

Drinking Water Safety in Newfoundland and Labrador

Annual Report
2011

“Decade of Commitment”



Drinking Water Safety

in Newfoundland and Labrador

Annual Report

2011

“Decade of Commitment”

For additional copies, please contact:

Water Resources Management Division
Department of Environment and Conservation
Government of Newfoundland and Labrador
P.O. Box 8700
St. John's NL A1B 4J6
Telephone: (709) 729-2563
Fax: (709) 729-0320

This document is also available electronically at:
<http://www.env.gov.nl.ca/env/waterres/reports/index.html#1>

Printed on recycled paper

Photo Credits: Courtesy of the Department of Environment and Conservation

Message from the Minister

As the Minister for the Department of Environment and Conservation, I am pleased to present the annual Drinking Water Safety in Newfoundland and Labrador report for 2011. This annual report outlines the accomplishments and activities for 2010–11 under the Multi-Barrier Strategic Action Plan (MBSAP). The province of Newfoundland and Labrador adopted a Multi-Barrier Strategic Action Plan in 2001 to ensure the safety of drinking water for residents of Newfoundland and Labrador. This strategy is considered to be the most effective method of managing drinking water systems.

The fiscal year 2010–11 marks the tenth anniversary of the Multi-Barrier Strategic Action Plan in Newfoundland and Labrador. This milestone is an opportunity to reflect on the state of drinking water in the province. The Province's MBSAP incorporates an extensive source water protection program, thorough drinking water quality monitoring program, and data management and reporting programs that protect drinking water. Innovative training opportunities are also provided for operators of drinking water distribution systems, with an emphasis on smaller communities in the province. The Province will work to strengthen these programs by identifying and addressing areas for improvement within each component of the MBSAP.

I commend the efforts of the Technical Working Group, which encompasses the Departments of Environment and Conservation, Health and Community Services, Municipal Affairs, and Service NL, as well as the province's regional Health Authorities.

I would also like to acknowledge the hard work of municipal governments in the provision of high quality drinking water to their citizens.



A handwritten signature in blue ink that reads "Terry French".

Honourable Terry French
Minister of Environment and Conservation

Executive Summary

This is the tenth annual report prepared by the Department of Environment and Conservation (ENVC), Government of Newfoundland and Labrador. This report describes the initiatives, activities and accomplishments of the various departments in carrying out the Multi-Barrier Strategic Action Plan (MBSAP) for the 2010–11 fiscal year (April 1, 2010 to March 31, 2011).

The first section of the report focuses on Level I of the MBSAP. This level includes source protection, drinking water treatment, and drinking water distribution. There are 489 public water supply sources in the province, 315 of which are protected under Section 39 of the *Water Resources Act*. 194 municipalities in the province of Newfoundland and Labrador use water from protected drinking water sources. 26 water treatment plants are in operation in Newfoundland and Labrador (seven of which are potable water dispensing units). In 2010–11, six water treatment systems were upgraded with new chlorination equipment.

The second section of this report focuses on Level II of the MBSAP. This level includes monitoring of the province’s drinking water quality, inspection and enforcement, data management and reporting, operator education, training and certification, and corrective measures.

A few of the many items highlighted in this section are:

- analysis of 3,838 inorganic and disinfection by-product samples
- analysis of 19,911 bacteriological samples
- preparation and mailout of 971 seasonal drinking water quality reports, and 364 annual reports to communities
- preparation of 169 permits dealing with water supply and water and sewer systems
- recognition of water operators working in the province through the annual award “Operator of the Year”
- administration of 177 on-site training sessions

The third section of this report focuses on the final level of the MBSAP. Level III is composed of legislation and policy frameworks, public involvement and awareness, guidelines, standards and objectives, and research and development. This section of the report discusses the stakeholders involved in the implementation of the MBSAP, such as the different levels of government and the public. In addition, it defines the legislation that governs drinking water quality and infrastructure in the province of Newfoundland and Labrador. Highlights include accomplishments of the Interdepartmental Safe Drinking Water Technical Working Group, the Department of Environment and Conservation’s efforts to increase public involvement and awareness of drinking water quality and related issues in the province, new initiatives, and research and development projects that the province has been working on throughout the 2010–11 fiscal year.

The Path Forward section of the report outlines the Government of Newfoundland and Labrador’s plans for the 2011–12 fiscal year. The Government of Newfoundland and Labrador

remains committed to ensuring the safety of the province's drinking water through action at all levels of the MBSAP. The Departments of Environment and Conservation, Health and Community Services, Municipal Affairs and Service NL work collaboratively to achieve the goals of the MBSAP, and to enforce regulations and guidelines regarding drinking water safety. Each department contributes uniquely to the safety of drinking water across the province.

Contents

| | |
|---|----|
| Message from the Minister | i |
| Executive Summary | ii |
| Figures | v |
| Tables | v |
| Weblinks | vi |
| Introduction | 1 |
| Decade of Commitment | 1 |
| Level I | 3 |
| Source Water Protection | 3 |
| Drinking Water Treatment | 7 |
| Drinking Water Distribution | 11 |
| Level II | 16 |
| Monitoring | 16 |
| Data Management and Reporting | 29 |
| Inspection and Enforcement | 33 |
| Operator Education, Training, and Certification | 36 |
| Corrective Measures | 43 |
| Level III | 45 |
| Legislative and Policy Frameworks | 45 |
| Public Involvement and Awareness | 47 |
| Guidelines, Standards, and Objectives | 47 |
| Research and Development | 47 |
| The Path Forward | 49 |
| Department of Environment and Conservation | 49 |
| Department of Municipal Affairs | 49 |
| Service NL | 50 |
| Department of Health and Community Services | 50 |

Figures

| | |
|--|----|
| Figure 1: The Multi-Barrier Strategic Action Plan | 2 |
| Figure 2: Number of PWSs and PPWSAs Per Fiscal Year | 4 |
| Figure 3: Total Number of Permits Issued by WRMD per Fiscal Year | 6 |
| Figure 4: Chlorination Systems Used in Newfoundland and Labrador | 9 |
| Figure 5: Total Number of Water Treatment Plants per Fiscal Year | 10 |
| Figure 6: Funding for Water and Wastewater Infrastructure Projects per Fiscal Year | 14 |
| Figure 7: Total Number of Bacteriological Samples Tested per Fiscal Year | 17 |
| Figure 8: Number of Unsatisfactory Bacteriological Samples per Fiscal Year | 18 |
| Figure 9: Number of BWAs and Number of Communities Affected | 19 |
| Figure 10: Reasons for BWAs | 20 |
| Figure 11: Percent Compliance of ENVC's Sampling Schedule per Fiscal Year | 23 |
| Figure 12: Number of Reports Published by ENVC per Fiscal Year | 32 |
| Figure 13: Number of Permits to Construct per Fiscal Year | 34 |
| Figure 14: Number of Certified Operators per Calendar Year | 40 |
| Figure 15: Number of Annual Workshop Attendees per Year | 41 |

Tables

| | |
|---|----|
| Table 1: Status of Public Water Supplies for 2010–11 | 4 |
| Table 2: Number of Referrals Processed by WRMD for 2010–11 | 5 |
| Table 3: Number of Activity Permits for 2010–11 | 7 |
| Table 4: Number of Disinfection Systems in Newfoundland and Labrador | 8 |
| Table 5: Number of Drinking Water Treatment Systems for 2010–11 | 9 |
| Table 6: Public Water Distribution System Classes for 2010–11 | 11 |
| Table 7: Provincial Contribution for Water and Wastewater Infrastructure Projects 2010–11 | 12 |
| Table 8: Number of Bacteriological Samples Tested in Each Region for 2010–11 | 17 |
| Table 9: Number of Unsatisfactory Samples for Total Coliforms | 18 |
| Table 10: Number of Unsatisfactory Samples for <i>E. Coli</i> | 18 |
| Table 11: Number of Samples Taken by ENVC for 2010–11 | 22 |
| Table 12: Number of Samples Scheduled and Collected by ENVC for 2010–11 | 22 |
| Table 13: Exceedances for the 2009–10 and 2010–11 Fiscal Years | 26 |
| Table 14: Types of Public Reports Produced by ENVC | 31 |
| Table 15: Inspections by ENVC for 2010–11 | 36 |
| Table 16: Total Number of Operator Certificates Issued per Calendar Year | 40 |
| Table 17: Corrective Measures Undertaken for 2010–11 | 44 |

Weblinks:

Department of Environment and Conservation
<http://www.env.gov.nl.ca/env/index.html>

Newfoundland and Labrador *Water Resources Act* SNL 2002 cW-4.01
<http://www.assembly.nl.ca/Legislation/sr/statutes/w04-01.htm>

Water Resources Management Division Reports and Publications
<http://www.env.gov.nl.ca/env/waterres/reports/index.html>

Protected Water Supply Area List and GIS Layers
<http://www.env.gov.nl.ca/env/waterres/gis/index.html>

Guidelines for Canadian Drinking Water Quality: Summary Table
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2010-sum_guide-res_recom/index-eng.php

Standards for Bacteriological Quality of Drinking Water
http://www.env.gov.nl.ca/env/waterres/regulations/policies/standards_microbiological.html

Standards for Chemical and Physical Monitoring of Drinking Water
http://www.env.gov.nl.ca/env/waterres/regulations/policies/physical_monitoring.html

Policy for Drinking Water Quality Monitoring and Reporting for Public Water Supplies
http://www.env.gov.nl.ca/env/waterres/regulations/policies/water_quality.html

Department of Environment and Conservation Drinking Water Quality Data
<http://www.env.gov.nl.ca/env/waterres/quality/drinkingwater/chemical.html>

Acts, Regulations, Policy Directives, and Water Quality Standards
<http://www.env.gov.nl.ca/env/waterres/regulations/policies/index.html>

“What’s New” The latest information posted by Water Resources Management Division
<http://www.env.gov.nl.ca/env/waterres/whatsnew/index.html>

Operator Education, Training, and Certification
<http://www.env.gov.nl.ca/env/waterres/training/index.html>

Guidelines for the Design, Construction, and Operation of Water and Sewerage Systems
<http://www.env.gov.nl.ca/env/waterres/waste/groundwater/report.html>

Best Management Practices for the Control of Disinfection By-products in Drinking Water Systems in Newfoundland and Labrador
<http://www.env.gov.nl.ca/env/waterres/reports/cwws/index.html>

Introduction

This is the tenth annual report prepared by the Department of Environment and Conservation (ENVC), to communicate how the Government of Newfoundland and Labrador is protecting the province's drinking water quality. This report highlights the initiatives, activities, and accomplishments made by the departments that carried out the Multi-Barrier Strategic Action Plan (MBSAP) in the 2010–11 fiscal year (April 1, 2010 to March 31, 2011). The report describes the three levels of the MBSAP and their various components. It illustrates how Government is implementing the MBSAP, and describes the intended path forward, and plans for future implementation of the MBSAP.

Decade of Commitment

In May 2000, Walkerton's drinking water system became contaminated with bacteria. Seven people died, and more than 2,300 became ill. The Walkerton Inquiry, commissioned by the Government of Ontario, outlined five key elements to produce a multi-barrier approach to assure safe drinking water:

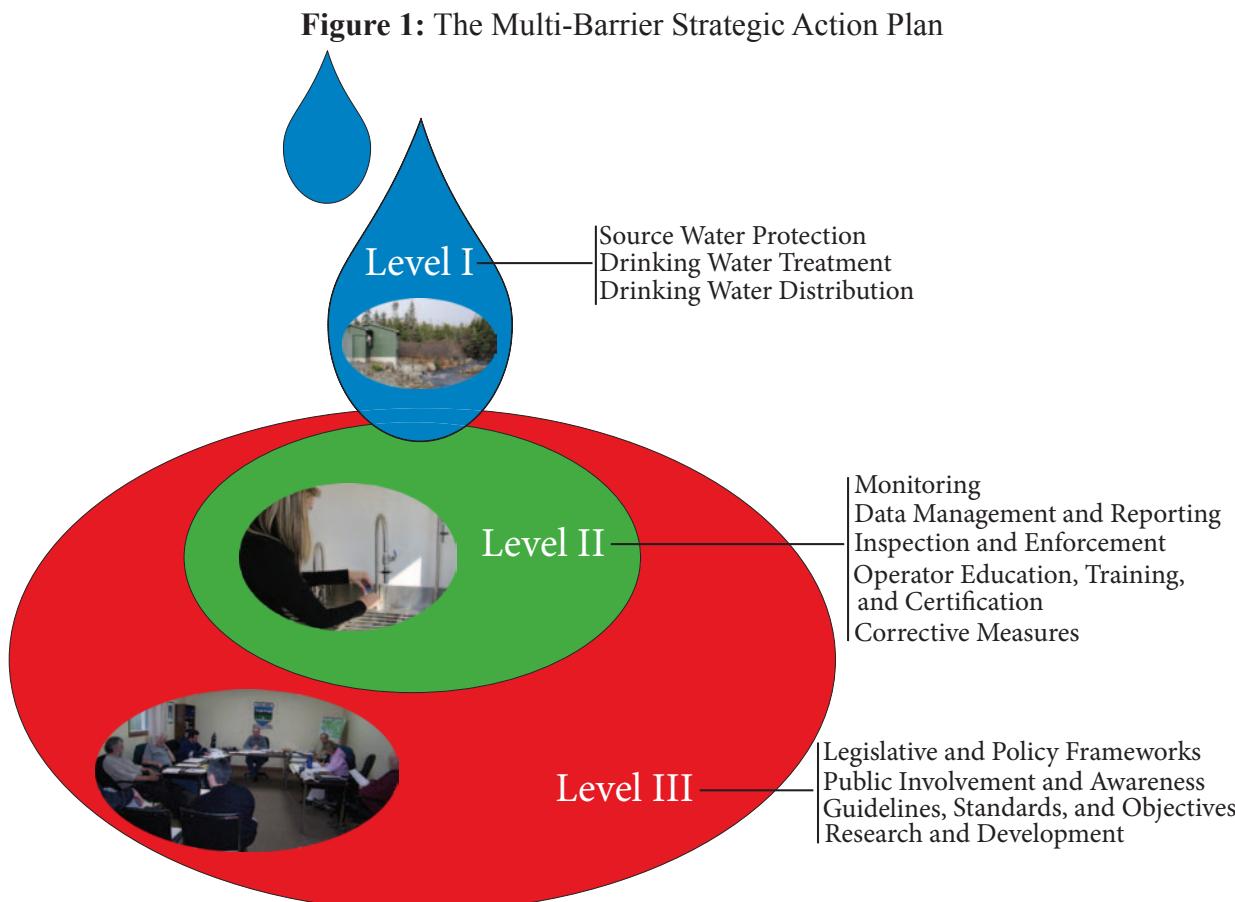
1. source protection
2. effective treatment
3. secure distribution
4. effective monitoring
5. effective responses to adverse events

In May of 2001, the Water Resources Management Division (WRMD) released "Source to Tap," a document that outlined the scope and current status of the various government programs that relate to drinking water safety. It presented the state of public water supply systems in relation to source protection, water treatment, drinking water quality monitoring and reporting, regulatory frameworks, mitigation planning, and operator education and training. It also outlined government's commitment and future plan of action to ensure the safety of drinking water in NL.

Government's commitment to expand and strengthen the existing multi-barrier approach for drinking water safety focused on the existing approach with special emphasis on the following areas:

- legislation, regulations and guidelines
- single point contact and lead agency
- source protection and management
- water services and infrastructure needs
- drinking water quality monitoring and reporting
- regulatory inspections
- operator education and training
- corrective measures

Ten years later, the government continues to implement the multi-barrier approach within the framework of the MBSAP. The MBSAP is considered to be the most effective method of managing drinking water systems and has been implemented throughout Canada. The MBSAP adapted by Newfoundland and Labrador has three levels, as illustrated in Figure 1.



The implementation of the MBSAP involves the collaborative efforts of four provincial government departments:

1. Environment and Conservation (acting as the lead agency)
2. Health and Community Services
3. Municipal Affairs
4. Service NL

In this report, indicators are reported for various components of the MBSAP. This information, which is collected and analyzed over time, can identify status and trends in the application of the various barriers of the MBSAP. These indicators of performance help ENVC identify gaps in the MBSAP that need to be addressed. Some examples of indicators are:

- the number of protected public water supply areas in the province
- the number of land use referrals within protected public water supply areas

- the number of watershed management committees
- the number of drinking water treatment and disinfection systems
- the amount of funding provided by the Department of Municipal Affairs for water infrastructure projects
- the number of boil water advisories issued
- the number of samples scheduled and the number of samples actually collected for the fiscal year
- the number of bacteriological and chemical water quality exceedances
- the number of drinking water quality reports published
- the number of regulatory permits issued
- the number of regulatory inspections performed
- the number of certified water and/or wastewater system operators
- the number of education and on-site training seminars conducted by ENVC
- the number of participants at the annual Clean and Safe Drinking Water Workshop
- the number of corrective measures undertaken
- the number of new or revised legislation, or guidelines for the protection of drinking water quality

Level I

The components of the first level of the MBSAP protect drinking water from the source to the tap, these are:

1. source water protection
2. drinking water treatment
3. drinking water distribution

Source Water Protection

Protecting public drinking water sources is the first step in maintaining a supply of clean and safe drinking water for communities. The province of Newfoundland and Labrador has one of the most widely adopted and well-established source water protection programs in Canada.

Public water supplies in the province come from two types of sources: surface water (rivers, ponds, and lakes) and groundwater (drilled and dug wells). Each source type presents its own set of risks and potential hazards that can contaminate drinking water.

Section 39 of the *Water Resources Act*, SNL 2002 cW-4.01 protects public drinking water sources. These areas are classified as protected public water supply area(s) for surface water supplies, and wellhead protected water supply area(s) for groundwater supplies. Establishing protection is a cooperative process that is initiated by individual communities.

There are 489 public water supply sources (PWS) in the province of Newfoundland and Labrador. Of these, 302 are surface water sources and 187 are groundwater sources. In total,

315 sources are designated as protected public water supply areas (PPWSAs) as of the end of the 2010–11 fiscal year. These PPWSAs service a population of 371,989, representing 91% of the serviced population. Table 1 shows the status of public water sources for fiscal year 2010–11. Figure 2 illustrates the total number of PWSs and the number of PPWSAs for each fiscal year since 2001–02. The decrease in PWSs can be mainly attributed to the removal of a number of small groundwater supplies that serviced very small populations and are either no longer maintained by the community or are connected to another water supply.

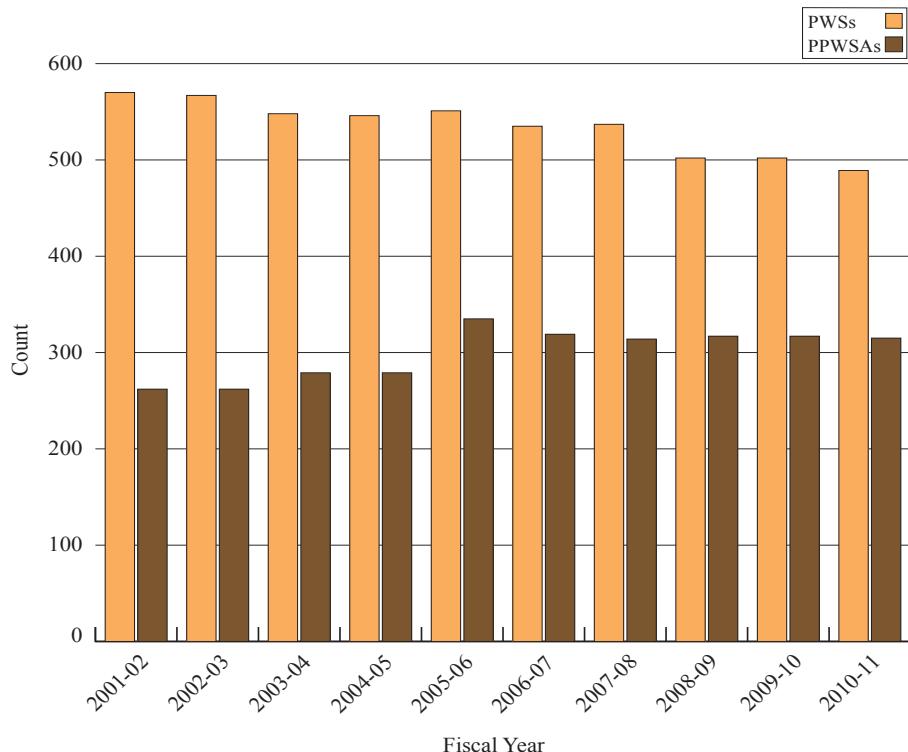
As seen in Figure 2, the number of PWSs that have protected areas has increased over the past ten years. Source protection of drinking water helps protect public health and reduces the cost involved in treating public drinking water supplies.

Table 1: Status of Public Water Supplies for 2010–11

| Source Type | | |
|---------------|-------------|-----------|
| Surface Water | Groundwater | Protected |
| 302 | 187 | 315 |

The Department of Environment and Conservation encourages all communities to begin the protection process for new or existing water supplies.

Figure 2: Number of PWSs and PPWSAs Per Fiscal Year



Watershed Management

The Water Resources Management Division (WRMD) of the Department of Environment and Conservation (ENVC) regulates development activities within protected public water supply areas. The division uses a number of tools to monitor such activities, including:

- referrals from the Interdepartmental Land Use Committee (ILUC), Crown Lands, Natural Resources, Municipal Affairs and Other agencies (Environmental Assessment (EA))
- permits for development
- watershed management plans
- watershed management committees

Referrals

In the 2010–11 fiscal year, the WRMD processed 153 referrals from various departments relating to proposed activities within PPWSAs, as outlined in Table 2.

If activities are within a PPWSA, the WRMD provides recommendations to the respective department(s) and requests that an application be submitted to the division, as per regulatory requirements. The purpose is to control the development or activity inside the designated boundary of a PPWSA to ensure that it will have either no impact or negligible impact on drinking water quality and/or quantity.

Table 2: Number of Referrals Processed by WRMD for 2010–11

| Type of Referral | | | | | Total |
|------------------|-------------------|------|-------------------|------------|-------|
| Crown Land | Natural Resources | ILUC | Municipal Affairs | Other (EA) | |
| 78 | 42 | 26 | 5 | 2 | 153 |



Gander Lake - a PPWSA

Activity Permits

All activities in a PPWSA (either a protected public water supply area, or a wellhead protected water supply area) require a permit. The proponent of an activity in a PPWSA is responsible for obtaining a permit for the activity.

Under the *Water Resources Act* for the 2010–11 fiscal year, 121 activity permits were issued:

- 96 permits for activity in a Surface PPWSA under Section 39*
- 15 permits for activity in a Surface PPWSA issued jointly under Section 39 and Section 48*
- 6 permits for activity in a Surface PPWSA issued jointly under Section 39 and Section 37*
- 2 permits for activity in a Surface PPWSA issued jointly under Section 39 and Section 37 and Section 48
- 2 permits for activity in a Groundwater PPWSA under Section 39 and Section 37

* Section 39 - permits for development in a PPWSA, Section 48 - permits to alter a body of water, Section 37 - permits to construct-water

Figure 3 presents the number of permits for an activity in a PPWSA issued by WRMD per fiscal year. The number of permits issued is largely driven by development activities in the province. Table 3 presents a breakdown of these permits by section for 2010–11.

Figure 3: Total Number of Permits Issued by WRMD per Fiscal Year

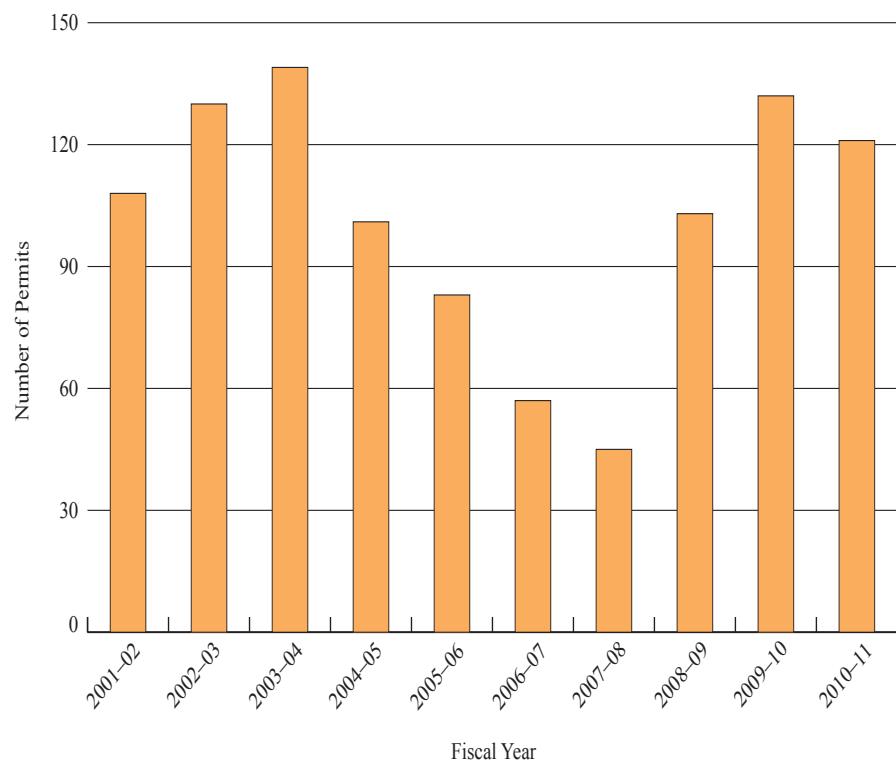


Table 3: Number of Activity Permits for 2010–11

| Type of Activity Permit | | | | | Total |
|----------------------------------|---------------------------------------|---------------------------------------|--|---|-------|
| Section 39 (Surface PPWSA) | Section 39 & 48 (Surface PPWSA) | Section 39 & 37 (Surface PPWSA) | Section 39, 37, & 48 (Surface PPWSA) | Section 39 & 37 (Groundwater PPWSA) | |
| 96 | 15 | 6 | 2 | 2 | 121 |

Watershed Management Committees

Watershed management committees are formed to oversee land use management, development issues, and activities inside a PPWSA. Stakeholders on such committees typically include town council members, town residents, representatives from industry involved in development activities in the area, Department of Environment and Conservation staff, other departmental government staff, members of environmental groups, and other concerned parties. The five active watershed management committees in the province during 2010–11 were located in:

- Clarenville
- Corner Brook
- Gander
- Grand Falls–Windsor
- Steady Brook

Drinking Water Treatment

Drinking water treatment refers to the processes that remove contaminants or adjust aesthetic parameters in source water, by the addition of chemicals, filtration, and/or other processes to satisfy drinking water quality guidelines. Each water source in the province has unique water chemistry, and potential for contamination according to its location and the development activities within its watershed area. Several water treatment strategies are used in the province to address the different scenarios, and provide unique solutions to treat the water before it is consumed.

Disinfection

The most critical aspect of water treatment is disinfection. While there are other forms of disinfection used in the treatment of drinking water, chlorination is recognized as the most feasible and practical disinfectant and is the most commonly used disinfection method in the province. It is used as one of three forms (powder, liquid, and gas) by communities across the province throughout their water distribution systems. When used in drinking water treatment, chlorine disinfects water and minimizes microbial growth in the distribution system. However, chlorine can also create disinfection by-products (DBPs) such as trihalomethanes (THMs) and

haloacetic acids (HAAs). While minimizing disinfection by-products is important, the risks of not disinfecting drinking water far outweigh any risks DBPs may cause. To ensure that drinking water remains safe, it is essential that the optimal level of chlorine is maintained throughout the system. Other methods used in the province are outlined in Table 4.

Table 4: Number of Disinfection Systems in Newfoundland and Labrador

| Type of Disinfection System | | | | | |
|-----------------------------|-------------------|----------------|-------|-------------|--------------------|
| Chlorination | Ultraviolet Light | Mixed Oxidants | Ozone | Chloramines | On-site generation |
| 446 | 21 | 5 | 4 | 2 | 1 |

Ultraviolet Light (UV): Water passes through an ultraviolet irradiation chamber and the ultraviolet rays de-activate any microbes in the water. UV is less effective in treating water with high turbidity and colour. A secondary disinfectant is required to maintain a detectable chlorine residual in all areas of the distribution system.

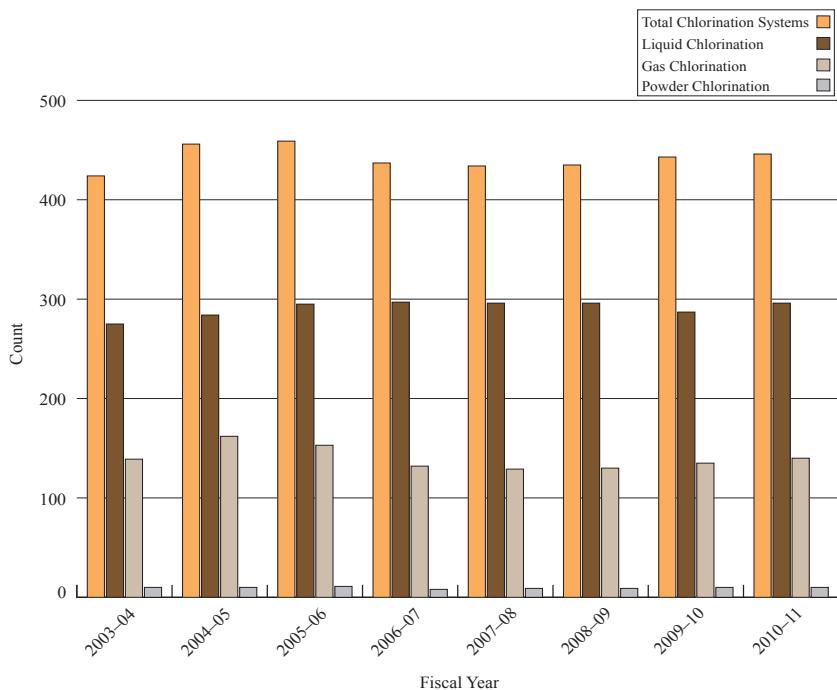
Mixed Oxidants: Uses salt, water and electricity to produce a concentrated solution of oxidants that disinfects source water and generally improves the taste and odour of drinking water.

Ozone: Ozone is created by passing dry, clean, air between two high-voltage electrodes in an ozone generator. The ozone is then injected into the water where it deactivates microbial agents. It also removes colour, taste, and odour from the water. A secondary disinfectant is required to maintain a detectable chlorine residual in all areas of the distribution system.

Chloramines: Chloramines are formed from chlorine and ammonia. Use of chloramines include final disinfection, persistence and ability to reach remote areas in the distribution system, penetration of biofilms, formation of lower levels of THMs and other DBPs, and taste and odour control.

On-site generation (OSG): On-site generation of sodium hypo-chlorite is actually a simple and basic process using salt, water and electricity. On-site generating systems work by running softened water into the salt dissolver. The salt is dissolved forming a brine solution, which is subsequently passed through electrolytic cells where low voltage (DC) current is applied to the brine, producing sodium hypochlorite.

Figure 4 illustrates the distribution of different chlorination types in the province since 2003–04. This range of chlorination types has been consistent for the past eight fiscal years and continues to be the most frequent method of disinfection of drinking water for communities across the province.

Figure 4: Chlorination Systems Used in Newfoundland and Labrador

Parameter Specific Drinking Water Treatment

Mitigative measures have been implemented in numerous drinking water systems to alleviate parameter specific water quality challenges. Although not full-scale treatment plants, the following corrective measures have been implemented throughout the province:

- screening (infiltration gallery)
- filtration
- pH adjustment
- arsenic removal
- iron/manganese removal
- lead removal

Table 5 shows the number of specific drinking water treatment systems in the province for the 2010–11 fiscal year.

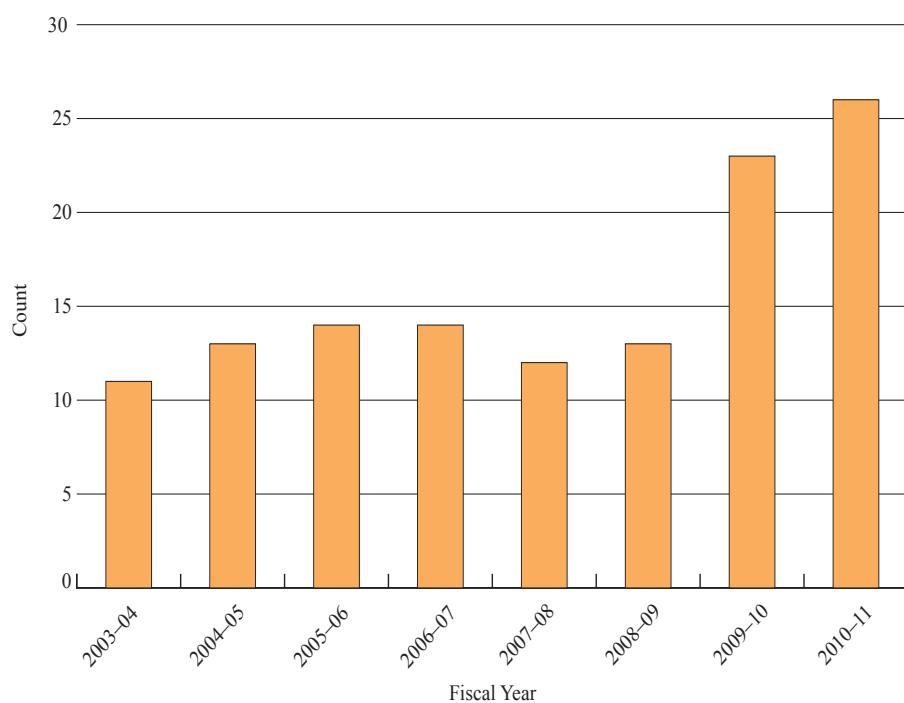
Table 5: Number of Drinking Water Treatment Systems for 2010–11

| Type of Drinking Water Treatment System | | | | | |
|---|-------------------------|------------------------|-----------------|------------------------|--------------|
| pH adjustment | Micron/pressure filters | Infiltration galleries | Arsenic removal | Iron/Manganese removal | Lead removal |
| 39 | 22 | 17 | 9 | 7 | 1 |

Water Treatment Plants

As of March 31, 2011, 26 water treatment plants are in place in Newfoundland and Labrador (this number includes seven potable water dispensing units). Figure 5 illustrates the total number of water treatment plants in Newfoundland and Labrador per fiscal year. These plants use a range of treatment processes in addition to disinfection. Seven of them are full-scale conventional treatment plants, designed to improve the quality of raw source water using processes such as, coagulation, flocculation, sedimentation, and filtration.

Figure 5: Total Number of Water Treatment Plants per Fiscal Year



If a water treatment plant is deemed necessary to ensure good water quality, municipalities must assess and implement a cost effective solution. The Department of Municipal Affairs (DMA), in consultation with the Department of Environment and Conservation, has developed guidelines for municipalities to follow regarding the selection process for a water treatment system. Under this process, a steering committee is established to oversee the technical aspects of the selection process. The committee will consist of representatives from the town council, Department of Environment and Conservation and Department of Municipal Affairs, the prime consultant and others as deemed necessary. The selection, supply and installation of the most appropriate treatment process will be via a Request for Proposals.

The prime consultant will compose a Request for Proposal (RFP) document based upon design flow and water quality objectives they have determined and were been approved by DMA and ENVC. The proposed water treatment processes must meet the requirements of the current version of ENVC's *Guidelines for the Design, Construction and Operation of Water and*

Sewerage Systems. Proponents will be ranked based on the evaluation criteria established in the RFP document including, but not limited to, capital and operation and maintenance costs; proponent's expertise and experience; reliability of existing systems; local service, etc. Prior to final acceptance of the recommended treatment process, bench modeling and/or onsite pilot testing may be required.

A full-scale water treatment plant is not a feasible solution for all communities. An alternative solution to the treatment challenge for smaller communities is the use of small-scale drinking water treatment systems - potable water dispensing units (PWDUs), which are configured to respond to a community's specific drinking water quality issues.

Drinking Water Distribution

The distribution system is the largest component of physical infrastructure that ensures drinking water safety. It includes all the pipes, valves, service lines, pumping stations, fire hydrants, and storage facilities required to deliver clean and safe drinking water.

In the 2010–11 fiscal year there were 520 public water distribution systems in Newfoundland and Labrador. Table 6 shows the breakdown of the number of water distribution systems in the province for 2010–11. 70% of public water distribution systems in Newfoundland and Labrador fall into the “very small” classification, as they serve populations of 500 or fewer people. These small systems face two major challenges:

1. Operation and maintenance: Successful ongoing operation and maintenance includes employing and retaining qualified and trained operators. This can be difficult in rural areas that are experiencing changing demographics.
2. Administration: Many communities with very small systems, serve small populations spread over large geographic areas, which increases the challenges associated with providing safe drinking water and maintaining the water supply systems.

Table 6: Public Water Distribution System Classes for 2010–11

| Water Distribution System | Very Large | Large | Medium | Small | Very Small | Unknown | |
|---------------------------|------------|-----------------|----------------|-------------|------------|----------|-------|
| Size (population) | > 50,000 | 15,001 - 50,000 | 1,501 - 15,000 | 501 - 1,500 | ≤ 500 | variable | Total |
| Count | 1 | 2 | 41 | 82 | 363 | 31 | 520 |

To address these challenges, the province continues to encourage the implementation of regional water systems and regional water system operators wherever needed and feasible.

Regardless of the size of the distribution system, ongoing infrastructure maintenance is required to ensure both reliable hydraulic capacity and safe drinking water. Proper maintenance depends on operator knowledge and adherence to best management practices and operational procedures. The Department of Environment and Conservation addresses this requirement through its Operator Education, Training, and Certification (OETC) program.

Proper maintenance prolongs the life of a water distribution system and reduces the frequency of leaks and breaks. Nevertheless, at some point repairs and replacements are necessary, and the financial cost can be substantial. During the 2010–11 fiscal year, the Department of Municipal Affairs spent \$17.07 million on water and wastewater infrastructure projects in the province. These funds went to capital works programs and studies. In addition, Municipal Affairs contributed \$145,000 to the Department of Environment and Conservation's Drinking Water Safety Initiative. Table 7 summarizes the water related projects approved by Municipal Affairs for the April 1, 2010 to March 31, 2011 fiscal year. The Provincial Share less GST amounts are shown.

Table 7: Provincial Contribution for Water and Wastewater Infrastructure Projects 2010–11

| Category | Provincial Share |
|---|-------------------------|
| New water and sewer (6 projects) | \$ 1,700,000.00 |
| Water and sewer upgrades (19 projects) | \$ 3,500,000.00 |
| New drinking water distribution (12 projects) | \$ 3,150,000.00 |
| Upgrades to drinking water distribution (26 projects) | \$ 4,800,000.00 |
| New drinking water treatment (5 projects) | \$ 1,850,000.00 |
| Upgrades to drinking water treatment (13 projects) | \$ 1,800,000.00 |
| Studies (4 projects) | \$ 125,000.00 |
| Drinking water safety initiative/potable water dispensing units | \$ 145,000.00 |
| Total | \$ 17,070,000.00 |

Notes for Table 7:

1. The water and sewer projects include upgrading and replacing existing water and sewer as well as new water and sewer lines.
2. New drinking water distribution projects include new wells, intakes, watermains, and pumphouse equipment like pumps and holding tanks.
3. Upgrades to drinking water distribution include pumphouse upgrading, intake improvements, watermain improvements and flushing.
4. New drinking water treatment projects include new filtration and chlorination systems.
5. Upgrades to drinking water treatment projects include introduction of a backwash system, water treatment plant improvements (replacing old components) and upgrades to pumphouse and chlorination system.
6. The studies/investigations referenced in the table include:

Harris Centre Water Research Fund - This fund supports Memorial University research to contribute to sustainable solutions in rural drinking water issues in Newfoundland and Labrador. Funding will be awarded to select research projects. Depending on the topic, nature, and results of each research project, the final outcomes may have direct and important implications on business, infrastructure, governance, and/or communities in general.

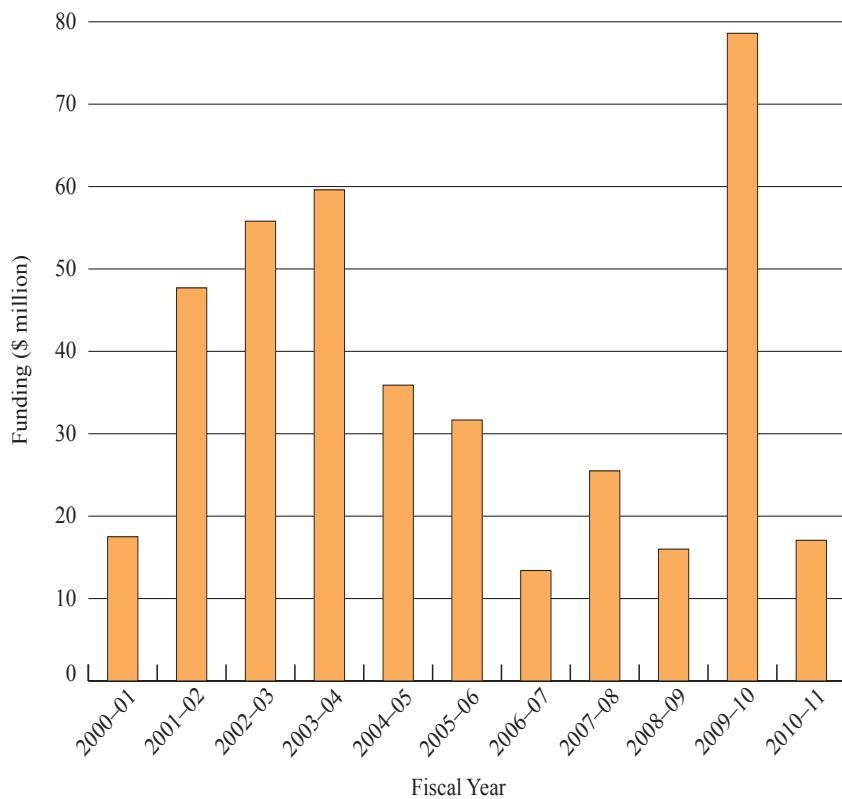
Leading Tickles Water System Study - This study includes a detailed investigation into the sediment issues with recommendations for future flushing activities, location for flushing hydrants and other water system piping upgrades. This project should reveal problems as well as solutions with the existing distribution system.

St. Bride's Water Supply Study - This project will assess the feasibility of water supply improvements and replacement of existing lines.

Potable Water Dispensing Units Groundwater Availability and Alternative Building Options - This is a preliminary investigation into the availability of groundwater and/or existing buildings in communities that have applied for a PWDU.

7. The drinking water safety initiative/potable water dispensing units include the PWDU design as well as the review and assessment of new communities that submitted applications under this initiative.

Figure 6 illustrates total funding amounts for water and wastewater infrastructure projects for each fiscal year.

Figure 6: Funding for Water and Wastewater Infrastructure Projects per Fiscal Year

**Drinking water distribution piping,
Exploits Regional Water Treatment Facility**

Water Storage Tank Study

Water storage tanks are often the most visible and expensive component of a water distribution system. There are currently 124 potable water storage tanks in 88 different communities across Newfoundland and Labrador. While tanks can provide multiple benefits for the operation of the distribution system, they can also be the source of some issues. Water storage tanks can have a major impact on drinking water quality and have been identified as a major factor in the formation of disinfection by-products in drinking water systems in the province. Other drinking water quality issues associated with tanks in the province include loss of chlorine residuals, taste and odour complaints due to stagnation, and the potential for pathogenic contamination.

An evaluation of existing water storage tanks in the province was performed as part of a study undertaken by the Water Resources Management Division of the Department of Environment and Conservation, highlighting specific examples of design and operational issues with tanks in communities in Newfoundland and Labrador. The study also examined tank appurtenances, tank cost, modeling of tanks, tank maintenance, and the regulatory approval process for water storage tanks in the province. As part of the study, several tools were developed including a new tank design and evaluation spreadsheet tool, standard operating procedures for tanks, a water storage tank database, and revised design guidelines for water storage tanks. The full report, Evaluation of Water Storage Tanks in Newfoundland and Labrador and their Effect on Drinking Water Quality, can be found at the following website:

www.env.gov.nl.ca/env/waterres/reports/drinking_water/Tank_Report_July_12_2011.pdf



Water storage tank,
Sheshatshiu, Labrador

Level II

The standard of performance achieved in Level I of the MBSAP is verified through the components of Level II, increasing overall protection of the province's drinking water.

The five components in Level II of the MBSAP are:

1. monitoring
2. data management and reporting
3. inspection and enforcement
4. operator education, training, and certification
5. corrective measures

This section of the report outlines Government's activities in each of the Level II components during the 2010–11 fiscal year.

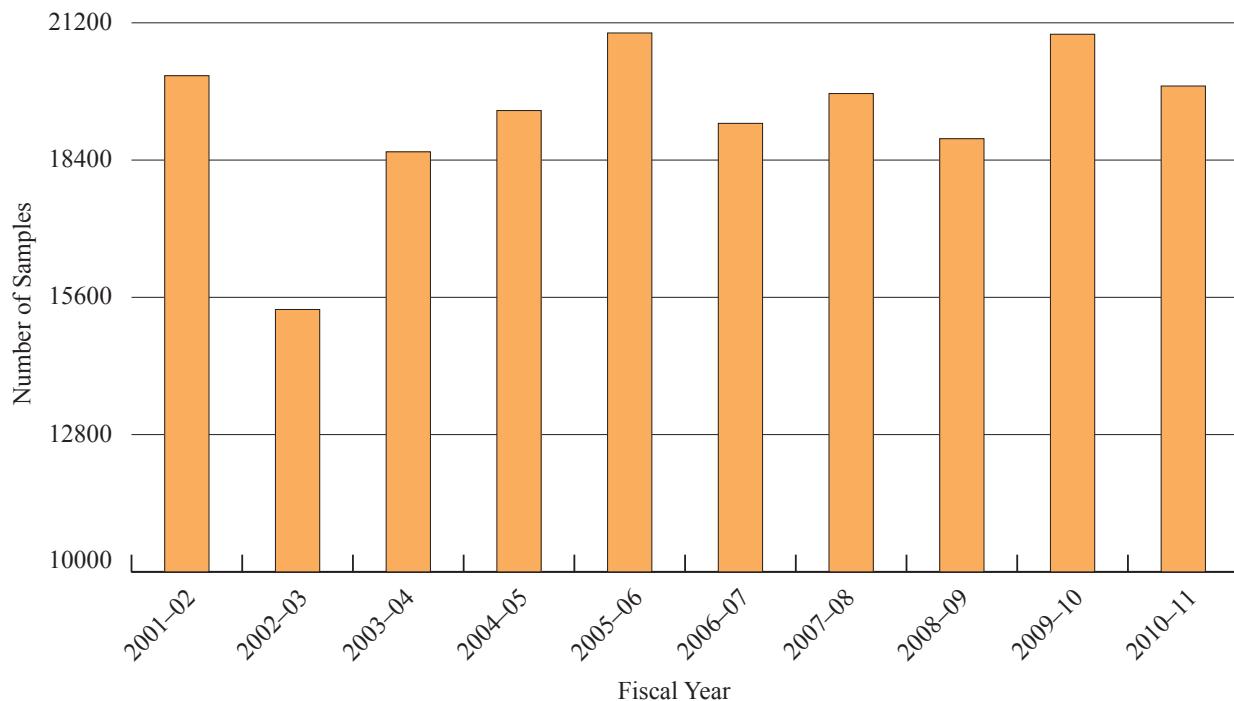
Monitoring

Drinking water quality monitoring consists of regular sampling of drinking water from both the source and the tap. The purpose of collecting drinking water samples is to test for parameters that may affect human health or the aesthetic quality of drinking water. In addition to its province-wide monitoring activities, the Department of Environment and Conservation's Water Resources Management Division also designs special monitoring programs to address site-specific characteristics or emerging water quality issues. Communities are encouraged to monitor specific water quality parameters themselves for operational purposes in water treatment plants, or if a specific parameter is of local concern.

Long-term monitoring of drinking water quality has many benefits, including identifying trends and changes in a community's water quality. Long-term monitoring allows the Government of Newfoundland and Labrador to identify issues and determine if source protection needs to be reviewed or corrective measures introduced or revised. The extensive monitoring program for drinking water quality in the province is a joint responsibility shared by the Department of Environment and Conservation and Service NL.

Bacteriological Water Quality

Under the direction of Service NL, Environmental Health Officers collect tap samples from public drinking water supplies for analysis of bacteriological parameters. The parameters monitored include total coliforms and *Escherichia coli* (*E. coli*). During the 2010–11 fiscal year, 19,911 bacteriological samples were collected and tested. Figure 7 shows a historical comparison of the total number of bacteriological samples that were collected and tested for each fiscal year.

Figure 7: Total Number of Bacteriological Samples Tested per Fiscal Year

Bacteriological Parameters: Analysis

The provincial public health laboratory analyzes samples for bacteriological parameters. Samples are also tested at its affiliated regional testing locations. The province compares the results to its own bacteriological standards (outlined in Standards for Bacteriological Quality of Drinking Water). The number of bacteriological samples tested at each public health authority affiliated regional location is shown in Table 8.

Table 8: Number of Bacteriological Samples Tested in Each Region for 2010-11

| Region | | | | | Total |
|------------|---------|---------|---------|----------|--------|
| St. John's | Eastern | Central | Western | Northern | |
| 7,665 | 1,342 | 4,287 | 4,042 | 2,575 | 19,911 |

Bacteriological Parameters: Results

Based on the analysis of bacteriological parameters for public drinking water samples taken during the 2010-11 fiscal year, 633 were found to be unsatisfactory in terms of total coliforms. Table 9 shows the number of samples found to be unsatisfactory for total coliforms, at each public health authority affiliated regional location, for the fiscal year 2010-11.

Table 9: Number of Unsatisfactory Samples for Total Coliforms

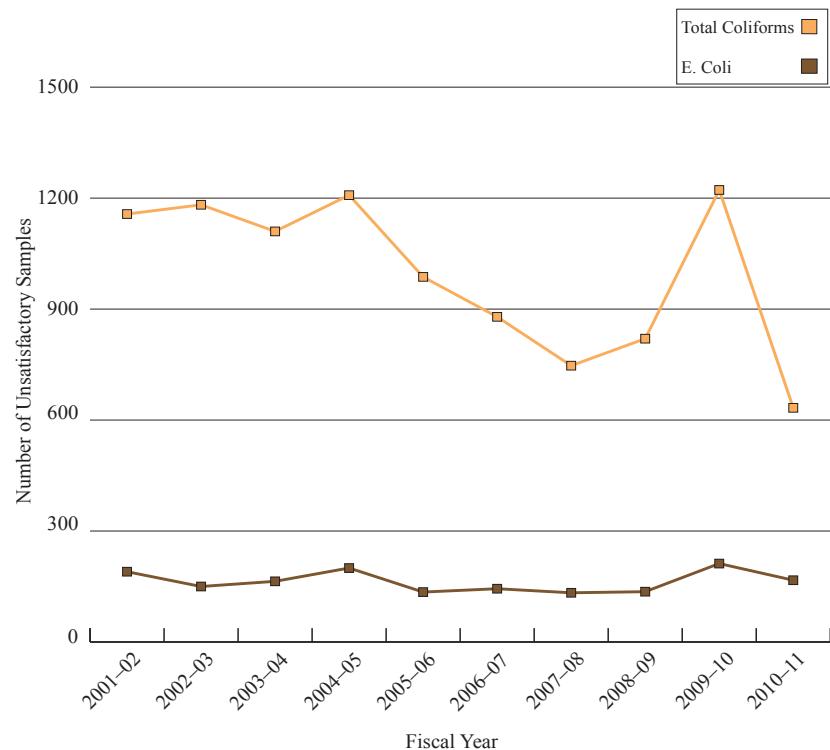
| Region | | | | | Total |
|------------|---------|---------|---------|----------|-------|
| St. John's | Eastern | Central | Western | Northern | |
| 115 | 74 | 243 | 157 | 44 | 633 |

There were 167 bacteriological samples tested that were found to be unsatisfactory in terms of *E. coli*. Table 10 shows the number of samples found to be unsatisfactory for *E. Coli*, at each public health authority affiliated regional location, for the fiscal year 2010–11.

Table 10: Number of Unsatisfactory Samples for *E. Coli*

| Region | | | | | Total |
|------------|---------|---------|---------|----------|-------|
| St. John's | Eastern | Central | Western | Northern | |
| 20 | 20 | 47 | 58 | 22 | 167 |

The number of unsatisfactory samples for Total Coliforms and *E. Coli* per fiscal year is shown in Figure 8.

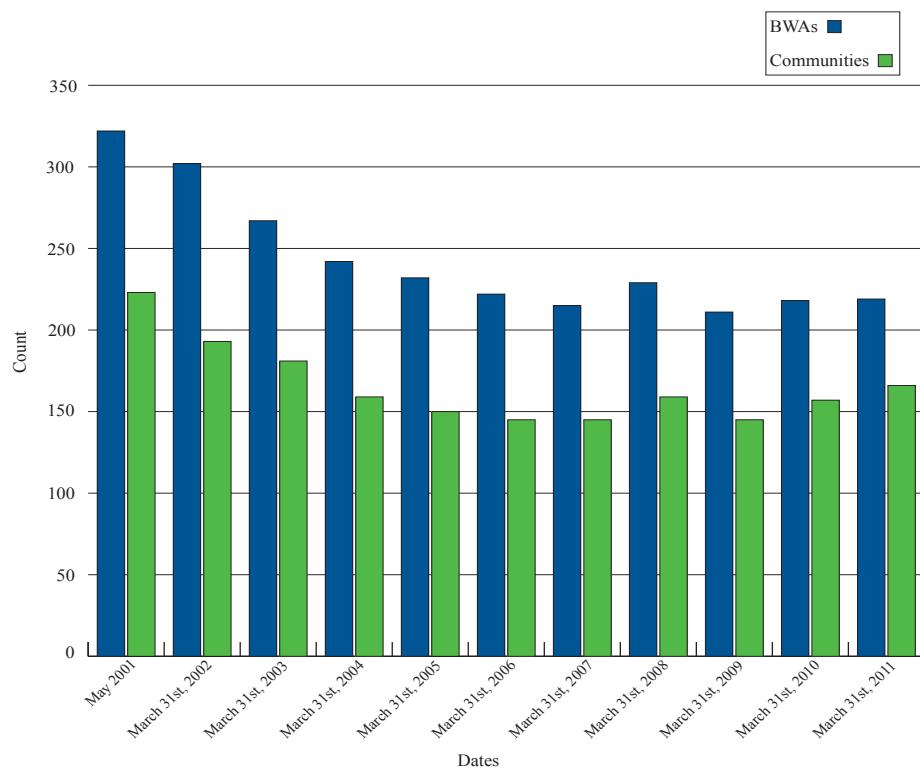
Figure 8: Number of Unsatisfactory Bacteriological Samples per Fiscal Year

Boil Water Advisories

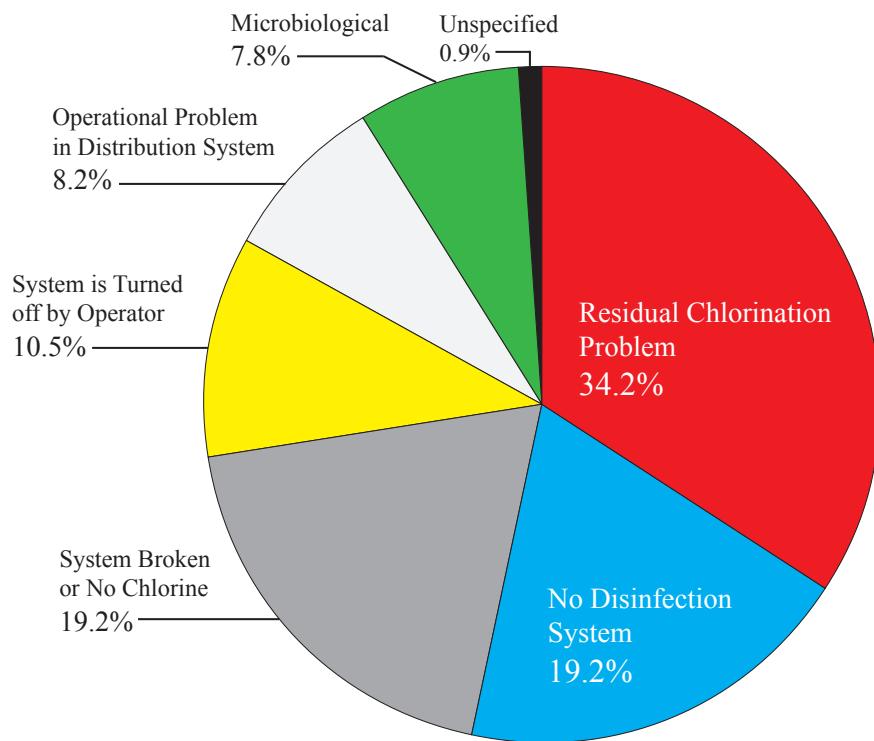
Boil water advisories (BWAs) are preventative measures for protecting public health from waterborne microbiological contamination that may, or are known to be, present in drinking water. A BWA is issued when water quality is questionable due to operational deficiencies (such as inadequate chlorine residual), no disinfection system or the water in a community's water system is contaminated with faecal pollution indicator organisms (such as total coliforms).

When discussing BWAs for the purpose of this annual report, we are referring to BWAs in effect at the end of the fiscal year, March 31, 2011. Figure 9 shows a historical comparison of BWAs per end of the fiscal year. On March 31, 2011, 219 BWAs were in effect, affecting 166 communities in the province, with an affected population of 40,218. Figure 10 illustrates the distribution of BWAs by reason used to issue the advisory for the 2010–11 fiscal year.

Figure 9: Number of BWAs and Number of Communities Affected



Gas chlorination, Ramea water treatment plant

Figure 10: Reasons for BWAs

The Department of Environment and Conservation's Guidelines for the Design, Construction and Operation of Water and Sewerage Systems require the following conditions to ensure the microbiological safety of drinking water:

1. All public water supply systems must be continuously disinfected.
2. All water entering the distribution system, after a minimum 20 minute contact time, shall contain a residual disinfectant concentration of free chlorine of at least 0.3 mg/L, or equivalent CT value.
3. Water which is primarily disinfected by means other than chlorination must be provided with residual chlorine sufficient to maintain a detectable residual as per condition 4 below.
4. A detectable residual disinfectant (either free or total chlorine) must be maintained in all points in the distribution system.

**Preparing colorimeter to test for chlorine in tap water**

Chemical and Physical Water Quality

The Department of Environment and Conservation's Water Resources Management Division monitors drinking water quality for a number of chemical and physical parameters. Samples for physical and chemical analysis are taken from the source water (lake, pond, river, reservoir, or well) and from the distribution system (tap samples). They are classified as:

- inorganics (metals, nutrients, physical parameters, and major ions)
- disinfection by-products (trihalomethanes and haloacetic acids)
- emerging or special parameters (for example, hydrocarbons)

Historical data for most inorganic and disinfection by-product monitoring is analyzed prior to planning the annual drinking water sampling schedule in April of each year. The schedule is designed around drinking water quality issues, water treatment systems, disinfection systems, and special parameter sampling programs. The minimum monitoring requirements are:

- for tap water, inorganic samples are collected twice a year
- for source water, the department normally collects inorganic samples for a water supply every third year

The department collects samples for disinfection by-products (DBPs) four times a year from surface water supplies that use chlorination as a disinfectant. Regular DBPs monitored are trihalomethanes (THMs) and haloacetic acids (HAAs). THMs are volatile substances defined as halogenated methane compounds that form during chlorination of waters containing naturally occurring organics. HAAs are a family of organic compounds based on the acetic acid molecule where one or more hydrogen atoms attached to carbon atoms are replaced by a halogen (Chlorine, Bromine, Fluorine and/or Iodine).

Guidelines for these disinfection by-products are based on locational annual running averages, which is an average value obtained from four samples per year over four seasons. These parameters typically do not form in groundwater because groundwater contains minimal organic matter. Groundwater sampling for these parameters is only completed for new public groundwater wells to gather baseline information. If DBPs are identified as an issue in a specific groundwater supply, then WRMD staff will monitor that groundwater supply four times per year.



Drinking water source sampling, Indian Bay Brook

The number of samples taken per region for 2010–11 are presented in Table 11.

Table 11: Number of Samples Taken by ENVC for 2010–11

| Region | Source | Tap | THM | HAA | Total |
|-----------------|--------|-------|-------|-------|-------|
| Eastern | 191 | 425 | 397 | 386 | 1,399 |
| Western | 149 | 353 | 375 | 371 | 1,248 |
| Central | 80 | 210 | 318 | 318 | 926 |
| Labrador | 29 | 60 | 86 | 86 | 261 |
| Other (Special) | 6 | 10 | 11 | 9 | 36 |
| Total | 455 | 1,058 | 1,187 | 1,170 | 3,870 |

In 2010–11, the Department of Environment and Conservation collected 3,870 samples. Additional samples may also be taken for communities due to community concerns, special monitoring programs or water quality studies. Ninety-seven percent of the samples that were scheduled for this fiscal year were collected. Table 12 shows the breakdown of these numbers for the fiscal year (excluding additional sampling such as resamples).

Table 12: Number of Samples Scheduled and Collected by ENVC for 2010–11

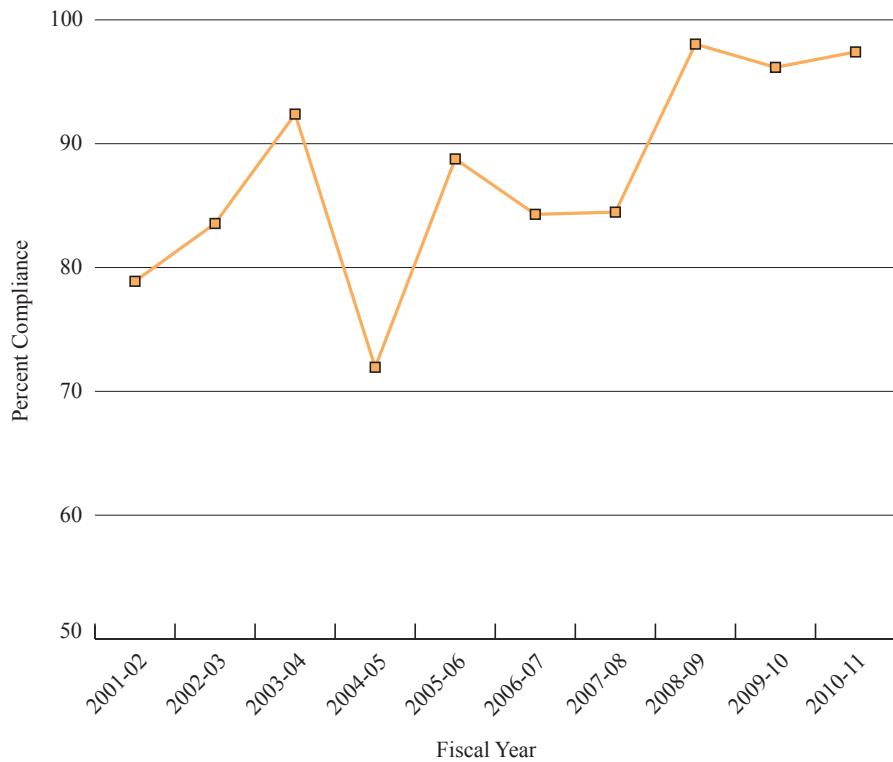
| Type of Sample | Scheduled | Collected | Percent |
|----------------|-----------|-----------|---------|
| Tap | 1,042 | 1,028 | 99 |
| THM | 1,210 | 1,167 | 97 |
| HAA | 1,194 | 1,152 | 97 |
| Source | 449 | 447 | 99 |
| Total | 3,895 | 3,794 | 97 |

The reasons that some samples were not taken (if applicable) are as follows:

- safety (source samples)
- town was not chlorinating at the time of sampling (THM and HAA samples)
- water supply not operating at the time of sampling (tap, THM and HAA samples)

Figure 11 shows ENVC's compliance with the sampling schedule for the past ten years.

Figure 11: Percent Compliance of ENVC's Sampling Schedule per Fiscal Year



Chemical and Physical Parameters: Analysis

Following the collection of drinking water quality samples, the Department of Environment and Conservation submits the samples to an external accredited laboratory for analysis. The accredited designation ensures that the laboratory provides quality and competency in its sample analysis. The accredited laboratory is selected using the public tendering process.

In 2001, the province of Newfoundland and Labrador adopted the *Guidelines for Canadian Drinking Water Quality* (GCDWQ) as a standard to ensure clean and safe drinking water. These guidelines are published by Health Canada and are updated as necessary.

In December of 2010, Health Canada released updated GCDWQ. These health-based guidelines have been developed for several chemicals, DBPs, micro-organisms and physical substances found in Canadian drinking water supplies. As well, the guidelines consider aesthetic effects and treatment processes/technologies.

The ENVC remains vigilant in the application of the most up to date guidelines.

Persistence Pays Off for Stoneville

The Local Service District (LSD) of Stoneville operates a water distribution system that services approximately 330 people. The LSD's water distribution system was under a Boil Water Advisory and the operators were frustrated and needed guidance. An on-site training session was conducted on disinfection to enable the operators to measure chlorine residual readings and to use that information to optimize chlorine usage in their system. The operators did not realize that the LSD had a chlorine residual meter, but through subsequent checking, found one and began recording residual readings.

The LSD was now able to measure and record chlorine residual readings. The operators noticed, however, that there was a significant fluctuation in readings taken at the same test point. A hypochlorination training session was conducted. During this session, the operators were taught how to program their metering pump, as well as disassemble and clean or repair the pump. Part of that training involved running a metering pump on manual or flow proportional dosing. (Flow proportional dosing is used where systems incur variable flow rates.) The Operator Trainer pointed out that the system was variable flow and programming the metering pump to external mode would allow the flow meter to control the rate of chlorine injection so that it was proportional to the flow rate. This would level out chlorine residual readings and help reduce chlorine costs.

The LSD was now able to control chlorine residuals. The LSD also discovered that the system's contact chamber was in disrepair and was being bypassed. During the disinfection training session the operators learned that prior to the first user, the water must have sufficient contact time with chlorine to inactivate pathogens. This created a situation where the system was once again put on a Boil Water Advisory until the contact time issues could be addressed. The Operator Trainer informed the LSD that they had three mitigative actions available:

1. greatly increase chlorine residuals to account for loss of contact time
2. repair the existing contact chamber
3. install a larger size service main between the chlorination building and the first user to provide the necessary contact time

The Operator Trainer showed the operators how to calculate the size of the pipe needed and the LSD opted to upgrade their distribution service main. The LSD of Stoneville is now successfully operating their water distribution system without a boil water advisory and providing safe drinking water to its residents.



Chlorine metering pump

Chemical and Physical Parameters: Results

Results for chemical and physical parameters are sent to the Department of Environment and Conservation when laboratory analysis is complete. The department then evaluates the results by comparing them to current GCDWQ. Source water results are compared to the GCDWQ to identify both drinking water treatment needs and corrective measures that may need to be taken. Tap water samples are compared to the GCDWQ to identify exceedances in chemical and physical parameters that may pose a risk to human health or aesthetic approval of drinking water. When an exceedance is confirmed for a parameter that may pose risk to human health, an exceedance report is sent immediately to the community, Departments of Health and Community Services, Municipal Affairs and Service NL. Exceedances for aesthetic parameters are also reported to communities, along with all other parameters, in quarterly Drinking Water Quality Reports. The WRMD's sampling and reporting procedures are outlined in the Drinking Water Quality Monitoring Manual, which can be viewed online at:

<http://www.env.gov.nl.ca/env/waterres/quality/drinkingwater/manual.html>.

Table 13 summarizes the tap water bacteriological, chemical and physical parameter exceedances for the 2009–10 and 2010–11 fiscal years.



WRMD Staff conducting drinking water monitoring



Taking a drinking water source temperature reading

Table 13: Exceedances for the 2009–10 and 2010–11 Fiscal Years

| Department | Exceedances | | | |
|------------------------------|--------------------------|-------------------------|---------|---------|
| | Parameters | | 2009–10 | 2010–11 |
| Service NL | Bacteriological | <i>Escherichia Coli</i> | 212 | 167 |
| | | Total Coliforms | 1,222 | 633 |
| Environment and Conservation | Chemical and Physical | Turbidity | 64 | 106 |
| | | Arsenic | 6 | 5 |
| | | Barium | 2 | 1 |
| | | Fluoride | 0 | 2 |
| | | Lead | 4 | 2 |
| | Disinfection By-Products | Trihalomethanes (THMs) | 167 | 126 |
| | | Haloacetic Acids (HAAs) | 184 | 157 |
| | Aesthetic Parameters | Colour | 462 | 488 |
| | | pH | 332 | 235 |
| | | Total Dissolved Solids | 11 | 17 |
| | | Chloride | 5 | 5 |
| | | Sodium | 2 | 2 |
| | | Sulphate | 3 | 4 |
| | | Copper | 3 | 6 |
| | | Iron | 87 | 91 |
| | | Manganese | 72 | 70 |

Aesthetic Parameters

Aesthetic parameters pose no direct health or safety concerns, but may reduce the consumer's opinion of the quality of their drinking water based on taste, colour, and/or odour. Aesthetic parameters can also help determine the operational efficiency of a water system, and may highlight a need to make operational changes to the disinfection, treatment, or distribution systems.

In 2010–11, several aesthetic parameters exceeded the aesthetic objectives as outlined in the GCDWQ. Aesthetic parameter exceedances included Colour, pH, Iron and Manganese. Colour and pH continue to be the most common type of aesthetic parameter exceedances.

Contaminants

Contaminants are substances that are either known or suspected to cause adverse health effects when they are present in drinking water in amounts greater than the established maximum acceptable concentrations set by the GCDWQ. Treatment technologies for most contaminants are available to control the levels of contaminants in drinking water at an acceptable concentration. In 2010–11, exceedances were detected for Arsenic, Barium, Fluoride and Lead. DBPs are the most common contaminants in the province and are attributed to chlorination of waters high in organic carbon content.

There is no standard solution that will address the issue of high DBP levels in drinking water for all communities. There are numerous probable causes that may be contributing to the formation of DBPs, just as there are numerous potential corrective actions that can be taken to address the problem. The difficulty lies in selecting the most appropriate corrective measure in light of what might be contributing to DBP levels. The selected corrective measure must address the issue of DBPs, but it must also be sustainable, i.e. fit the community involved in terms of available resources and other constraints.

The province has developed three tools to help communities improve the levels of DBPs in their drinking water:

1. Best management practices for the control of DBPs
2. Decision making framework for selection of DBPs corrective measures
3. Checklist of community information for DBPs management

The Best Management Practices (BMPs) for the Control of Disinfection By-Products can be used to help reduce THMs and other DBPs for new, upgrading, and existing water distribution systems. These BMPs have been shaped by the understanding developed of THM characteristics and behaviour, the assessment of various corrective measures, and through modeling of water distribution systems. The adoption of BMPs by consultants, owners and operators of water systems, and government departments is the first step towards dealing with DBP issues. For a

Drinking Water Quality Sampling Program for the Town of Happy Valley - Goose Bay

In spring 2010, the Water Resources Management Division, Department of Environment and Conservation, in partnership with the Town of Happy Valley-Goose Bay, began an intensive drinking water sampling program for the town.

Happy Valley-Goose Bay receives water from two sources – water from Spring Gulch, which is purchased from the Department of National Defence (DND), and water sourced from a Well Field of five groundwater wells located near the Churchill River. The Well Field provides approximately 65% of the Town's total water needs, while Spring Gulch supplies the remaining 35%. The majority of the town is supplied with water blended from both sources.

A total of 53 samples were collected in the Town from fourteen locations throughout the part of Town that receives the blended water supply. Samples were collected four times from each site between May 2010 and February 2011. Sampling sites were selected to provide a representative distribution throughout the area of Town that is supplied by water from both Spring Gulch and the Well Field. Additionally, samples were collected at the Water Treatment plant and from dedicated taps from Spring Gulch and the Well Field at the Sandhill Reservoir, prior to the water being blended for distribution.

Major ion chemistry indicates that water from Spring Gulch is a carbonate-bicarbonate water type, while water from the Well Field is a sodium-chloride water type. The chemistry of water from the Well Field dominates the blended water chemistry, which could affect aesthetic qualities of the water with regards to taste. This blended water is of high quality and meets all guidelines for water quality with regards to the GCDWQ.

Hardness and TDS in drinking water can also affect taste. The ranges of both these parameters for all samples collected are within GCDWQ. The differences between the two sources of water are distinct, which could affect perception of taste when comparing drinking water in the Town.

No additional treatment of the Town's drinking water supply is required or recommended at this time.



Sandhill Reservoir, Happy Valley - Goose Bay

number of years the province has been monitoring drinking water systems for different DBPs to try and determine the degree and extent of the problem as part of the Multi-Barrier Strategic Action Plan (MBSAP). ENVC has released the document “Best Management Practices for the Control of Disinfection By-Products in Drinking Water Systems” which introduces a new element to the MBSAP; issue analysis and identification of potential sustainable corrective measures to drinking water quality issues.

This document contains a decision making framework for selection of DBP corrective measures. The framework can be used as a guide when identifying probable causes of DBPs and selecting the corrective measures that will reduce DBP levels in a community’s drinking water distribution system.

The document also includes a checklist of community information for disinfection by-product management that can be used to assist in the decision making process. The checklist allows users to obtain the necessary information from a community’s water distribution system to help identify the main contributing factors to DBP formation within that distribution system.

Data Management and Reporting

The large volume of data acquired during the implementation of the various components of the MBSAP must undergo a stringent quality assurance/quality control (QA/QC) process before it can be compiled, analyzed, and reported to the public. The WRMD strives to collect quality data and report it to the public in an open and timely manner.

The data management and reporting process ensures that decision makers and the general public have access to the necessary information about their drinking water quality. This allows the public to address any issues or concerns they have about their drinking water or corrective actions.

In the 2010–11 fiscal year, 3,870 drinking water quality samples were collected by the department. Each sample provides a unique set of results and are stored in the ENVC drinking water quality database.

The database is a critical component in the management and reporting of drinking water quality data. It contains the results of every drinking water sample taken in the province, under the Department’s drinking water quality monitoring program. The database also stores other necessary information used in program management such as status of protected public water supplies, drinking water quality index rankings and special parameters.

Data management is essential to ENVC’s drinking water quality program and is constantly evolving to meet the needs of related programs. The WRMD continues to focus on using its enterprise–level database and web service technology to ensure that the most current and accurate data is available.

Optimization of the Exploits Regional Water Treatment Facility Nets Improvements in Water Quality and Saves on Operational Costs

The Exploits Regional Water System services the towns of Grand Falls-Windsor, Bishop's Falls, Botwood and Peterview. Since November of 2008, Grand Falls-Windsor has had THMs that were consistently over the Canadian Drinking Water Quality Guideline value of 100 micrograms per litre. HAAs have been consistently over the guideline value of 80 µg/L for this town. Other communities on the system have experienced similar problems with DBPs. The Exploits Regional Water System has struggled to maintain chlorine residuals in the far ends of the distribution system.

These concerns were unexpected as the Exploits Regional Water System has a conventional Water Treatment Plant (WTP) that is equipped to remove precursor natural organic matter from the source water before it can react with chlorine to form DBPs. However after 15 years of operation, the system required significant upgrades including the replacement of filter media (gravel, sand and anthracite).

In January 2011, the first of four multi-media filters underwent upgrades. These upgrades included; removal of existing media and cleaning of the filter box, inspection and repairs to the filter box (walls, grouting, backwash system, under drain, etc.) if required, and finally the installation of new media. Upgrades to the three remaining filters were undertaken between February and April of 2011. In addition to upgrading the filters, WTP operators also worked on optimizing the pH adjustment and coagulant dosages in order to improve pre-treatment processes within the treatment train.

Drinking water quality results since the filter upgrades and optimization of the pre-treatment chemical dosage at the WTP, show a significant drop in DBP levels. Average THM levels since January 2011 are 41.5 µg/L and average HAA levels are 25.8 µg/L. Approximately a 60% reduction in THM levels, and a 75% reduction in HAA levels. Since the upgrades, there has also been some noticeable improvement in drinking water pH and turbidity. Chlorine usage has improved since the optimization of the WTP. The chlorine dosage has been reduced from approximately 120 pounds per day to approximately 80 lbs per day.

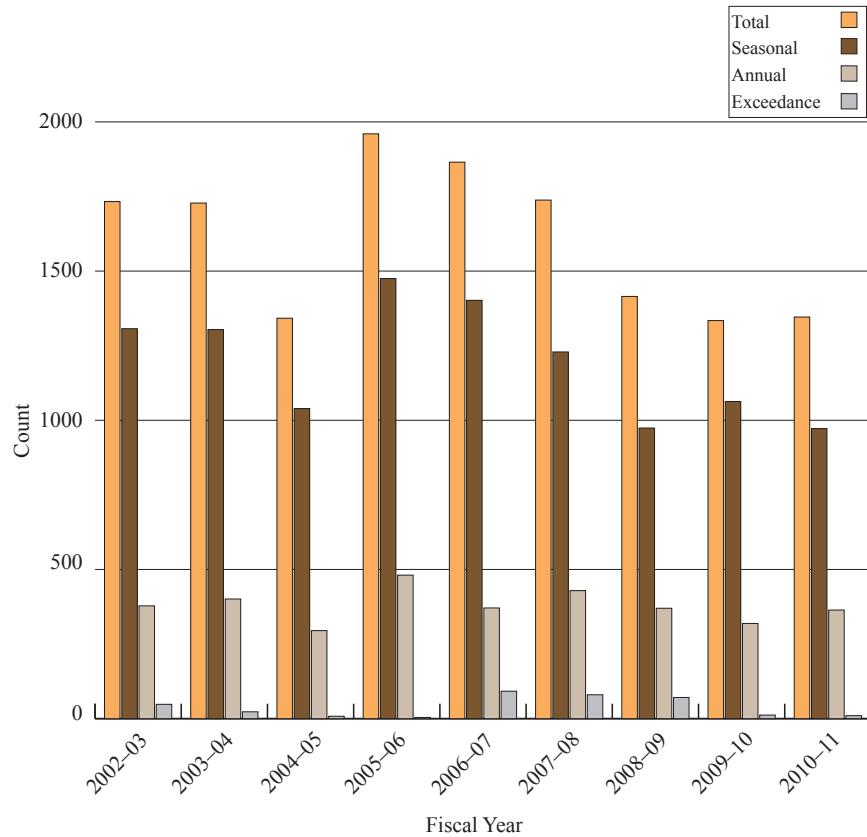


**Operator performing a jar test
to optimize coagulation-flocculation process**

As part of ENVC's commitment to report drinking water quality data to the public in an open and timely manner, WRMD distributes a number of reports for communities and the general public. Table 14 summarizes the reports used to communicate the results from programs related to drinking water quality. Figure 12 illustrates the number of these reports ENVC has published per fiscal year starting in 2002–03.

Table 14: Types of Public Reports Produced by ENVC

| Type | Description |
|--|--|
| Exceedance Reports | Exceedance reports are provided to communities when a laboratory result is above the <i>Guidelines for Canadian Drinking Water Quality</i> for contaminant parameters. These reports are faxed and/or mailed to the affected community as soon as the department receives the results. In the 2010–11 fiscal year, 10 exceedance reports were sent out to communities. |
| Seasonal Drinking Water Quality Reports | All communities with public water supplies are provided with an interpreted report if seasonal monitoring has been conducted. These reports clearly indicate any parameters that exceed the <i>Guidelines for Canadian Drinking Water Quality</i> . The province recommends that communities post these reports in public locations. In the 2010–11 fiscal year, 972 seasonal reports were mailed out. |
| Annual Drinking Water Quality Reports | All communities with public water supplies are sent an annual interpreted report for all drinking water quality monitoring activities conducted during the calendar year. This report clearly indicates any parameters that exceed the <i>Guidelines for Canadian Drinking Water Quality</i> . The province recommends that communities post these reports in public places. In the 2010–11 fiscal year, 364 annual reports were mailed out. |
| Annual Drinking Water Safety in Newfoundland and Labrador Report | The Annual Drinking Water Safety in Newfoundland and Labrador Report has been published each year since 2001. It outlines accomplishments and activities under the Multi-Barrier Strategic Action Plan for drinking water safety in a particular fiscal year. |
| Web Documents on Drinking Water Quality | The WRMD's website is an important tool for communicating with the public. It is updated regularly with new information on drinking water quality and related topics. The "What's New" screen, which lists the most current information, is online at: http://www.env.gov.nl.ca/env/waterres/whatsnew/index.html |

Figure 12: Number of Reports Published by ENVC per Fiscal Year

The most frequent method of reporting used by ENVC is the seasonal drinking water quality report, sent out after each drinking water monitoring season. Depending on the type of sampling performed, these reports can contain results for samples collected at the source (for chemical and physical parameters) or at the tap (for chemical and physical parameters, THMs, HAAs). They compare sample results to the GCDWQ and note exceedances. The reports contain regular and exceedance water quality information for tap and source water. These reports also include two summary indices:

1. Water Quality Index (WQI)
2. Langelier Index

The WQI describes the quality of a drinking water supply based on the six most recent tap samples, describing the condition based on six categories ranging from excellent to poor. The drinking water in some communities is not ranked due to the presence of a boil water advisory, contaminant exceedance, or significant gap in data required to be collected at the time of the WQI calculation. If the community is not ranked, then a water quality issue exists that needs to be addressed by the town.

The Langelier Index is one of the tools used by a water system operator to stabilize water so that both the internal corrosion of the piping system and deposition of scale can be controlled. The

Langelier Index can fluctuate frequently. Operators can control various parameters throughout the life of the distribution system to regulate Langelier Index readings, such as pH. The Langelier Index does not indicate the overall quality of drinking water in the system.

A second key reporting function is the contaminant exceedance reporting protocol. This protocol is activated when sample analysis indicates the presence of a contaminant in a concentration that is above the maximum acceptable concentration listed in the GCDWQ. The reporting protocol continues to be successful in ensuring prompt communication with communities and appropriate government departments.

Under the contaminant exceedance protocol, the laboratory performing the drinking water quality sample analysis is required to notify the department as soon as it detects any contaminant exceedances. The department sends the laboratory an immediate confirmation of receipt and initiates site analysis to determine if the contaminant exceedance requires a resample. Following the site analysis, an exceedance report is issued to the community explaining the exceedance and whether or not a resample is required. This report is copied to members of the Departments of, Health and Community Services, Municipal Affairs and Service NL.

Inspection and Enforcement

Permits

Under the *Water Resources Act*, the Department of Environment and Conservation has the authority to issue various permits relating to different aspects of drinking water protection under the MBSAP. These include:

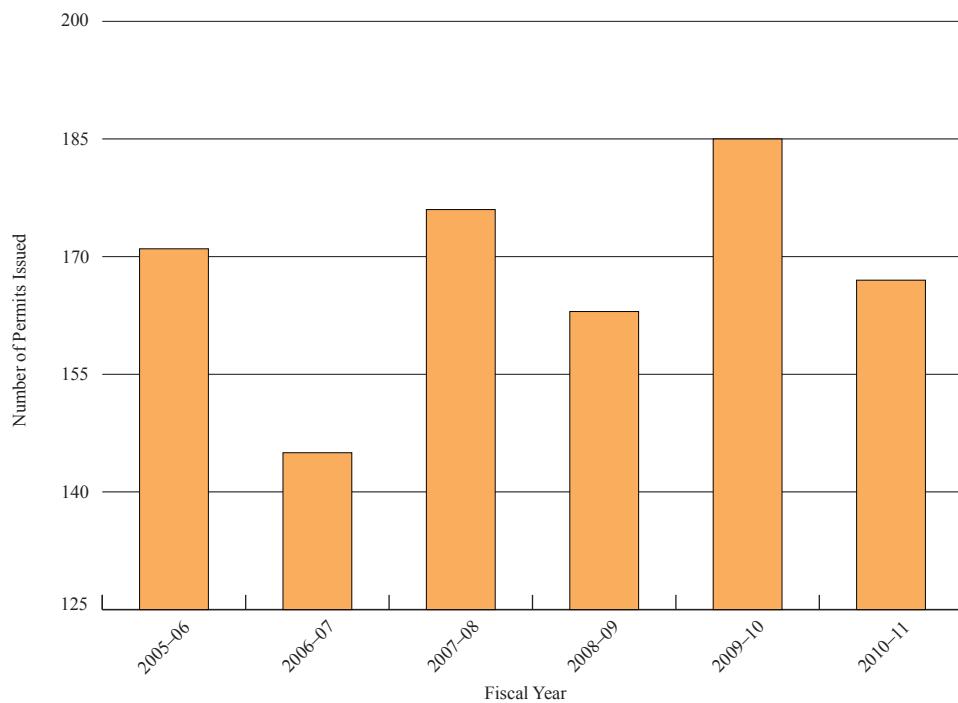
- permits to construct water and sewage works under Section 36 and 37 of the Act
- permits to operate water and sewage works under Section 38 of the Act
- permits for development activity in a protected water supply area under Section 39 of the Act
- non-domestic well permits under Section 53 of the Act

The Department of Environment and Conservation's permitting process ensures adequate review of proposed work to determine if it meets provincial standards and guidelines. The inspection of projects and the enforcement of permits that have been issued by the Department ensure that projects are in compliance with the conditions outlined in the permits.

The design and construction of all water and sewage infrastructure in the province requires an approval from the Minister of Environment and Conservation. The permit to construct is issued to the owner of the infrastructure and outlines standard requirements and any special conditions necessary to govern the installation of the works. The normal process is that a licensed professional engineer submits a design on behalf of a community which is reviewed for compliance with the Department of Environment and Conservation's Guidelines for the Design, Construction and Operation of Water and Sewerage Systems. If acceptable, a permit to construct

is issued. During the 2010–11 fiscal year, the Department of Environment and Conservation issued 167 permits to construct for water and sewer infrastructure. See Figure 13 for a historical comparison of permits to construct.

Figure 13: Number of Permits to Construct per Fiscal Year



The permit to operate is designed to focus the awareness of municipal government leaders and operators on the activities required to develop and practice proactive operation and maintenance of their drinking water infrastructure. Permits to operate are issued in four different areas: water distribution, water treatment, wastewater collection, and wastewater treatment. In the 2010–11 fiscal year, the department issued two permits to operate. The total number of active permits to operate, at the end of the 2010–11 fiscal year, was 336 permits to operate water distribution systems and 15 permits to operate water treatment systems.

Permits are also required, under Section 48 of the *Water Resources Act* to drill a non-domestic well and must be obtained before construction begins. 38 non-domestic well permits were issued during the fiscal year for various uses which includes public water supplies.

Inspections/Investigations

The *Water Resources Act* states that a permit holder shall allow inspectors to carry out inspections of an activity for which a license or permit has been issued. Investigations can also occur once the Department of Environment and Conservation is made aware of a contravention of the *Water Resources Act* or associated regulations and permits. The Department of

Wellhead Inspection Program

The Wellhead Inspection Program is designed to monitor the construction and maintenance of all public water supply wells in the province. The goal of this program is to inspect wellheads, surrounding areas and report findings to owners of these supplies so that all necessary repairs are conducted to help protect water quality and quantity.

There are many technical items in this inspection. Some of these are:

- location of well
- sources of pollution or contaminants
- well cap – sealed except for air vents
- height of well casing/cap above finished grade
- electrical access
- slots, holes, and other orifices in the casing or cap
- presence of water around casing – water staining indicating over-topping of well
- well pits, enclosures and buried wellheads – access dangerous or impossible
- nearby improperly abandoned wells
- presence of an adequate sample port
- access to wellhead for maintenance
- many others

The program continues to positively affect public water supplies sourced from groundwater throughout the province by identifying current and potential concerns and issues at or nearby public water supply wells. Through annual reporting to these wellhead owners, there have been many positive changes made to wellheads, pump houses, and surrounding areas that undoubtedly have prevented or corrected water quality issues.

A report titled “The State of Public Water Supply Wells in Newfoundland and Labrador” is anticipated for release late 2012. This report will provide a snapshot of the state of public water supply wells and identify many concerns and issues, as well as positive changes, regarding these wells.



Example of open well and well with vermin proof cap

Environment and Conservation requires that all public waterworks be maintained and operated sustainably, as prescribed by the *Water Resources Act*. Departmental staff conduct inspections of water supply systems under construction, the operation of water treatment and distribution systems, groundwater wells being drilled, and activities taking place in PPWSAs to ensure that they comply with the terms and conditions of their permit. Communities may conduct routine surveillance and monitoring of approved development activities within PPWSAs to ensure existing development activities are being conducted in an environmentally acceptable manner and to ensure that there are no development activities taking place without prior approval from the department.

Investigations are typically issue-specific. Additionally, the Minister may order studies, monitoring, or investigations for the purpose of collecting data and information that the Minister considers necessary in the interest of the conservation, development, control, improvement and proper utilization of water resources.

In the 2010–11 fiscal year, departmental staff carried out a total of 66 inspections/investigations. In addition, staff may visit public water supplies two to four times a year during scheduled monitoring work. Table 15 presents a breakdown of inspections for 2010–11.

Table 15: Inspections by ENVC for 2010–11

| Inspection Type | | | | Total |
|------------------------------|----------------------------------|------------------------|--------------------------------|-------|
| Water and Sewer Construction | Protected Surface Water Supplies | Water System Operation | Protected Groundwater Supplies | |
| 58 | 5 | 3 | 0 | 66 |

Enforcement

One of ENVC's main goals is to ensure communities achieve clean and safe drinking water in a sustainable and efficient manner. When non-compliance with the conditions of a permit is reported, WRMD responds to enforce the permit.

Operator Education, Training, and Certification

Certified operators are integral to the proper operation and maintenance of the systems that supply clean and safe drinking water to the consumer. Through continuing education, training, and certification, the Department of Environment and Conservation is addressing the need for qualified operators of drinking water treatment and distribution systems in this province.

Providing opportunities for ongoing training and education to operators of municipal drinking water systems is a major component of the MBSAP. Recognizing this, the Department of Environment and Conservation developed a unique approach to meet the training needs of

Innovative Wellhead Design - The Town of St. George's

The Town of St. George's established a new wellfield in 2009–10. This wellfield was designed with a different approach to wellhead surface construction.

The Water Resources Management Division, through the Terms and Conditions issued with Non-domestic Well Permits, has been striving to change wellhead construction practices so that well pits, enclosures or other similar structures around wells are no longer allowed. Ideally, new wellheads should be finished outside, be completed at least 0.6 metres above a finished grade that will cause all surface water to flow away from the well, and capped with a double-vented vermin-proof well cap.

The wellheads at the St. George's wellfield are of an innovative method of wellhead construction in line with these Terms and Conditions. These wellheads are completed using a mounded approach with an integrated manhole-like enclosure. These wellheads are finished in excess of the required 0.6 metres above finished grade so that flooding is not an issue. The manhole-like enclosure has a cement floor with an above-hatch access that is easy and safe to operate. The mounded earth around each enclosure serves as additional protection and identification for the wellheads.

A very innovative feature of these wellheads is the water sampling ports and drainage system. A water sampling port is located on each wellhead and significantly aids in water sampling by eliminating back pressure and, with the proven ability of the operators to control well pumps, ensures that each sample is from the well below. The drainage is accomplished by a floor drain that has a built-in check valve so that any excess exterior water cannot re-enter the enclosure.

These small well-designed enclosures serve to protect the wellhead above grade and significantly aid water sampling at each wellhead.



Town of St. George's wellhead

operators across the province through the development of the Operator Education, Training, and Certification (OETC) program. The OETC program is the first of its kind in Canada, and was specifically designed to meet the needs of the province's small rural communities.

The OETC program provides operators with education and hands-on training opportunities that are focused on four key areas:

- job competency
- drinking water safety
- environmental protection
- infrastructure sustainability

The education component of the OETC program takes place in a classroom-like setting. Seminars are designed to provide operators with the theory and knowledge that will allow them to successfully operate their water systems. Seminars are free of charge, and locations are chosen to minimize travel time and costs for participants. The curriculum of the education program focuses on topics such as:

- water distribution system basics
- water distribution system hydraulics
- water quality issues
- water treatment level I and level II

During the 2010–11 fiscal year, the OETC program co-funded a course in partnership with the City of St. John's. The course was titled “Chlorine Training—One Tonne Container, Practical Exercise”, and ENVC provided funding for 15 participants, including 14 municipal operators and 1 OETC participant. The need to provide operator education opportunities through the OETC program remains strong. Communities across the province, many of which are facing challenges of operator retirement and turnover, constantly need to educate new operators. The WRMD is committed to delivering its existing seminars on water distribution and water treatment in the coming years, and to expanding the curriculum as required. During the 2010–11 fiscal year, 35 drinking water related classroom seminars were held at 17 locations across the province.

Operator Training

The operator training program provides municipal drinking water system operators with hands-on training opportunities. The program utilizes three Mobile Training Units (MTUs) that have been equipped with various equipment and tools used in the operation and maintenance of drinking water systems. Training sessions are delivered on-site in the operator's community to maximize accessibility to the training opportunities. During 2010–11, the province's three operator trainers conducted 177 on-site training sessions throughout the province. These sessions were attended by a total of 216 operators.

Currently the on-site training curriculum includes the following sessions:

- disinfection
- hypochlorination
- gas chlorination
- hydrant maintenance
- control valve maintenance
- pipe tapping
- leak detection
- distribution system flushing

Based on the demand from municipal water system operators, a new session, pH adjustment systems, is being developed for incorporation into the program curriculum. A draft of this curriculum was completed during the 2010–11 fiscal year and will be available to operators as an on-site training session during the 2011–12 fiscal year.

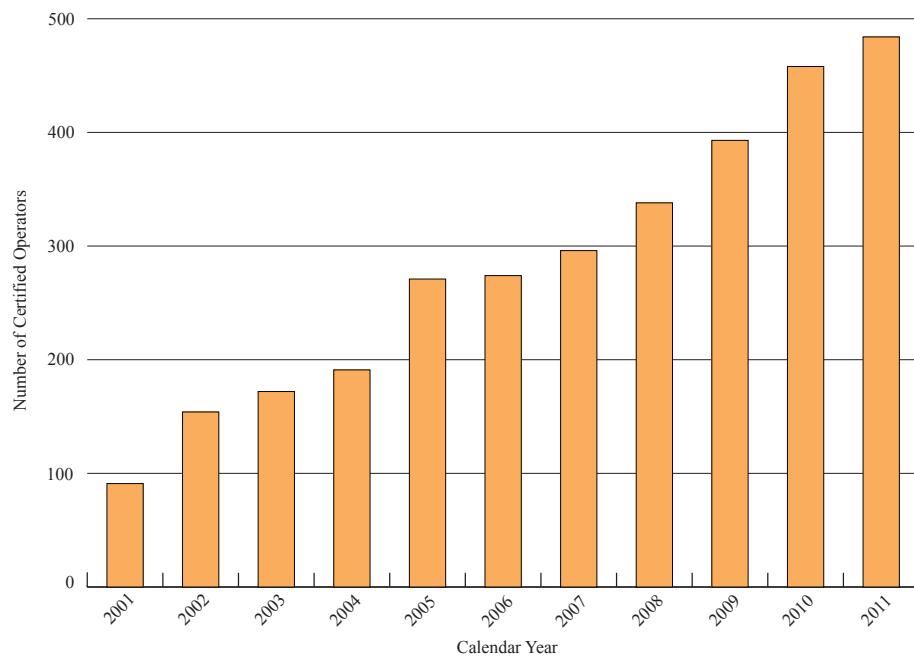
WRMD staff members have been designing and constructing a water distribution system working model to augment their hands-on training program. This model will be used in conjunction with training sessions currently being delivered through the MTUs. The first version of the working model was launched at the 2011 Gander Workshop. Operator Trainers have been revising the working model design and began the construction of the second working model during the 2010–11 fiscal year.

Operator Certification

Certification of water operators in this province is a responsibility of the OETC program. Certification provides operators with an avenue for demonstrating their knowledge and commitment to their profession. It also provides communities with the assurance that their water systems are operated by qualified and knowledgeable personnel. As this report was being prepared, there were 360 certified water and/or wastewater operators in Newfoundland and Labrador, for 68 of these operators, this was their first level of certification achieved. Current certification levels include:

- Water Distribution Operators (Class I, II, and III)
- Water Treatment Operators (Class I, II, III, and IV)
- Wastewater Collection Operators (Class I and II)
- Wastewater Treatment Operators (Class I and II)

Figure 14 illustrates the number of certified operators in the province per calendar year since 2001. 345 certified operators are currently employed with an approximate attrition rate of twelve operators per year. Table 16 contains the total number of operator certificates issued per calendar year.

Figure 14: Number of Certified Operators per Calendar Year**Table 16:** Total Number of Operator Certificates Issued per Calendar Year

| Calendar Year | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|-----------------------|------|------|------|------|------|------|------|------|------|------|------|
| Water Distribution | 31 | 83 | 0 | 32 | 96 | 3 | 23 | 15 | 88 | 80 | 15 |
| Water Treatment | 3 | 7 | 35 | 7 | 2 | 10 | 24 | 17 | 3 | 7 | 13 |
| Wastewater Collection | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 74 | 28 | 15 | 13 |
| Wastewater Treatment | 0 | 3 | 0 | 1 | 0 | 1 | 0 | 26 | 1 | 4 | 29 |
| Total Certificates | 36 | 94 | 35 | 40 | 98 | 15 | 47 | 132 | 120 | 106 | 70 |

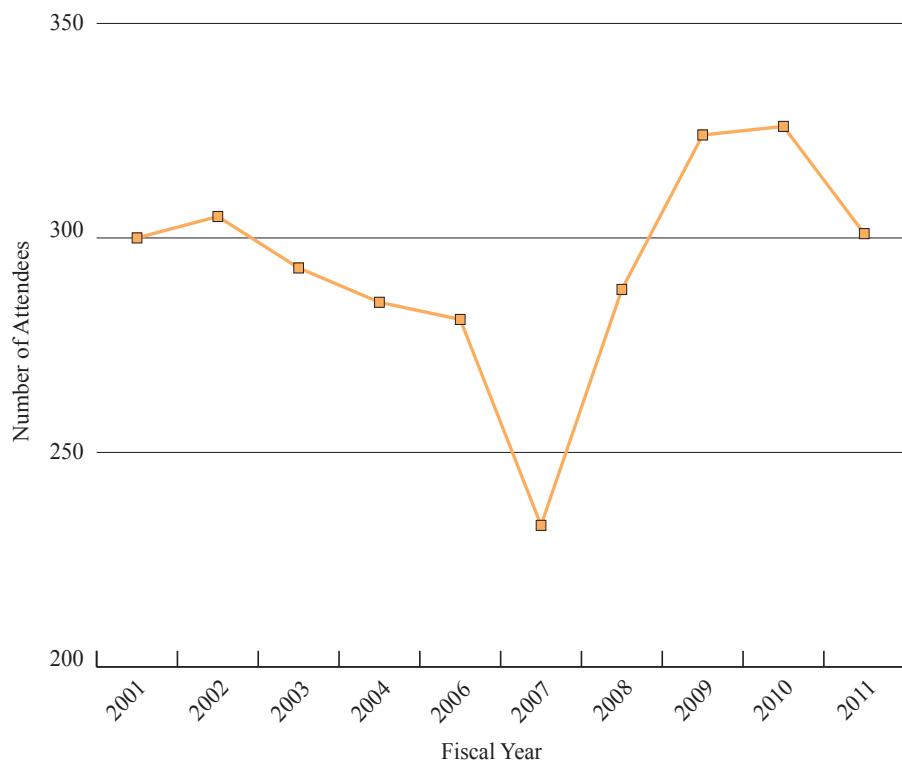
Annual Clean and Safe Drinking Water Workshop

The Annual Clean and Safe Drinking Water Workshop is open to all community operators and administrators. It brings together drinking water quality stakeholders and provides them with opportunities to learn about drinking water safety, to exchange information, and to share experiences. The presentations delivered during this event are carefully chosen to address specific challenges faced by small communities in providing clean and safe drinking water.

The theme of the 2011 Clean and Safe Drinking Water Workshop was “Decade of Commitment” and it took place on March 22-24, 2011 in Gander. The workshop attracted 301 participants from

across the province and country. Figure 14 illustrates the number of attendees at the Annual Clean and Safe Drinking Water Workshop, which has been held every year with the exception of 2005. Copies of all presentations delivered as part of the workshop are available on the department's website. The annual event also includes a trade show exhibition which allows operators and municipal administrators to network with equipment suppliers from across the country. At the 2011 workshop, 15 companies showcased a variety of technologies and services related to water distribution and treatment. The Department of Municipal Affairs once again provided financial assistance to municipalities to cover travel costs associated with attending the workshop. Communities from the Island portion of the province that were approved for the subsidy were reimbursed up to \$300, and communities from Labrador that were approved for the subsidy were reimbursed up to \$600.

Figure 15: Number of Annual Workshop Attendees per Year



The next Annual Clean and Safe Drinking Water Workshop is scheduled for March 27th to 29th, 2012.

Future Initiatives

The OETC will be developing and introducing new education initiatives to its curriculum over the coming years. The development of additional education seminars will require training for OETC staff, as well as research and development of seminar materials.

2011 Operator of the Year Awards

Recognizing Excellence in the Municipal Drinking Water Industry

The Department of Environment and Conservation created the Operator of the Year Awards to recognize the outstanding dedication of municipal operators in providing their residents with clean and safe drinking water. Community representatives across the province were invited to nominate an operator they felt had made an outstanding contribution. In total, 37 nominations were submitted to the selection committee for consideration in two categories:

1. Volunteer Operator of the Year
2. Operator of the Year

The Volunteer Operator of the Year Award was created to honour an individual that operates a municipal drinking water system without any monetary compensation. The 2011 Award was presented to a team of operators; Mr. John Braye and Mr. Edmond Fudge from the Town of Brighton. Both gentlemen are also members of the Town Council. Their dedication and commitment to providing the residents of Brighton with safe drinking water does not go unnoticed by the community that was proud to submit their award nomination.

The 2011 Operator of the Year was presented to Mr. Tony Skiffington, town foreman and water system operator for the Town of Gambo. Despite recent challenges impacting the Town of Gambo, Tony was noted for being steadfast and focused on the task at hand and for remaining composed and calm. The Town of Gambo were pleased to recognize Tony for his dedication to the provision of clean and safe drinking water to the residents of Gambo.



Minister Ross Wiseman with the 2011 Volunteer Operators of the Year - John Braye and Edmond Fudge of Brighton



Minister Ross Wiseman with the 2011 Operator of the Year - Tony Skiffington of Gambo

The following education seminars have been targeted for development:

- potable water dispensing unit operation and maintenance
- NL water resources portal training for communities and orientation session for municipal staff
- water distribution system flushing

Other priority areas for future development include:

- delivering drinking water related education and on-site training sessions focused on new operators and communities facing drinking water challenges
- providing specialty courses to respond to the training needs of water operators throughout the province - During the 2011–12 fiscal year, ENVC will be funding two speciality courses:
 1. Groundwater, Wells and Well Pumps
 2. Water Chemistry for Operators
- construction of an additional two training units for MTU's stationed in the Eastern and Central regions of Newfoundland and Labrador. With completion of the second model scheduled for 2011–12, and a third to follow.

Corrective Measures

The Level II components of the MBSAP just discussed, provide an ongoing picture of drinking water supply, quality, and infrastructure. The issues identified require the implementation of corrective actions to deal with these issues. Corrective measures can include structural, non-structural, or operational techniques and other best management practices.

There are five classes of corrective measures: policy, design, water system management, water treatment alternatives, and source alternatives. Table 17 shows the progress made in each category of corrective measure, including activities undertaken as part of the Rural Drinking Water Safety Initiative.



Gander pre and post treatment drinking water

Table 17: Corrective Measures Undertaken for 2010–11

| Corrective Measure | Description |
|------------------------------|---|
| Policy | <ul style="list-style-type: none"> • Year three of the Rural Drinking Water Safety Initiative completed • Year ten of the MBSAP for Safe Drinking Water in NL • The Interdepartmental Committee on Rural Drinking Water Initiative met 3 times |
| Design | <ul style="list-style-type: none"> • Study on Evaluation of Potable Water Storage Tanks in Newfoundland and Labrador and their Effect on Drinking Water Quality was completed • 6 technical studies underway |
| Water System Management | <ul style="list-style-type: none"> • Ongoing operator education, training and certification • Permits to Construct issued relating to water system management <ul style="list-style-type: none"> o Water main upgrades and replacement– 17 o New or upgraded pumps– 8 o New tanks or upgrades to tanks– 5 o New contact tanks– 2 o New or upgraded valves– 7 o New or upgraded SCADA– 2 o Sampling stations– 2 • 3 community assessments undertaken in response to drinking water quality issues |
| Water Treatment Alternatives | <ul style="list-style-type: none"> • Permits to Construct issued relating to water treatment <ul style="list-style-type: none"> o New chlorination systems– 6 o Chlorination system upgrades– 7 o New filtration systems– 2 o New pH adjustment systems– 2 o New PWDU– 1 o New water treatment plant– 1 o Water treatment plant upgrades– 3 • 53 applications for funding for the installation of PWDUs received by the Department of Municipal Affairs as of end of fiscal year • Study on NL water treatment plants underway |
| Source Alternatives | <ul style="list-style-type: none"> • Permits to Construct issued relating to water sources <ul style="list-style-type: none"> o Infiltration gallery– 1 o New wells– 3 o New or upgraded intakes– 2 • 349 public wellhead inspections undertaken |

Level III

The management of drinking water is multifaceted and depends on the contribution of several levels of government as well as the public. The four components of Level III of the MBSAP are:

1. legislative and policy frameworks
2. public involvement and awareness
3. guidelines, standards and objectives
4. research and development

Legislative and Policy Frameworks

The legislation that governs drinking water quality in the province includes the *Water Resources Act*, the *Municipal Affairs Act*, and the *Municipalities Act*. All of the legislation, policy directives, standards, and regulations are posted on the Province's website. These three Acts contain broadly stated initiatives:

- the *Water Resources Act* regulates the administration of water rights, the protection of public water supply areas, and a range of construction and development permits pertaining to drinking water infrastructure and development that may impact public water supplies
- the *Municipal Affairs Act* administers the management of waterworks
- the *Municipalities Act* grants powers to municipalities for the construction, operation, and maintenance of water systems and for the allocation of funds for this work

Government also introduces regulation and policy directives to provide more explicit direction for legislation.

Interdepartmental Cooperation

The provincial government's efforts to provide clean and safe drinking water are the result of the combined contributions of four departments: the Department of Environment and Conservation (acting as the lead agency), and the Departments of Health and Community Services, Municipal Affairs, and Service NL. Each department is responsible for one or more components of the MBSAP. Their efforts are coordinated by an interdepartmental committee of deputy ministers, which is chaired by the Deputy Minister of the Department of Environment and Conservation. The committee's work is supported by the Interdepartmental Safe Drinking Water Technical Working Group, which was formed in June 2000. The working group is chaired by the Department of Environment and Conservation, and includes representatives from the Departments of Health and Community Services, Municipal Affairs, and Service NL. Medical Officers of Health and representatives from the Public Health Laboratory are also members of the working group. The working group met twice in 2010–11, with all activities reported to the chair of the Steering Committee of Senior Government Officials. The committee leads work on the development of policy and guidelines specifically in the area of microbiological safety. It is responsible for the establishment of the hierachal coding of BWAs. It also conducts QA/QC and groundtruthing of BWAs.

Envirothon 2010

The Newfoundland and Labrador Envirothon is a province-wide, high school environmental competition aimed at increasing awareness of natural resources and the environment. The Model Forest of Newfoundland and Labrador has hosted this event annually since 2002. Winning teams are given the opportunity to compete in the international Canon Envirothon event each year.

In 2010, the NL Envirothon took place in Bishop Falls from May 13 - 15 and included the special topic 'groundwater'. The Water Resources Management Division were honoured to participate as special judge in the event and develop a mock scenario entitled "Protection of Groundwater through Urban, Agricultural and Environmental Planning". Students were presented with the scenario and asked to develop a groundwater protection plan. Demonstrations were also given on bacteriological water quality testing, as well as a field exam relating to the special topic 'Groundwater'. This event is a great opportunity to teach students about the importance of protecting this province's water resources while engaging the public and promoting awareness.

The Water Resources Management Division would like to congratulate Team Titans from Corner Brook High for their efforts in the 2010 Envirothon.



Envirothon 2010 Participants

In 2010–11, the committee focused on the QA/QC of BWAs, and the implementation of the MBSAP for drinking water safety in Newfoundland and Labrador.

Public Involvement and Awareness

The Department of Environment and Conservation continues to provide easily accessible and timely drinking water quality information to the public. The department's website is a major tool for increasing public awareness and encouraging public involvement. One new addition is a Drinking Water Outreach Video that can be accessed on the department's website at: <http://www.env.gov.nl.ca/env/waterres/quality/drinkingwater/index.html>.

Watershed management committees are another way the public can participate in efforts to ensure clean and safe drinking water supplies. They are excellent forums in which stakeholders can voice opinions and concerns about land management and water quality issues in their watershed areas. The establishment of watershed management committees furthers the Department of Environment and Conservation's goal of increasing public involvement and awareness of drinking water safety issues.

Guidelines, Standards, and Objectives

To ensure clean and safe drinking water, the Department of Environment and Conservation sets drinking water safety guidelines, standards, and objectives, and regularly reviews and updates them to address current issues and challenges.

Research and Development

In order to stay on top of current and emerging issues that affect drinking water safety, the Department of Environment and Conservation undertakes several research and development activities each year.

Final drafts for a number of technical studies under the Rural Drinking Water Safety Initiative were being completed during the 2010–11 fiscal year:

- study on pH Adjustment Systems and Recommendations for Design and Operational Guidelines
- study on Water Quality and Demand on Public Water Supplies with Variable Flow Regimes and Water Demand
- study on Regional Groundwater Chemistry Mapping for the Island of Newfoundland
- study on Drilled Well Database Evaluation and Correction
- study on Pathogenic Inactivation in Drinking Water Systems in Newfoundland and Labrador
- study on Characteristics and Removal of Natural Organic Matter in Drinking Water Systems in Newfoundland and Labrador

The Department of Health and Community Services are currently drafting guidelines for issuing public water supply non-consumption advisories. Advisories will be reported for fiscal year 2011–2012. Additionally the Department of Health and Community Services will be initiating a study of retrospective review of private well water quality during 2011–12.



**2011 Clean and Safe Drinking Water Workshop participants
watch a demonstration of the OETC Working Model**

The Path Forward

Department of Environment and Conservation

The Department of Environment and Conservation will continue to pursue its commitment to develop and strengthen all levels and components of the Multi-Barrier Strategic Action Plan.

The department's drinking water monitoring activities for the 2011–12 fiscal year are planned as follows: 3,899 drinking water quality samples scheduled for collection and analysis.

- 302 source water samples, which will be analyzed for inorganic chemical parameters
- 1,067 tap water samples, which will be analyzed for inorganic chemical parameters
- 1,264 tap water samples, which will be analyzed for trihalomethanes
- 1,266 tap water samples, which will be analyzed for haloacetic acids

The department will continue to provide education and hands-on training opportunities to water system operators. The development of new and updated curriculum to address the education and training needs of communities across the province is scheduled for 2011–12. This will include the continuation of new seminars similar to the Proper Handling of Chlorine and Chlorine Containers, and new training sessions such as pH Adjustment Systems. Training sessions to assist communities with the understanding of their Drinking Water Quality Reports is still under development.

A new watershed management guide is under development for municipalities and local service districts who have a designated Protected Water Supply Area but lack a Watershed Management Committee or Watershed Management Plan.

The department is looking forward to the completion of the Water Distribution System Working Model and the incorporation of this tool into its operator training program. The development of new initiatives related to the certification of water operators in Newfoundland and Labrador will be a priority for 2011–12.

The 2012 Clean and Safe Drinking Water Workshop is scheduled for March 27th, 28th and 29th 2012, in Gander. The department looks forward to sharing information and experiences with the various stakeholders involved in providing clean and safe drinking water to the people of the province.

Department of Municipal Affairs

The Department of Municipal Affairs will continue to financially support requests from communities for the provision of water related infrastructure as well as provide implementation oversight. Cost effective approaches with regard to regionalization of operational and maintenance services also will be encouraged in the way of both advisory and financial support.

Appropriate water treatment technology to enable communities to meet the *Guidelines for Canadian Drinking Water Quality* continues to be a priority for capital funding assistance. In this regard, the Department is involved in the Province's Drinking Water Safety Initiative. This initiative outlines several options to improve drinking water safety based on a comprehensive evaluation of every public water supply in the Province. A significant component of this initiative includes the installation of potable water dispensing units. These units are small scale water treatment plants from which the residents of small communities are provided high quality drinking water which meet the *Guidelines for Canadian Drinking Water Quality*.

Service NL

Through its bacteriological water monitoring program, Service NL helps ensure that public drinking water is protected from waterborne diseases and is safe for consumption. Service NL collected 19,911 public bacteriological water samples in 2010–11. Its ongoing high level of public water sample collection is an indication of the Department's commitment to a satisfactory level of bacteriological water monitoring and compliance with levels recommended in the Province's standards and the *Guidelines for Canadian Drinking Water Quality*.

The Department is also interested in improving the surveillance of drinking water that is accessible to the public through means other than municipal/public water supplies, such as via semipublic and institutional supplies. It will continue discussions with the Department of Environment and Conservation on this issue.

Service NL will also continue to partner with the Department of Health and Community Services and the Regional Health Authorities. It is important to ensure that Environmental Health Officers and Environmental Technicians can access the highest standard of professional development in their field, particularly in bacteriological water monitoring. Support for training and professional development in this program will continue.

Department of Health and Community Services

Through the Newfoundland and Labrador Public Health Laboratory and regional drinking water testing locations, water samples from municipal and private supplies are tested for the bacteriological indicators *E. coli* and total coliform bacteria.

In 2010–11 the Department of Health and Community Services continued to support and fund the testing program.

In 2011–12 the Department of Health and Community Services and the four Regional Health Authorities will continue with their drinking water safety initiatives by working collaboratively with provincial and municipal partners to maintain, and enhance where possible, drinking water related health protection efforts and disease prevention initiatives.

Specifically, they will:

- Provide policy and technical support to Environmental Health Officers with Service NL who perform bacteriological water quality monitoring, interpret bacteriological water quality test results and issue boil water advisories.
- Review boil water advisory guidelines, and revise where necessary.
- Review drinking water safety promotional materials, and revise where necessary. Drinking water awareness information is available online at:
<http://www.health.gov.nl.ca/health/publichealth/envhealth/drinkingwater.html>
- Provide health-related advice to municipal leaders and residents when unsatisfactory water quality in public water supplies is identified.
- Partner with Service NL and the Canadian Institute of Public Health Inspectors (Newfoundland and Labrador branch) to provide Environmental Health Officers with drinking water quality related continuing professional development opportunities.



Environment and Conservation

Water Resources Management Division
Department of Environment and Conservation
Government of Newfoundland and Labrador
P.O. Box 8700, St. John's, NL
A1B 4J6