether it is a pond, brook or well, water treatment systems and the distribution system are the physical components where the first level of the MBSAP is applied. Source protection of water supplies, of which there were 308 in the province, is an important way to protect the original natural quality of water from impacts due to land use activities and development. Water treatment comprised of 424 chlorination systems, 11 water treatment plants and several other systems with filtration or other treatment are operated to remove or inactivate microbiological contamination, remove chemical substances or to improve upon aesthetic parameters. The water distribution itself is an important determinant of water safety, but there are many challenges with this component as there are 548 water supply systems serving all types of communities from cities to small local service districts. Aging infrastructure is being cited as one of the main issues that Government addressed in 2003-04 by investing \$59.6 million for water and sewer projects.

The second level of the MBSAP includes chemical, physical and bacteriological water quality monitoring as well as, reporting, inspection and operator training. Statistics in Chapter 3 show that there were over 2,200 tap water samples and 720 source water samples analyzed for over 30 parameters including THMs and HAAs as well as over 18,500 samples for bacteriological water quality. New data management systems and reporting tools were developed to help manage this data. Whenever test results exceeded provincial standards appropriate action was taken. The number of boil advisories on public water supplies, of which there were 242 as of March 31, 2004, continues to draw attention but this number is declining. Apart from direct infrastructure improvements, inspections, issuing of construction and operating permits, and operator training are all helping to make continuous improvements to public water supplies.

The third and last level of the MBSAP deals with legislative and policy frameworks; public involvement and awareness; setting guidelines, standards and water quality objectives; and research and development. Some of the highlights in this area include enforcement of the Water Resources Act, as well as other applicable legislation. Government has made significant strides in providing information to the public about drinking water at the community level. For example, the Department of Environment and Conservation has developed a new tool called the Water Quality Index, which will make it easier to describe water quality in simple terms for comparative purposes. Government is working with other Federal agencies on such things as drinking water quality guidelines.

Government is committed to ensuring drinking water safety by following a Multi-Barrier Strategic Action Plan. This plan involves activities undertaken by four line departments; Environment and Conservation, Municipal and Provincial Affairs, Health and Community Services and Government Services; each contributing uniquely to the plan by means of their respective mandates and programs. Coordination between the departments is ensured by a Technical Working Group which meets frequently and reports to a committee of senior government officials.

Table of Contents

1	Introduction	1
	1.1 Overview	1
	1.2 Objectives	1
2	Level 1 of the MBSAP	3
	2.1 Source Water Protection	3
	2.2 Water Treatment	5
	2.3 Water Distribution System	6
3	Level 2 of the MBSAP	8
	3.1 Monitoring	8
	3.1.1 Sampling	8
	3.1.1.1 Chemical and Physical Water Quality Monitoring	8
	3.1.1.2 Bacteriological Water Quality Monitoring	10
	3.1.2 Results of Water Quality Monitoring	11
	3.1.2.1 Chemical Indicators	11
	3.1.2.2 Bacteriological Indicators (Boil Water Advisories)	15
	3.2 Inspection, Abatement and Enforcement	16
	3.2.1 Inspection	16
	3.2.2 Abatement	17
	3.2.3 Enforcement	18
	3.3 Data Management and Reporting	18
	3.3.1 Data Management	18
	3.3.2 Reporting	20
	3.4 Operator Education, Training And Certification	22
	3.4.1 Operator Education	22
	3.4.2 Operator Training	23
	3.4.3 Operator Certification	23
4	Level 3 of the MBSAP	25
	4.1 Legislative and Policy Frameworks	25
	4.2 Public Involvement and Awareness	25
	4.3 Guidelines, Standards and Objectives	26
	4.4 Research and Development	26
5	Conclusions	27
6	Path Forward	28
	6.1 Government Action Plans - 2004-2005	28
	6.1.1 Department of Environment and Conservation	28
	6.1.2 Department of Municipal and Provincial Affairs	29
	6.1.3 Department of Health and Community Services	29
	6.1.4 Department of Government Services	30
	6.2 Inter-Departmental Cooperation	30



1 Introduction

1.1 Overview

This is the third annual report on the safety of drinking water quality in the province. It provides information on the progress and accomplishments made to ensure drinking water safety. This report was prepared in fulfilment of the Department of Environment and Conservation's (ENVC) commitment to issue an annual progress report on drinking water safety in the province.

The Government of Newfoundland and Labrador provides clean and safe drinking water to the public by implementing a Multi-Barrier Strategic Action Plan (MBSAP) for drinking water safety. This plan simply refers to the protection of drinking water on a variety of levels. The components of the MBSAP are shown in Figure 1 and include:

- Level 1** Source Water Protection; Water Treatment; and Water Distribution System
- Level 2** Monitoring; Inspection, Abatement and Enforcement; Management and Reporting; and Operator Education, Training and Certification
- Level 3** Legislative and Policy Frameworks; Public Involvement and Awareness; Guidelines, Standards and Objectives; and Research and Development

The primary goal is to ensure that adequate safeguards are in place at each stage of the water supply system to minimize the possibility of pathogens and other contaminants entering the water. Additional goals of the action plan are to provide public access to drinking water quality data, ensure open and transparent communication with the public on all drinking water quality related issues, increase public confidence in drinking water, and ensure long term sustainability of water supply systems.

The key elements of the MBSAP are further complemented by inter-departmental cooperation whereby four government departments are working together. Figure 1 also shows the participating agencies for each key element of the MBSAP. A committee of Deputy Ministers deals with drinking water safety on a proactive basis. The committee is chaired by the Deputy Minister of Environment and Conservation, and includes the Deputy Minister of Health and Community Services, the Deputy Minister of Municipal and Provincial Affairs, and the Deputy Minister of Government Services. The committee is supported by an inter-departmental Safe Drinking Water - Technical Working Group (SDW-TWG).

Under the leadership of the Deputy Minister's committee, the departments have made substantial progress in implementing the MBSAP for drinking water safety. This report closely follows the key elements of the MBSAP as shown in Figure 1, and is primarily written to reflect available data for the fiscal year 2003-04 which is up to and including March 31, 2004.

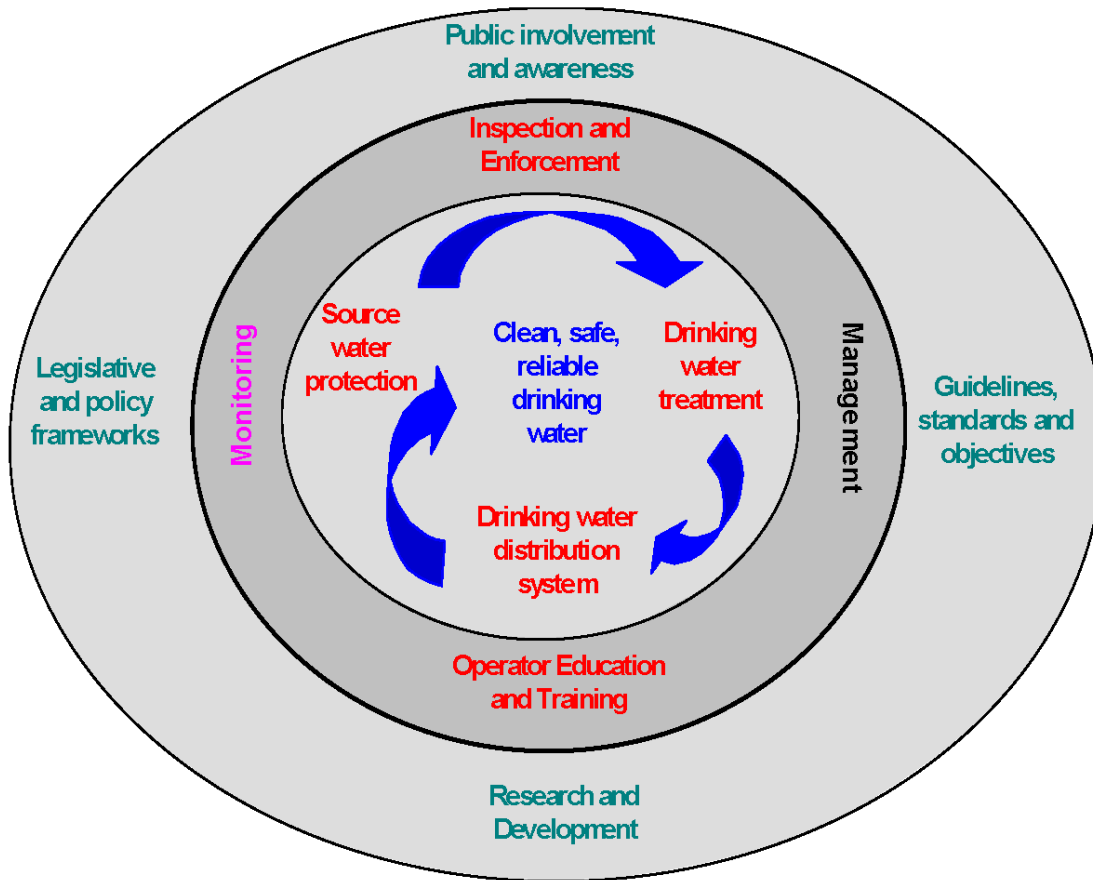
1.2 Objectives

The main objective of this report is to provide an overview of the progress of activities on each component of the MBSAP for drinking water safety. The highlights of the various sections of the report are as follows:

Section 2 provides details of the progress and accomplishments made on activities under Level 1 of the MBSAP - Source Water Protection; Water Treatment; and Water Distribution System.

Section 3 provides details of the progress and accomplishments made on activities under Level 2 of the MBSAP - Monitoring; Inspection, Abatement and Enforcement; Management and Reporting; and Operator Education, Training and Certification.

Figure 1 : The components of the Multi-Barrier Strategic Action Plan (MBSAP)



Department of Environment and Conservation

Department of Environment and Conservation / Department of Government Services

Department of Environment and Conservation / Department of Municipal and Provincial Affairs

Department of Environment and Conservation / Department of Health and Community Services / Department of Government Services / Department of Municipal and Provincial Affairs / Federal Government

Section 4 provides details of the progress and accomplishments made on activities under Level 3 of the MBSAP - Legislative and Policy Frameworks; Public Involvement and Awareness; Guidelines, Standards and Objectives; and Research and Development.

Section 5 provides an overall summary of the progress and accomplishments made on activities under all levels of the MBSAP.

Section 6 provides details of the proposed activities of the path forward for the next fiscal year (2004-05) in order to provide clean, safe and secure drinking water.



2 Level 1 of the MBSAP

2.1 Source Water Protection

The population of Newfoundland and Labrador is estimated to be 512,930 people (Statistics Canada, 2001 Census of Canada). Approximately 90% of the population is concentrated along the coastline which is 17,540 kilometres long. As of March 31, 2004 the public water supply database indicated that there are 605 communities and 548 public water supply systems as shown in Figure 2. Many communities have more than one water supply system while 225 communities do not have any public water supply system. The residents of these communities use private wells or other sources to meet their water needs.

There are 308 public surface water sources servicing the majority of the population in the province. This is due to the reliability of surface water supplies and easy access to a large number of lakes and ponds. There are 211 public groundwater sources consisting of both dug and drilled wells. Dug wells are usually between two and five metres deep, depending on the depth at which bedrock is encountered. The depth of drilled wells ranges from about 15 to 150 metres. Groundwater wells are the water supply of choice for most smaller communities, for augmenting systems where distribution costs would otherwise pre-

clude a single public water supply, and for private on-site water supplies.

This province continues to have one of the most well established source water protection programs in the country with approximately 89.3% of the total population of Newfoundland and Labrador receiving drinking water from protected surface and groundwater supplies. The 279 active protected water supplies are indicated in Figure 2. Even though the source water protection program is very successful, in that most of the major water supply areas have been designated as protected areas, ENVC is continuing its efforts to designate remaining unprotected areas as protected areas on a need and feasibility basis. In the 2003-04 fiscal year, an additional 23 water supply areas were designated as protected water supply areas.

There is a total of 12 watershed management committees in the province dealing with land management issues in the most sensitive water supply areas. Additional watershed monitoring committees will continue to be appointed, as the need arises. No new watershed management committees were appointed in 2003-04. Watershed management plans are developed in cooperation with communities as and when needed.



The Big Pond protected water supply area for the Local Service District of Bellevue.

Tools for Sourcewater Protection

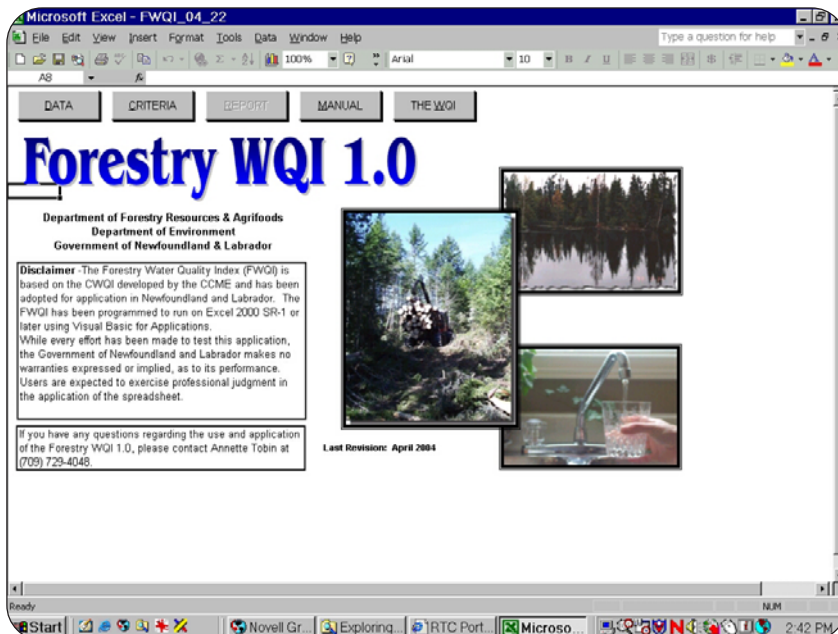
In addition to the continued effort of protecting water supply areas and establishing watershed management committees and plans, numerous tools are being utilized to ensure further protection of source water. In the past fiscal year, all public water supply areas have been delineated and digitized. The water supply areas already protected and those being evaluated and reviewed for protection (by the Inter-departmental Land Use Committee-ILUC) have been incorporated as a Water Supplies Area GIS layer in the Departmental Drinking Water Quality GIS System. This Water Supplies Area GIS layer is available to the public and stakeholders from the departmental web page. The GIS Water Supplies Area layer will allow consultants, municipalities and other stakeholders to better plan and manage activities within watersheds using GIS. Though planned for the past fiscal year, the addition of unprotected and potential water supply areas to the GIS Water Supplies Area layer could not be completed.

A new digitized procedure was developed for submitting boundaries to the ILUC process for protecting water supplies. This allows for more accurate legal descriptions in a new format which is more useful and easier to share

between government departments and other stakeholders.

Land use analysis using remote sensing imagery has been completed for selected watersheds in the past fiscal year. This was accomplished using GIS tools and will be used for development of watershed management plans, identification of high risk areas and detailed analysis of all sensitive watersheds on a need basis.

In the past fiscal year, the Canadian Council of Ministers of the Environment Water Quality Index (CCME WQI) has been used to evaluate the effects of various Best Management Practices (BMPs) with respect to source water protection. The CCME WQI has also been adapted to capture the effects of forestry activities in watersheds through the development of the Forestry Water Quality Index (FWQI). The FWQI was jointly developed by the Department of Environment and Conservation, Department of Natural Resources and the Western Newfoundland Model Forest. The FWQI will allow better planning and management of forestry activities within protected water supply areas.



Screenshot of the Forestry Water Quality Index Calculator.

2.2 Water Treatment

Chlorination is the most widely used method of water treatment throughout the province. Although it is primarily aimed at destroying and rendering harmless disease-causing micro-organisms, it also protects the distribution system from microbial growth. There are 139 gas chlorination systems, 275 hypo chlorination systems and 10 powder systems in the province. In addition to chlorination, there are 11 operational conventional water treatment plants. Also, there are a number of communities that have infiltration galleries and filtration units to deal with site-specific water quality problems such as high colour, iron and manganese.

The number of water treatment facilities across the province continues to grow gradually. There are eight additional communities that are in the process of evaluating, installing or commissioning new water treat-

ment plants. The Department of Environment and Conservation, in consultation with the Department of Municipal and Provincial Affairs (MAPA), assesses water treatment needs of communities and makes recommendations for funding. The decision to implement a conventional or package water treatment facility is made based on a review of the available water quality data and the extent and nature of water quality problems. For example, most communities affected with unacceptable levels of arsenic have been provided funding to develop alternate water supply sources.

Disinfection of drinking water is recognized as an essential component of the MBSAP and, has been given priority throughout the past year. Readers should refer to the MAPA for further information about municipal infrastructure funding programs.



Operator Trainer Gerry Lahey (right) providing training to Pasadena water system operator Chris Upshall (left) on their gas chlorination disinfection system.

2.3 Water Distribution System

According to the water system classification developed by the Association of Boards of Certification, of the 548 water supply systems in the province, there are 413 very small systems, 72 small systems, 57 medium systems, five large systems and one very large system. The majority of the water supply systems service a population base in the range of 150 to 500 people. The distribution of different types of water supply systems is shown in Figure 2.

The issues with respect to water supply infrastructure continue to be those identified in the previous annual reports. The main issues with respect to water distribution systems in the province are:

- aging infrastructure
- difficulty of employing/retaining qualified and trained operators

Aging infrastructure of water supply systems continues to be one of the greatest challenges faced while implementing the MBSAP. Government continues to invest heavily in the upgrade of existing, as well as in the construction of new water and sewer infrastructure. Based on the Department of Municipal and Provincial Affairs annual report, \$59.6 million dollars was spent on water and sewer related infrastructure during 2003-04.

Proper operation and maintenance of water supply systems continues to be a challenge to smaller communities due to the difficulty of employing and retaining qualified and trained operators. The total cost incurred on annual operation and maintenance of water supply systems is also an issue due to the limited tax base of smaller communities. In order to overcome these issues the Government introduced a large scale operator education, training and certification program with no cost to municipalities in 2001 and implemented the hands-on training phase of the program in 2002. In 2003, the mobile training units delivered 369 on-site training sessions. These were in addition to the regular education seminars offered by ENVC. This program will be discussed in greater detail in Section 3.4.

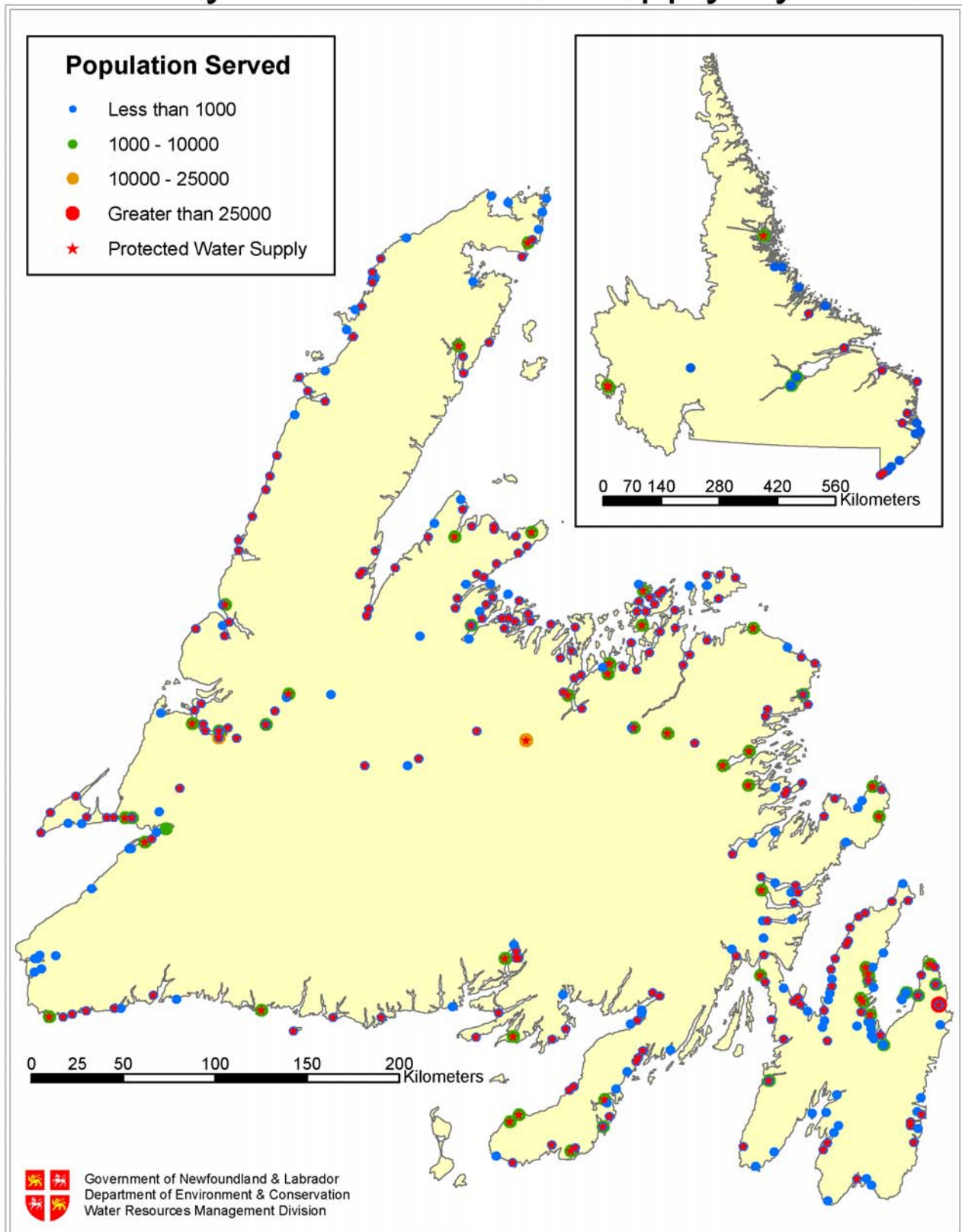
The large number of communities, and a relatively small population spread over a large geographical area, makes the administration of public water supply systems and the provision of safe drinking water a challenging task. To address this situation government is encouraging the concept of regional water systems and regional water operators. There are three operational regional systems in place. In addition, there is one regional water operator who is responsible for five communities.



This is the pump system for a well in Chance Cove. From right to left are the booster pump, six pressure tanks and a flow meter.

Figure 2 : Public Water Supplies

Diversity of Public Water Supply Systems





3 Level 2 of the MBSAP

3.1 Monitoring

The province continues to monitor drinking water quality of all public water supplies. This enables the province to adopt a proactive approach towards the safety of drinking water, in which emerging issues of concern are identified quickly and responded to in an efficient manner. The central coordination of sampling ensures that the same procedures are adhered to throughout the province and it allows for modifying and improving the sampling and analysis program in a very cost effective manner.

Routine monitoring of drinking water quality in this province is a joint responsibility of ENVC and Department of Government Services (GSC). The Department of Environment and Conservation is responsible for chemical and physical monitoring of source and tap water quality while GSC through its network of 15 offices, is responsible for monitoring of bacteriological tap water quality and chlorine residuals. Larger municipalities such as St. John's and Corner Brook also collect bacteriological samples which are submitted to the province for analysis.

3.1.1 Sampling

3.1.1.1 Chemical and Physical Water Quality Monitoring

Samples for physical and chemical analysis are taken from the source water (lake, pond, river, reservoir, well or spring) and from the distribution system. The distribution system samples, classified as tap water samples, are taken at a site significantly beyond the point at which treated water enters the distribution system. The delivery of the chemical drinking water quality monitoring program is carried out by five Watershed Management Specialists, one Groundwater Management Specialist and three Regional Water Quality Officers, along with their other duties and responsibilities.

Samples are collected semi-annually with the exception of Trihalomethanes (THMs) which are collected on a quarterly basis. Haloacetic acids (HAAs) samples are collected from a few selected water supplies each year. If there are any known or emerging site-spe-



Watershed Management Specialist Deneen Spracklin measuring the chlorine residual of a THM sample.

cific water quality issues at any water supply, the sampling frequency for inorganic parameters is changed from semi-annually to seasonal. Sampling is also carried for various organic parameters for selected supplies each year. While the main emphasis of the sampling is on tap water quality, source water quality is also monitored on a selective basis in order to assess the impact of land use activities, effectiveness of buffer zones and other

environmental controls, THMs pre-cursor levels, and comparison between source and tap water quality.

During the period of April 1, 2003 to March 31, 2004, 2,914 source and tap water samples were collected for various types of chemical analysis. An overview of the sampling activities for the past fiscal year can be seen in Table 1.

Table 1: Overview of Chemical/Physical Sampling Activity from April 1, 2003 - March 31, 2004

Parameter	Number of Source Samples			Number of Tap Samples		
	Total*	Surface	Ground	Total*	Surface	Ground
Inorganic Chemical Parameters	720	351	357	1024	655	359
THMs	N/A: THMs are a result of chlorination, thus not found in source samples			1021	977	38
HAAs	N/A: HAAs are a result of chlorination, thus not found in source samples			132	126	4
Organic Chemical Parameters	No source samples taken			17	0	17

* The total number also includes samples that were analyzed but then subsequently excluded from the database due to changes in the public water supply database such as change of supply status from active to inactive and from public to private. The number of inorganic chemical source samples, inorganic chemical tap samples, THMs samples and HAAs samples that were deleted were 12, 10, 6 and 2 respectively.



Bottles used for chemical and physical water quality sampling. From left to right, three plastic bottles for tapwater, two glass vials for THMs and two glass vials for HAAs.

The monitoring program is limited to public water supplies only and there is no legislative requirement for the monitoring of institutional, commercial and private supplies but Government is planning to review this issue.

To help ensure that consumers of water provided by a public drinking water supply have clean and safe drinking water, the province has adopted the chemical and physical guidelines in the *Guidelines for Canadian Drinking Water Quality 6th Edition, 1996* (GCDWQ), as revised, as provincial objectives. The provincial "Standards for Chemical and Physical Monitoring of Drinking Water" can be accessed at:

www.gov.nl.ca/env/Env/waterres/Policies/WQ-Standard-PhysicalChemical.asp

Presently, the GCDWQ do not recommend a limit for HAAs. However, the province continues to test for HAAs in tap samples from surface water supplies (since HAAs are not of concern with groundwater supply sources) to establish baseline data to be used as part of a national study for the development of HAAs guidelines. In total, 70 water supplies that serve 69 communities were sampled for HAAs in 2003-04. Monitoring efforts will continue to fill in data gaps in this area. The HAAs summary data for all communities sampled can be accessed at:

www.gov.nf.ca/env/Env/waterres/Surfacewater/HAA/HAA.asp

3.1.1.2 Bacteriological Water Quality Monitoring

The provincial "Standards for Bacteriological Quality of Drinking Water" can be accessed at:

www.gov.nl.ca/env/Env/waterres/Policies/WQ-Standards-Microbiological.asp

In total, 18,568 bacteriological samples from public water supplies were tested during the 2003-04 fiscal year. The bacteriological water quality monitoring program is carried out by 35 Environmental Health Officers working in the Avalon, Eastern, Central, Western and Labrador regions from 15 Government Service Centre locations. The ColiBlue is the standard test method currently in use for the determination of *E. coli*. With an option to use the Colilert method if need be under field conditions. The Colilert method is a qualitative, presence-absence, test method while the ColiBlue test method is a quantitative test method. Both methods simultaneously test for the presence of total coliforms and *E. coli* in a 100 millilitre water sample. The testing services are provided by the Public Health Laboratory (PHL) with regional testing sites that operate under the direction of the PHL. The results of these tests are compared to the current standards for bacteriological safety of drinking water and action is taken accordingly.

The PHL and regional testing sites also process bacteriological water samples submit-



Laboratory Technologist, Mr. Peter Kent, performing an analysis at the Public Health Laboratory, St. John's.

ted by individuals to test private wells. Bacteriological results are reported to the individuals concerned and when fecal contamination is found or detected it is reported to GSC officials as well.

3.1.2 Results of Water Quality Monitoring

3.1.2.1 Chemical Indicators

Based on the information and knowledge gained through regulatory inspections and the drinking water quality monitoring program, the main challenges and issues with respect to chemical indicators of drinking water quality identified in 2003-04 are as follows:

- Aesthetic parameters - pH, colour and others
- Contaminants- antimony, fluoride, barium, mercury, cadmium, arsenic, lead and turbidity
- THMs

Aesthetic Parameters

There are a number of aesthetic parameters such as pH, colour, sulphate, sodium, chloride, copper, iron and manganese whose values fall outside the recommended guidelines for some water supplies. Aesthetic pa-

rameters reflect substances or characteristics of drinking water that can affect its acceptance by consumers but which usually do not pose any health effects. Improvement of aesthetic parameters contributes to the overall quality and safety of drinking water.

pH - There are about 41 communities where pH values in tap samples were below the pH of 5.0. Although pH is an aesthetic parameter which does not have direct health implications, low pH levels accelerates the corrosion process of pipes and fittings and the leaching of metals. There are about 10 communities where pH values are above the recommended guideline of 8.5. The Department of Environment and Conservation has been working with a number of communities to help adjust and optimize the pH in tap water.

Colour - The other main aesthetic parameter of concern is colour. There are about 243 communities with colour values in the tap samples above the recommended guideline of 15 True Colour Units (TCU). Colour in drinking water may be due to the presence of coloured organic substances or metals such as iron, manganese and copper. The presence of colour is not directly linked to health but it can be aesthetically displeasing. Colour is also of concern since the presence of colour in un-



Raw water (left) and water after treatment (right) at the Clarenville water treatment plant. Photograph was supplied by Winston Lethbridge, Treatment Plant Operator.

treated source water is an indirect indicator of the THMs formation potential when the water is chlorinated.

Bogs and wetlands produce large amounts of dissolved organic materials such as tannins, lignins and humic acids, which can give water a tea-like colour. Calcium carbonate from regions with limestone bedrock may give water a greenish colour, while ferric hydroxide (iron) may impart a reddish colour. The degree of colouring will depend on the concentrations of these and other substances. Water colour is highly influenced by land cover in a basin. Bogs and wetlands drainage will contribute high levels of colour to surface runoff, while less organic soils or exposed bedrock in a basin will contribute little to no colour. Treated drinking water should not have much apparent colour.

Others - There were exceedances detected at the tap in some of the public water supply systems for additional aesthetic parameters. These parameters such as sulphate, sodium, chloride, copper, iron and manganese are not a health related concern. Exceedances of these parameters are expected due to their natural abundance in the geology and waters of the province. For example, iron and manganese levels are often elevated in water supplies throughout the province due to the natural weathering of iron and manganese bearing rocks and minerals. Sulphate is another naturally occurring substance that may be leached from the soil or released from decaying plant matter and is commonly found in water supplies.

Contaminants

The main contaminant chemicals or parameters of concern in our public water supplies are: arsenic, lead, turbidity and THMs. Table 2 provides information on the total number of samples affected by each of the main contaminants. Antimony, fluoride, barium, mercury and cadmium also showed up in reported water samples. It was demonstrated in subsequent testing that these results were outliers, erroneous or due to sampling errors. The fluoride exceedance was likely due to the geology of the source.

Antimony - One sample from a groundwater based water supply system was identified as being affected by antimony. The water supply was re-sampled and the subsequent sample did not show elevated levels of antimony. The interim maximum acceptable concentration (IMAC) for antimony in drinking water is 0.006 mg/L. Antimony is a naturally occurring metal that is introduced into water through the natural weathering of rocks, runoff from soils, effluents from mining and manufacturing operations, industrial and municipal leachate discharges and from household piping and possibly non-lead solder.

Fluoride - One sample from a groundwater based water supply system was identified as being affected by fluoride. The maximum acceptable concentration (MAC) for fluoride in drinking water is 1.5 mg/L. The fluoride concentration in natural water varies widely as it depends on such factors as the source of the water and the geological formations present. Trace amounts of fluoride may be essential for human nutrition and the presence of small quantities leads to a reduction of dental caries.

Barium - One sample from a groundwater based water supply system was identified as being affected by barium. The water supply was re-sampled and subsequent samples did not show elevated levels of barium. The MAC for barium in drinking water is 1.0 mg/L. Barium is not found free in nature but occurs in a number of compounds.

Mercury - One sample from a groundwater based water supply system was identified as being affected by mercury. The water supply was re-sampled and subsequent samples did not show elevated levels of mercury. The MAC for mercury in drinking water is 0.001 mg/L.

Cadmium - One sample from a groundwater based water supply system was identified as being affected by cadmium. The water supply was resampled and subsequent samples did not show elevated levels of cadmium. The MAC for cadmium in drinking water is 0.005 mg/L.

Arsenic - Six samples from groundwater based water supply systems were

identified as being affected by naturally occurring arsenic. The recommended guideline for arsenic is 0.025 mg/L. Arsenic is the 20th most common element in the earth's crust and is known to occur in water in some Canadian provinces. Some of these groundwater based water supply systems were decommissioned and alternate water supply sources were developed for these communities. One water supply system had a filtration based treatment unit installed. One is being sampled to understand the seasonal nature of arsenic contamination in it so that an appropriate solution can be recommended.

Lead - Nine samples from groundwater based water supply systems were identified as being affected by lead. Lead may appear in tap water as a result of dissolution from natural sources or more commonly, from distribution systems and plumbing containing lead in

pipes, solder or service connections. The recommended guideline for lead in drinking water is 0.010 mg/L.

Most of these lead exceedances are attributed to improper flushing of pipes and are thus not always representative of the water quality in the distribution system. While sampling protocols have been revised to ensure that tap samples are properly flushed and are representative of the water quality in the distribution system, in a few cases, local plumbing problems or low water usage at some sites require flushing to be carried out for longer periods than is usually done. Such sites are identified on an ongoing basis and flushing protocols for these sites are modified to obtain representative samples from these locations.

Repeat samples collected from lead exceedance sites using extended flushing usu-

Table 2: Number of Tap Samples with Contaminant Exceedances

Contaminants	Recommended Guideline	Number of Samples	Comments
Antimony	0.006 mg/L	1	The water supply was re-sampled and the subsequent sample did not show elevated levels of antimony.
Fluoride	1.5 mg/L	1	Fluoride is naturally occurring and is from the geology.
Barium	1.0 mg/L	1	The water supply was re-sampled and subsequent samples did not show elevated levels of barium.
Mercury	0.001 mg/L	1	The water supply was re-sampled and subsequent samples did not show elevated levels of mercury.
Cadmium	0.005 mg/L	1	The water supply was re-sampled and subsequent samples did not show elevated levels of cadmium.
Arsenic	0.025 mg/L	6	Five water supplies were decommissioned. One water supply had an arsenic filter installed. One water supply is being sampled further to better understand the problem.
Lead	0.01 mg/L	9	Most of these lead exceedances are attributed to improper flushing of pipes. In a few cases, local plumbing problems or low water usage at some sites was the cause of high lead levels.
Turbidity	1.0 NTU	120	Source control and treatment alternatives as appropriate.
THMs	100 µg/L (Seasonal Average)	83* communities	Being addressed through water treatment, chlorine demand management and operator education, training and certification.

*THMs guidelines are based on seasonal averages for a community and not on individual samples.

ally confirm that the initial exceedance is sampling related rather than an actual problem with the water quality in the distribution system. Because in such cases the first sample is usually not representative of water quality in the distribution system, the exceedance reporting protocol for lead has been revised to report lead exceedances only if both the first and second samples indicate a lead exceedance. This revision protects the public from unnecessary inconvenience.

Turbidity - Another parameter of concern is turbidity. Turbidity affected 120 samples from surface water based water supply systems. The MAC of turbidity in treated water is 1.0 NTU. High turbidity by itself is not considered a harmful condition, but its presence can reduce the effectiveness of disinfection.

Reducing turbidity in water supplies requires using good source control and treatment alternatives as appropriate. Groundwater wells usually do not exhibit turbidity, but if they do, it is a good indicator of surface water influence. The source and cause of the problem needs to be assessed and recommendations made to the communities on appropriate corrective measures on an individual basis.

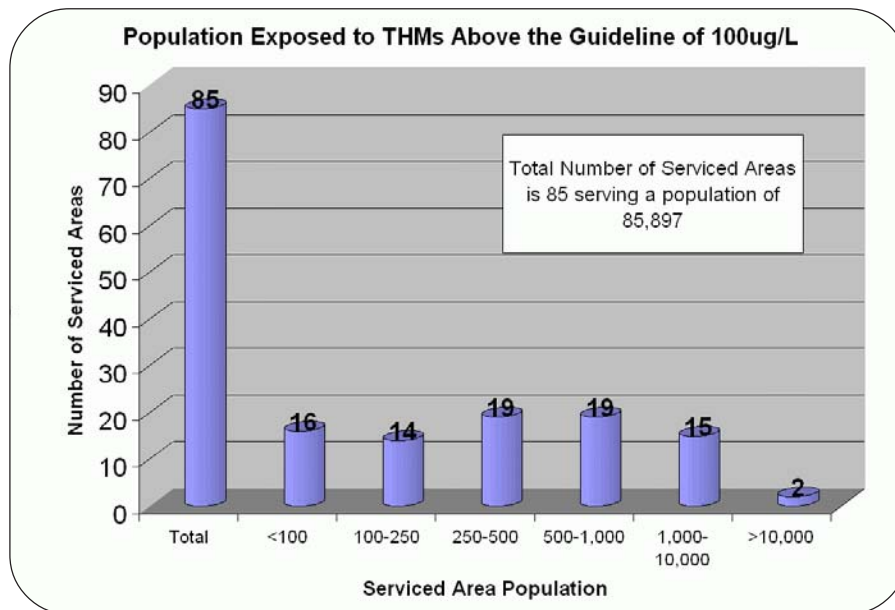
THMs - THMs formation is a common problem in surface based public water supplies with chlorination as the only method of water treatment. THMs exceedances are usually not found in groundwater supplies due to low concentrations of organic precursors. There are 85 serviced areas, affecting 83 communities, where THMs levels are above the recommended guideline of 100 µg/L. As shown in Figure 3, the total population exposed to THMs levels above the recommended guideline was 85,897.

Appropriate measures to address THMs problems have been taken in six communities. Exploratory work was done to set up chlorine demand management models for four small size communities affected by THMs. Training sessions have been completed for all communities with hypo-chlorination systems and similar training is progressing for communities on gas chlorination systems. The objective of these training programs is to minimize THMs formation without compromising the bacteriological integrity of drinking water through the proper operation of water chlorination facilities.

Organics

Thirteen public groundwater supplies were tested for trichloroethylene (TCE). Four

Figure 3 : Summary for Trihalomethanes



were also sampled for methyl tertiary-butyl ether (MTBE). The selection of those wells was based on an assessed risk of contamination from activities that could potentially endanger the water quality of these wells. In all samples no TCE or MTBE was detected.

3.1.2.2 Bacteriological Indicators (Boil Water Advisories)

The MBSAP identifies a series of measures to prevent possible contamination from reaching a consumer. Occasionally, due to the failure of perhaps one or more barriers, it becomes necessary to take an additional final step to ensure that there is no disease causing bacterial or microbiological contamination of drinking water. Disinfecting water by boiling is one way to protect public health, if the drinking water is of questionable microbiological quality.

The results of tests conducted on the 18,568 bacteriological samples collected are shown in Table 3. 5.98% of samples collected were found to be unsatisfactory in terms of total coliforms and 0.88% were unsatisfactory in terms of *E. coli*. In addition to the samples collected by GSC directly, several municipalities collect their own samples and submit them to the PHL in St. John's for analysis. The presence of total coliforms in concentrations greater than the guidelines indicates that the treatment is inadequate or that the distribution system is experiencing regrowth or infiltration. They are not necessarily an indication of the

presence of fecal contamination. The presence of *E. coli* is a definite indicator of the presence of fecal contamination and must be dealt with as soon as reported.

There are many reasons why a boil water advisory (BWA) may be issued. The most common reasons are that a public water supply has no chlorination or other disinfection system, or if there is one, it is not working properly. Water tests may indicate there is a problem with insufficient levels of residual disinfectant or the presence of the indicator bacteria, total coliforms, or *E. coli*. Lastly, a boil water advisory may be issued because it is known that contamination may have occurred following a major water main break, serious flooding, water treatment plant failure or because there is a waterborne disease outbreak due to waterborne agents such as *Giardiasis* in progress. These situations tend to occur rarely and corrective action can be taken quickly.

The number of boil water advisories in effect for public water supplies in Newfoundland and Labrador as of March 31, 2004 is 242. These boil water advisories affect 159 communities in the province, many of which have more than one public water supply. On a population basis, this issue affects approximately 42,589 people. Figure 4 illustrates the various reasons for boil water advisories. It should be noted that the number of boil water advisories issued primarily due to failure of microbiological test results is relatively low at 6.3% and furthermore, poor test results are

Table 3: Bacteriological Test Results from Public Water Supplies - Fiscal Year 2003-04

	GSC Region					Total
	Labrador	West	Central	East	Avalon	
Number of Samples Tested	1,753	3,480	5,496	2,443	5,396	18,568
Total Coliforms Detected	263	209	365	96	177	1,110 (5.98%)
<i>E. coli</i> Detected	36	53	51	16	8	164 (0.88%)

largely the result of failure to properly disinfect the water.

The number of currently affected communities is less than the 223 that were affected by the 322 boil water advisories that were in place when the "Source to Tap" report was written in 2001. These figures do not include water supplies that were placed on a boil water advisory during the course of the year and were subsequently removed as problems were corrected. Additionally, these figures do not include any boil water advisories that were recommended for private water supply systems such as those owned by individuals, groups of individuals, commercial facilities or institutions. There were no waterborne disease outbreaks in the province last year.

The challenge for government, municipalities and individuals is to correct the deficiencies that necessitate boil water advisories. From the preceding facts and figures it is evident that the provision of adequate primary disinfection and the proper operation of existing chlorinators is the key to ensuring safe drinking water. Only once all public water supply systems become equipped with disinfection systems, and are operated by trained individuals, will the number of boil water advisories be significantly reduced further.

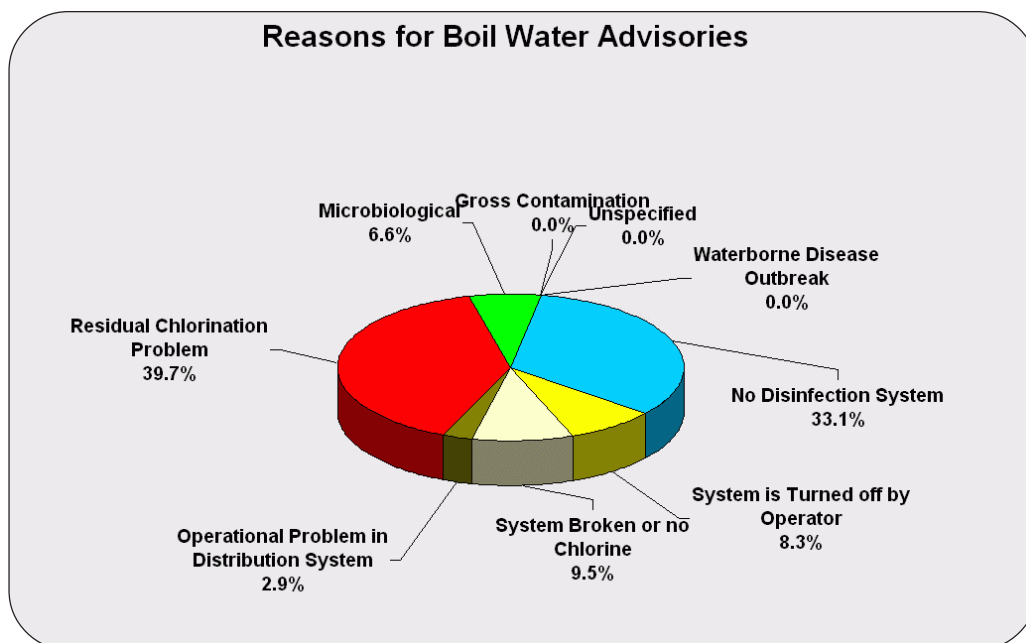
3.2 Inspection, Abatement and Enforcement

3.2.1 Inspection

The Department of Environment and Conservation requires that all public waterworks be maintained and operated in a manner that provides safe and clean drinking water for the benefit of present and future generations of Newfoundlanders and Labradorians. This is enforced through informal site visits of public water supplies. If problems are reported or noted then a formal inspection is undertaken. During the past fiscal year, over 100 inspections were carried out pertaining to water and sewer related activities.

Public groundwater wells and other selected wells were also inspected on a regular basis in order to ensure that these wells were constructed as per requirements of the *Water Resources Act*. Approximately 367 inspections of public groundwater supplies were carried out in the past fiscal year. Finally, approximately 25 inspections were carried out on protected public water supplies to respond to public concerns in reference to development activities, as well to update land use inventory and identify the need for the preparation of watershed management plans.

Figure 4 : Boil Water Advisory Reasons





Water and Wastewater Specialist Ron Goulding inspecting a hypochlorination unit in the community of Lawn.

3.2.2 Abatement

The problems identified as a part of the drinking water quality monitoring and regulatory inspections are dealt with using a number of conventional and non-conventional abatement strategies.

The Department of Environment and Conservation is assisting several communities in reducing THMs levels. As discussed earlier, focused "on-site" operator education and training is being undertaken to address THMs and other operational issues. Also, chlorine demand modeling will be undertaken for selected communities to develop guidelines for chlorine demand management.

Contaminants with concentrations above the recommended guideline, such as antimony, fluoride, barium, mercury, cadmium, arsenic, lead and turbidity need to be assessed on a case by case basis to determine the source and the extent of contamination. On detection of a contaminant with concentrations above the recommended guideline in a sample the first action is to resample to confirm that

the exceedance is an actual exceedance and not a sampling or testing error. Once the exceedance has been confirmed and the source and extent have been determined, appropriate mitigative solutions are adopted.

Arsenic contamination is usually addressed by decommissioning the water supply and providing an alternate supply if the extent of the problem is significant enough. Alternative sources of water have been provided for five communities affected by high levels of arsenic. This was found to be the most cost effective and sustainable solution. On the other hand, in one instance it was sufficient to install an arsenic filter to mitigate the problem.

Mitigation of elevated turbidity in water supplies, may take place at the source protection level or through water treatment. At the source protection level turbidity control may be achieved by enforcing better control of activities such as erosion, deforestation, etc., that might increase turbidity in the water.



The Musgrave Harbour water treatment plant. This is a conventional packaged water treatment plant that was installed in 1998.

3.2.3 Enforcement

Issuing permits is an integral component of the enforcement of the MBSAP for drinking water safety. All public water supply and sewer systems in the province are regulated under the *Water Resources Act* which was assented to on May 22, 2002. 297 permits were issued throughout the past year dealing with various components (construction and operation) of water supply and sewer systems.

In addition to the above permits, ENVC also issued 139 permits under Sections 39 of the *Water Resources Act*. This regulatory permitting process deals with development activities within public water supply areas and is designed to ensure the integrity of drinking water sources.

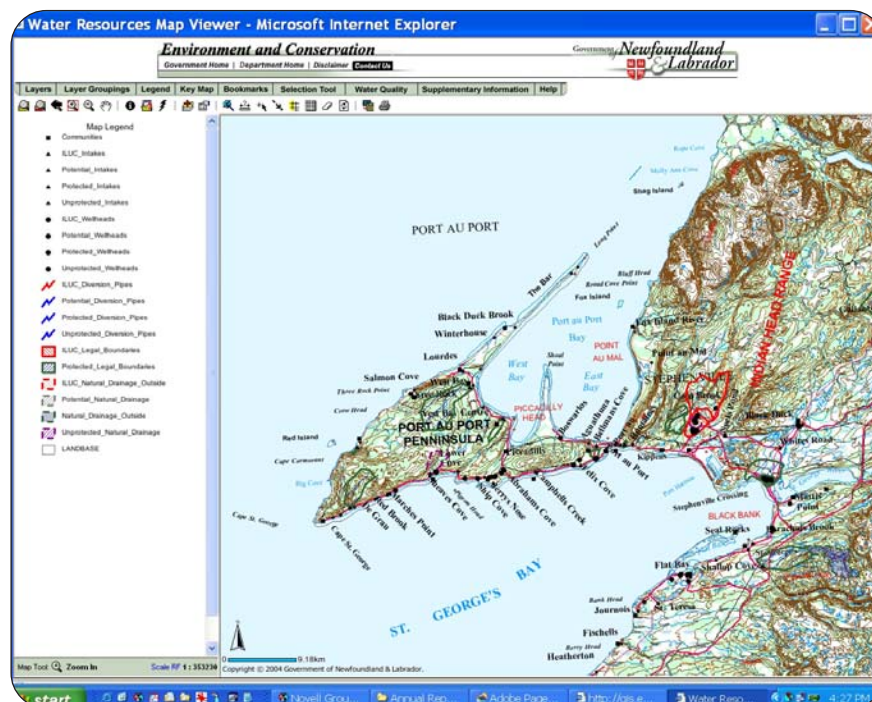
The *Water Resources Act* provides for the licensing of water well drillers in the province by setting minimum standards of training and experience in the construction of drilled wells.

All non-domestic wells also require a permit from the ENVC before construction begins. A database of domestic well records is maintained by the ENVC with up to 50 items of information concerning a well including assessment of each well's water quality. There are 16,118 records in the database, with 525 new well records added in the past fiscal year. This information has been put on compact disk and is referred to frequently by consultants, municipalities, other government departments, pump installers, water bottlers, well drillers, and realtors.

3.3 Data Management and Reporting

3.3.1 Data Management

A number of various data management tools are used to process, manage, analyze, and report drinking water quality data and other related information. These tools include:



Screenshot of the Drinking Water Quality web based GIS application.

- Drinking water quality database and reporting system
- Public water supply database
- DOEC drinking water quality data search engine
- Drinking Water Quality web based GIS application
- Municipal Information Management System

The Department of Environment and Conservation drinking water quality database and reporting system that had been completely revised and enhanced in the 2001-02 fiscal year was successfully used to manage and report drinking water data collected in the 2002-03 and 2003-04 fiscal years. All chemical analysis results for samples taken under the chemical monitoring program across the province were stored in one provincial database in the department including: surface water sources, groundwater wells and tap water (organic, inorganic, THMs, HAAs).

In the past fiscal year, the drinking water quality database was transferred to an enterprise level Oracle database management system. Use of an enterprise level Oracle database and server allows for more effective

sharing of data as well as an increased ability to spatially enable water resources data (e.g. associate water quality to water supply polygons in GIS). This greatly increases analysis capability of ENVC staff.

The public water supply database contains a complete list of all communities with public water supply systems. The database is dynamic in nature and is continuously being updated to reflect changes and new information gathered through ground truthing.

The Department of Environment and Conservation drinking water quality data search engine is a data querying tool developed specifically for internal management and reporting of drinking water quality data and to respond to public enquires in regional offices. It facilitates quick response to public enquires. The department's drinking water quality data search engine is updated on a quarterly basis.

In the past fiscal year, a new Drinking Water Quality web based GIS application was developed and deployed in ENVC for internal use. This application allows all government staff to interactively analyze water quality

records and spatial aspects of water supplies. It also displays boil water advisories. This will improve government's response to integrated watershed management, water quality issues and enquires. At some time in the future, this GIS application will be made available to the public through the departmental web page.

In order to facilitate the sharing of water supply and water quality information among government departments, the Municipal Information Management System (MIMS) was created. MIMS is a database, managed by the Department of Municipal and Provincial Affairs, which consists of several modules including basic information on all municipalities, waste management, capital works, financial details, municipal profiles and water supply information. This database provides essential information such as the area(s) serviced, the type of water supply, types of treatment, watershed or wellhead protection, boil water advisory status, bacteriological testing results, chemical testing results, and details on persons responsible for the system as well as their location. MIMS will be enhanced in several areas in the coming year to allow access by regional offices and to streamline entry of bacteriological test results.

A strategic plan on drinking water quality data management and communication was developed in the past fiscal year and is being implemented to improve the collection, management and communication of drinking water quality data in order to provide the public with timely and user friendly access to accurate drinking water quality data.

3.3.2 Reporting

The interpretive annual water quality report for each community sampled that was used for the first time in the 2001-02 fiscal year was successfully used again in 2002-03 and 2003-04 fiscal years. The quarterly and annual reporting system was used to generate and mail out 336 quarterly reports during spring 2003, 322 quarterly reports during summer 2003, 401 quarterly and annual reports during fall 2003, and 245 quarterly reports during winter 2004.

The early exceedance reporting system that was implemented in 2001-02 was also successfully used in the 2002-03 and 2003-04 fiscal years. This system allows the department to inform a community of any problems in samples collected from the community as soon as it is detected at the analytical laboratory. This system was used to report eight exceedances and two information reports during spring 2003, seven exceedances and one information report during summer 2003, one exceedance during fall 2003, and four exceedances during winter 2004 to the communities. An information report is similar to an exceedance report but while an exceedance report is sent out when the concentration of a contaminant is above the MAC, an information report is sent out on the rare occasion when the concentration of a contaminant is exactly at the MAC.

To provide the public with greater access to drinking water quality data, the database is continuously being refined and improved to allow better reporting of water quality information on the web. The web page provides the following information:

- historical drinking water quality data
- drinking water quality data for the past two sampling seasons
- proposed sampling to be conducted in the upcoming fiscal year
- boil water advisory information
- operator education, training and certification schedule
- drinking water quality manual
- reports and publications

The web page can be visited at the following link:

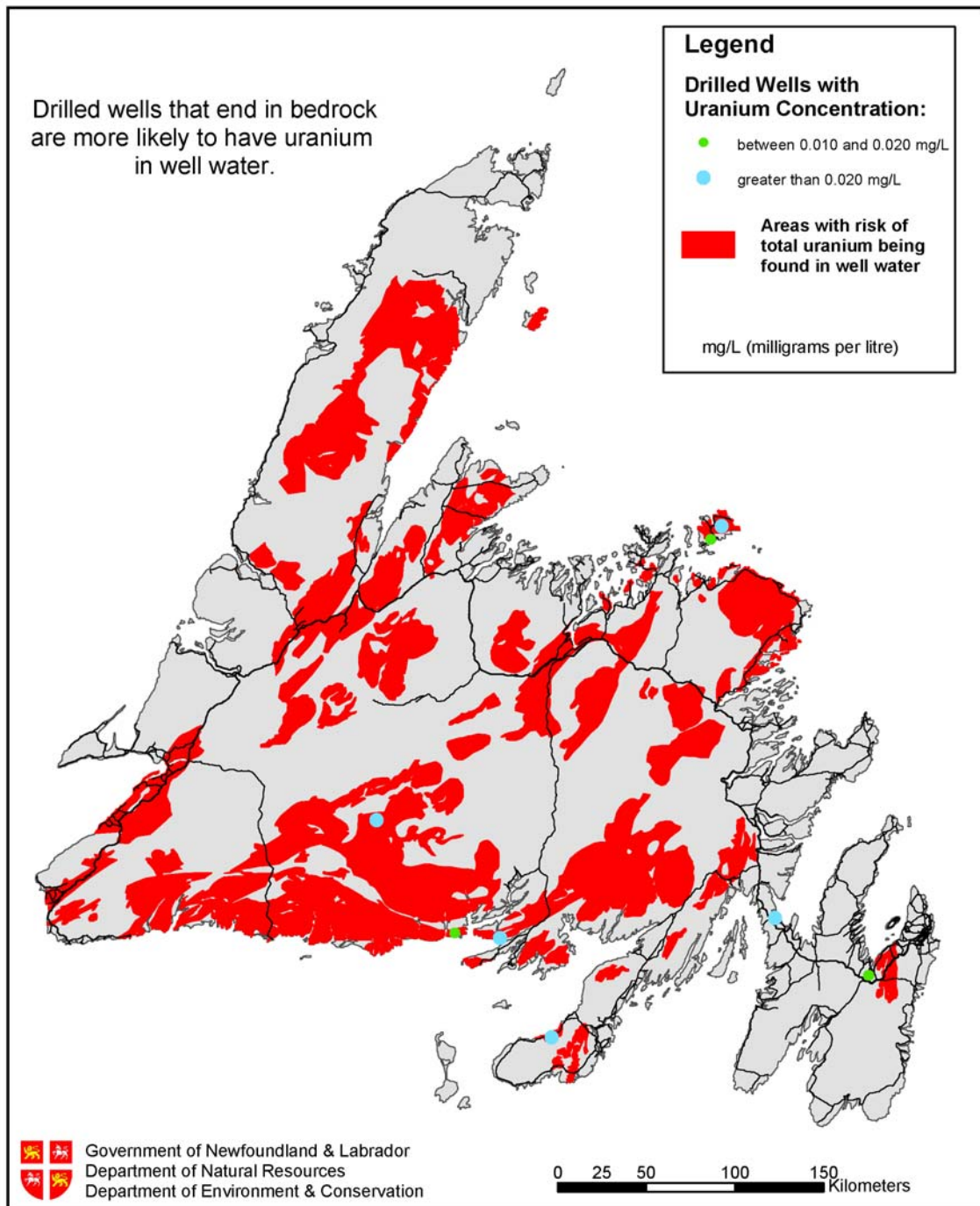
www.gov.nl.ca/Env/water

The use of the CCME WQI to communicate drinking water quality results was evaluated and successfully implemented in a pilot project in the 2002-03 fiscal year. The index was further tested in the past fiscal year and was updated to incorporate such challenges as boil water advisories and THMs. In the 2004-05 fiscal year this will be implemented in the quarterly and annual reports to report drinking water quality information to the public in an easy to comprehend ranking based format.

Under a Memorandum of Agreement between ENVC and the Department of Natural Resources a uranium risk map of the island portion of the province was compiled during the past fiscal year as seen in Figure 5.

This map has been posted on the ENVC web site. The map will serve as a reference and guidance document for the development of new wells in the province. Government recommends that all well owners chemically test their well water.

Figure 5
Areas of Potential Uranium Concentration
in Well Water



3.4 Operator Education, Training And Certification (OETC)

3.4.1 Operator Education

The availability of qualified and trained operating personnel for water systems is vitally important for safe and sustainable operation of water supply systems and to this end ENVC is committed to delivering the operator education, training and certification program as outlined in the 2001 strategic plan.

The focus of the operator education component continues to be on operator competency in the operation and maintenance of the province's water supply systems. The initial focus was on chlorination and disinfection equipment and practices, and now the focus in the upcoming fiscal year will broaden to include the water distribution system, and then to water treatment facilities in the future. The classroom style Operator Education Seminars are intended to provide operators and municipal officials with the knowledge needed to operate and maintain their water systems so as to provide safe clean drinking water at reasonable costs.

As presented in Table 4, during 2003-04 the OETC program saw the delivery of 75 one day classroom seminars, covering four separate topics, in 20 locations throughout Newfoundland and Labrador. Total attendance at these seminars was 1237, representing municipal systems, non municipal systems such as school boards, industry, parks and campgrounds, and government departments responsible for water systems. Due to the ongoing concern for the number of boil water advisories and non-operational chlorination systems, all sessions are geared towards water system safety. Each session emphasizes safe operation of the distribution system, the need for chlorination, and on operation and maintenance of chlorination equipment.

It is recognized that many councillors and municipal administrators are unable to attend the day long training sessions, as most have other day jobs. In an effort to provide some basic knowledge of water systems, chlorination systems and various regulations con-



Operator Training Co-ordinator Bob Kennedy leading a training seminar.

Table 4 - Operator Education and Training Activities during 2003-04

Seminars	Total Attendance	Number of Persons	Number of Municipalities Represented	Number of Non Municipal Institutions Represented	Government Departments Represented
75	1,237	507	233	16	4

cerning these systems, a number of evening sessions aimed at municipal administrators were held at 13 locations across the province. These seminars had an attendance of 85 individuals.

These educational seminars are made available free of charge to the municipality, group, or individual attending. The only cost to participants is their travel and meals, and as every effort is made to hold the seminars at convenient locations throughout the province, overnight travel is generally not required, except for communities on Coastal Labrador who must travel to Happy Valley-Goose Bay. The Department of Municipal and Provincial Affairs provided financial assistance to municipalities to help cover the cost of travel and meals for municipal employees attending the seminars.

In addition to the preparation of the presentation and handout material for the 74 presentations made during the year, the following documents were prepared:

- Operator Education and Training – Progress Report
- On- site Operator Training Curriculum
 - Round I Curriculum
 - Round II Curriculum
 - Round III Curriculum
- Operator Education Schedules
- Web Page Information for OETC Section

The Department of Environment and Conservation will host its annual "Clean and Safe Drinking Water Workshop" in September.

3.4.2 Operator Training

In February 2003, three Mobile Training Units (MTUs) were made available to the OETC program. In the past fiscal year, 369 public water supply systems have been visited by the MTUs. These units are 16 foot long cube vans equipped with a work area, and training equipment to provide operators an opportunity to operate and maintain their equipment, and to demonstrate other tools and equipment. Equipment available as training aids in the MTUs include hypochlorinator pumps; hydrants; hydrant tools; valves; valve location equipment; backflow prevention devices; pipe location equipment; leak detection equipment; pressure gauges; flow meters; and confined entry safety equipment.

3.4.3 Operator Certification

There has been a steady increase in the number of certification exams undertaken by water distribution system operators in this province. Table 5 lists the certification exams that were administered by the OETC program in the past fiscal year.

There are 74 municipalities with certified operators. Additionally, there are three certified operators with Parks Canada, three with Indian Bands and one with a federal facility. The department will continue to encourage and facilitate operator certification as and when appropriate.



The inside of a Mobile Training Unit showing some of the training equipment. Note the valve box cleaning tool (1), hypochlorination system (2) and fire hydrant (3).

Table 5 - Certification Exams Administered during 2003-04

Certification Exam	Number of Exams Administered
Water Distribution I	1
Water Distribution II	1
Water Treatment I	36
Water Treatment II	2
Water Treatment III	2



4 Level 3 of the MBSAP

4.1 Legislative and Policy Frameworks

The Department of Environment and Conservation strives to enforce sections 37, 38 and 39 of the *Water Resources Act* SNL 2002 cW-4-01, Environmental Control Water and Sewage regulation, well drilling regulations and policy directives under the act relating to drinking water safety.

The Department of Municipal and Provincial Affairs strives to enforce various sections of the Municipal Affairs Act SNL 1995 cM-20.1 and the Municipalities Act SNL 1999 cM-24 relating infrastructure funding and administration of municipal infrastructure relating to drinking water safety.

4.2 Public Involvement and Awareness

The Department of Environment and Conservation is committed to ensuring public

involvement and participation with respect to drinking water safety. All drinking water quality data is available in the public domain. All drinking water related information is posted on the departmental web page, while communities continue to receive regular mail-outs of drinking water quality reports. Additionally, the annual drinking water quality report is available to the general public.

The numerous activities under the OETC program ensure the involvement of municipal operators and administrators. Particularly, the annual drinking water safety workshop is a great forum that encourages involvement from such groups as municipalities, consultants, government officials etc. The watershed management committees also allow the active involvement of concerned stakeholders as well as the general public.



The opening session of the annual drinking water safety workshop held in Gander.

4.3 Guidelines, Standards and Objectives

The Department of Environment and Conservation has been working on the development or revision of a number of documents relating to drinking water safety. The document entitled "*Guidelines for the Design, Construction, Operation and Maintenance of Water and Sewer Works*" is being revised. The department participated in the development of Atlantic Canada guidelines for the supply, treatment, storage, distribution and operation of drinking water supply systems.

On an on-going basis ENVC, participates in the development of Canadian Guidelines for Drinking Water Quality through the national drinking water committee. The provincial standards for chemical and bacteriological drinking water are updated on a regular basis. The Drinking Water Quality Manual and Boil Water Advisory Guidelines are also reviewed and updated as required.

4.4 Research and Development

The Department of Environment and Conservation constantly strives to improve all aspects of the MBSAP for drinking water safety through research and development of new tools and methodologies.

In the past fiscal year much effort has been placed on developing a Drinking Water Quality web based GIS application as described earlier in the report. The development and implementation of the Drinking Water Quality web based GIS application provides government departments with an increased ability to analyze drinking water quality in a spatial context. This helps provide better protection and management of our drinking water quality sources, improved sharing of data between government agencies, better reporting tools for communities and a greater ability to identify regional trends and water quality issues on a proactive basis.

To improve reporting to communities and to better prepare them for identifying and dealing with water quality issues, ENVC is

in the process of implementing the CCME WQI on its drinking water quality data and plans to add a new report in the next fiscal year to its quarterly and annual mail-out to the communities. The CCME WQI report for each community will compare the water quality data for each community to the GCDWQ and produce a simplified ranking system. (excellent, good, fair, etc) to describe the water quality of each community. This will help people better understand their drinking water quality.

The Department of Environment and Conservation is also testing a new quarterly report on the corrosion potential of the water supply. This Corrosion Index report will be of particular significance for operators and administrators of public water supplies. This Corrosion Index report will help communities in the adjustment and optimization of pH to enhance drinking water quality and prolong the life of the distribution system. In the past fiscal year, the CCME WQI was also adapted to be used as a screening tool for contaminants and surface water intrusion

The department continues to work with Health Canada to develop guidelines for HAAs. To help develop these guidelines and in anticipation of the these guidelines, the department has been sampling selected supplies every year for HAAs.

To directly help communities with high THMs concentrations and to develop guidelines that will help reduce THMs concentration for new supplies, the department has also completed exploratory work to set up chlorine demand management models for four small communities affected by THMs.



5 Conclusions

Government is committed to ensuring drinking water safety and restoring public confidence in public water supply systems. In May 2001, government approved the implementation of a strategic action plan for drinking water safety. This plan is based on the multi-barrier framework and is being implemented jointly by four government departments under the direction of the Deputy Minister's committee supported by a technical working group.

As mentioned in this report, substantial progress has been made on all elements of the MBSAP in the past fiscal year in order to provide clean, safe and secure drinking water to the people of this province. This includes the designation of 23 new protected water supply areas; investment of substantial capital funds on various water and sewer projects; improved internal reporting and management of drinking water quality data and boil water advisories through a GIS application; reduction in number of boil water advisories; resolution of trihalomethanes and other drinking water quality issues (pH, colour, turbidity, arsenic, fluoride and lead) in a number of communities; improvements in regulatory approval and inspection systems; and delivery of 75 one-day seminars and 369 on-site training sessions under operator the education, training and certification program. Water treatment systems have been improved on a case by case basis, this includes the development of alternate water supply sources for some communities affected by arsenic. All protected and

ILUC water supply areas have been digitized into GIS format and have been made available to the public and stakeholders. Also, land use analysis for selected watersheds has been completed using remote sensing. The GIS application used in conjunction with the land use analysis will facilitate natural resource development activities within public water supply areas. The CCME WQI was further tested in the past fiscal year and was updated to incorporate such challenges as boil water advisories and THMs. It was also used to evaluate best management practices within selected watersheds and was adapted to capture the effects of forestry activities in watersheds through the development of the Forestry WQI (FWQI). The CCME WQI and FWQI will allow better planning and management of best management practices and forestry activities within protected water supply areas.

This report identifies the challenges and issues encountered throughout the 2003-04 fiscal year and in the next section outlines a path forward to deal with them. Government, in cooperation with municipalities, will continue to respond to these challenges and it is anticipated that the already substantial improvements in relation to these issues will be augmented throughout the next year.



6 Path Forward

6.1 Government Action Plans - 2004-2005

6.1.1 Department of Environment and Conservation

In 2004-05 ENVC will continue to strengthen and expand all those elements of the MBSAP in which it is involved, especially source protection, regulation of water and sewer infrastructure, water quality monitoring and reporting, and its community based OETC program.

Source water protection is one of the key elements of the MBSAP and the first step to ensure drinking water safety. The Department of Environment and Conservation will continue to designate water supplies as protected areas as needed. In order to strengthen its source protection program, in 2004-05 ENVC will continue to encourage development of watershed management plans/committees and will complete the addition of the unprotected and potential water supply areas to the GIS Water Supplies Area Layer. The complete GIS Water Supplies Area Layer will be then made available to government, industry and the private sector. It will complement the land use inventory, watershed management and well-head protection activities.

Approximately 3,454 samples will be collected for chemical water quality analysis in the upcoming fiscal year. In addition, samples will also be collected for QA/QC analysis and repeat sampling will be carried out on site specific exceedances. The entire cost of the chemical analysis will be borne by ENVC.

A new application/inspection tracking system will be implemented. This will streamline the tracking of applications and approvals issued under various sections of the *Water Resources Act*. The system will be web based and accessible by regional staff. The goal of the system is to decrease the time spent tracking information and preparing approvals to allow more time for field work.

The Department of Environment and Conservation will continue to focus its effort on operator education, training and volunteer certification to ensure the long term sustainability of the municipal water infrastructure and delivery of clean and safe drinking water. To date, work in this area has been very well received by municipalities and has resulted in a number of operational and maintenance related improvements.

Based on the findings from drinking water quality monitoring, regulatory inspections and the OETC program, site specific contamination issues will continue to be identified and mitigation plans will be developed to address these issues. Water treatment needs will be assessed for affected communities. As has been experienced to date, it is expected that priority concerns will be:

- Aesthetic parameters - pH and colour
- Contaminants - turbidity, arsenic and lead
- THMs
- Bacteriological Parameters

Similar to the arsenic and uranium mapping produced in the past, contaminant mapping will be developed for other contaminants.

The water supply atlas and public water supplies list will be updated regularly. The drinking water quality database, the drinking water quality search engine and the drinking water quality information on the department's web page will be updated every quarter. The CCME WQI will be implemented in the quarterly and annual reporting system. This tool will help communities better understand their water quality results.

Once the departmental drinking water quality web based GIS application has been deployed successfully internally, the second phase of the departmental GIS development project will provide public access to the GIS using the internet.

Testing has begun for a new community reporting application which will incorporate

the new Oracle database. This reporting application will be more flexible and efficient and will further improve the management, analysis, utility and reporting of the drinking water quality and boil water advisory data being collected.

As discussed earlier, the new reporting application will also include a new quarterly report on the corrosion potential of the water supply. This Corrosion Index report will help communities in the adjustment and optimization of pH to enhance drinking water quality and prolong the life of the distribution system.

The Department of Environment and Conservation will continue to improve public access to drinking water quality data especially through the departmental web page. The department will continue to maintain boil water advisory information on its web page, based on the information provided by the GSCs.

The drinking water safety workshop will be held on an annual basis but will be scheduled in the Fall of each year instead of Winter. It has been rescheduled for September 2004 at the request of the participants since many system operators were involved in snow clearing operations and were unavailable to attend in March. The workshop will be held in Gander from September 21 to 23, 2004. The title of the workshop is "Clean and Safe Drinking Water - Operation, Maintenance and Treatment of Small Systems". The workshop will also include an expanded trade show of suppliers and consultants demonstrating their products and educating people on product functions and operation.

6.1.2 Department of Municipal and Provincial Affairs

The Department of Municipal and Provincial Affairs is encouraging regionalization of water supply systems where smaller communities in the region will be serviced by bigger communities. It is also encouraging water operator regionalization. The department will provide an appropriate level of funding for such projects. The department is encouraging municipalities to invest in treatment technology that is appropriate to their particular situation from a technical and from an economical point of view.

The department will continue to provide financial assistance to communities wishing to attend the training, workshop and certification courses relating to drinking water safety.

6.1.3 Department of Health and Community Services

During 2004-05, the Department of Health and Community Services will continue to provide policy and program guidance support to the bacteriological water quality monitoring program carried out by the Department of Government Services. In addition, the Department will carry out drinking water health promotion activities throughout the year. This will include attending trade shows and the development of drinking water awareness material related to specific drinking water hazards and at-risk populations.

Listed below are the drinking water related materials available from the Department of Health and Community Service and the Government Service Centre.

- Roadside Spring Warning Signs (to be drafted during 2004-2005)
- Cross Connection Control pamphlet (to be drafted during 2004-2005)
- A Guide To Safe Drinking Water
- Boil Water Advisory Instructions - For Municipalities
- Boil Water Advisory Warning
- Home Owner's Maintenance Kit
- The Sanitary Dug Well -Revised
- Warning! This Water Must Be Boiled Before Drinking
- Warning! This Water Is Considered Unfit For Drinking Or Domestic Use
- Warning! Do Not Drink This Water
- What You Should Know About... Lead
- What You Should Know About... Chlorine and THM's
- What You Should Know About... Roadside Springs
- What You Should Know About... Home Drinking Water Treatment Units
- What You Should Know About... Giardia
- What You Should Know About... Boil Water Advisories
- What You Should Know About... Arsenic

The promotional materials are available at Government Service Centre locations in the province and have been posted on the Department's website at

www.gov.nl.ca/health/publications/ehp/default.htm

The use of existing information resources will also be promoted by making municipalities aware of their availability and to encourage the distribution of the materials to their residents. The Department of Health and Community Services will contact all municipalities in the province once again this year to inform them about the drinking water materials that are available and to facilitate the distribution of materials to the municipalities. In past years there was great interest shown by municipalities in the promotional materials produced by the department.

6.1.4 Department of Government Services

The number of bacteriological water samples collected during the 2003/04 fiscal year increased by 23.9% over the 2002/03 totals. This was in part due to an increase in the Environmental Health Officer (EHO) staffing levels during the latter part of 2002/03. During the year the department had 36 funded EHO positions however only 33 of those were filled. This was mainly because of a country wide shortage of qualified EHO's which made recruitment and retention difficult. Nevertheless, the department will continue to strive to ensure that water sample collection complies with the levels currently recommended in the Provincial Standards and the *Guidelines for Canadian Drinking Water Quality*.

6.2 Inter-Departmental Cooperation

As stated in Section 1, the Drinking Water Safety Technical Working Group (TWG) consists of representatives from the four government departments responsible for certain aspects of providing clean and safe drinking water through the implementation of the MBSAP.

The TWG meets frequently and reports activities regularly to the steering committee

and to senior government officials. This working group ensures that the participating departments are always appraised of current events pertaining to drinking water. It allows appropriate efforts to be directed at emerging issues with the best available resources without duplication. With this working group, there is an effective networking mechanism in place.

Some of the major accomplishments of the TWG in 2003-04 include:

- Review the inventory of municipal systems with chlorination
- Review BWAs for communities with no chlorinators, or refusing or unable to chlorinate
- Review guidelines and discussion paper for commercial/institutional water supplies
- Coordinate implementation of MIMs, add enhancements for regional data input and update integrity of the core data.
- Review and approve Hach™ meter as the standard for provincial chlorine meters.
- Review and approval of "*Protocol for Communities Switching to Alternate Water Supplies*"
- Discuss issues with communities altering water system without permits or approvals.
- Discuss and recommend action for regional water committees.
- Review (clarify) standards for issuing boil water advisories.
- Initiated and completed a province-wide review of boil water advisories where chlorinators or other improvements to water systems were installed.
- Notification process was adopted.
- Reviewed BWA notification protocol to ensure communities on shared water supplies were also notified of BWAs when necessary.
- Exchange of information on drinking water issues within the department.

This co-ordinated approach by government will be continued to ensure substantial progress in implementing the MBSAP for drinking water safety.