5.

ENVIRONMENT AND LABOUR - DRINKING WATER SAFETY SYSTEM

BACKGROUND

5.1 There are approximately 1,880 public drinking water supplies in Nova Scotia. Municipal governments operate 82 of these, while the rest are smaller public supplies owned and operated by private or non-profit concerns such as restaurants, camp grounds, schools and nursing homes. Approximately 54% of the Nova Scotia public is served by municipal drinking water supplies. The remainder obtain drinking water from small public supplies or privately-owned supplies, such as wells.

5.2 Responsibility for public drinking water safety is shared. Owners of drinking water supplies are responsible for maintaining the safety of their supplies. The Department of Environment and Labour is responsible for enforcing compliance with water safety laws and regulations. It derives its authority from the Environment Act. However, the Province's responsibility for private drinking water supplies (e.g., wells) does not extend beyond regulating well construction and investigating contamination originating from outside the supply owner's property.

5.3 Historically, public drinking water safety was regulated under the Health Act. Municipal water sampling and monitoring were conducted by Provincial inspectors on a weekly basis. Non-municipal public drinking water supplies were not monitored. In 1995, under the new Environment Act, the Department of the Environment was designated as "*the lead agency of Government*" for water resource management. At the same time, new Regulations came into effect for water treatment and distribution facilities. In 1998 the Department implemented an initiative which required municipal water system operators to monitor their own systems and collect water samples for testing on a daily or weekly basis. The Department discontinued its routine testing of municipal drinking water supplies in 1999 and now, by way of inspection or audit, ensures the required testing is carried out by the supply owner. This change puts the onus on drinking water supply owners to fulfill due diligence requirements and enables the Department of Environment and Labour to focus on its regulatory responsibilities.

5.4 The Department's water supply monitoring Regulations were expanded to include public drinking water supplies not operated by municipalities. The Department defines a public drinking water supply as a water works system for the provision of water to the public for human consumption where the system has at least 15 service connections or serves 25 or more individuals per day at least 60 days of the year. Effective October 1, 2000, public drinking water supply owners – both municipal and non-municipal – are required to have a water quality monitoring program and meet the health-based *Guidelines for Canadian Drinking Water Quality* published by Health Canada.

5.5 The Department of Environment and Labour was created on October 1, 2000 through an amalgamation of the former Departments of Environment and Labour, along with some other government entities. Within the Department, the Environmental Monitoring and Compliance Division is responsible for field operations relating to environmental matters. Activities of the Division include processing applications, inspecting and monitoring approved water supplies, enforcement activities, and responding to public issues and complaints. For operational purposes,

the Province is divided into four regions. The Department has a staff of 73 assigned to carry out inspections and other duties related to a variety of environmental matters, of which drinking water safety is one component.

RESULTS IN BRIEF

5.6 The following are our principal observations from this audit.

- The Department released its new drinking water strategy in October 2002. The strategy is based on the principles of sustainability and integrated management, and the premise that everyone has a responsibility to maintain and protect the environment. The accompanying multi-year action plan includes activities that address some of the main components in each of the stages of the multiple-barrier approach.

- Standards exist for the construction and operation of public water supplies, the qualifications of public water supply operators, accreditation of laboratories which test water samples, and the construction of wells. There are no standards for the safe collection, transport and discharge of water by tank trucks for domestic consumption, but draft guidelines have been developed and await approval.

- The Department has adopted Health Canada's health-based *Guidelines for Canadian Drinking Water Quality* as the standard for Nova Scotia public drinking water supplies. Provincial Regulations require public water supply owners to regularly monitor and test their supplies. Municipal water supplies are audited by the Department on a regular basis.

- The Department estimates there are approximately 1,800 public drinking water supplies – other than municipal supplies – that require registration and implementation of a water quality monitoring program. The Department originally estimated that it would have all of the public water supplies registered by October 1, 2002. As of November 5, 2002, approximately two years after the regulatory requirement for registration was approved, there were 1,512 supplies registered.

- The Department has inspected a number of registered water supplies because of the presence of contamination and the release of a boil water advisory. However, there have not yet been any audits of registered water supplies because registration is still in progress. We noted insufficient planning relating to the compliance monitoring process for registered water supplies. The Department has not yet determined how it will carry out the audits, including the procedures and forms to be used. It has not prepared an analysis of how audits of registered supplies will be allocated among various government departments and whether there are sufficient resources available to do the work. The Department has not adequately considered how it will ensure other departments' inspectors are providing sufficient compliance monitoring coverage.

- Departmental requirements for the documentation and follow-up of boil water advisories need to be more closely complied with.

- Responsibility for the enforcement of drinking water safety is clearly set out in legislation and regulations, as well as in policy directives and guidelines issued by the Department to staff. Documented roles and responsibilities are consistent with relevant legislation.

AUDIT SCOPE

5.7 In early 2002, with follow-up in October, we performed a broad scope audit of the Department of Environment and Labour under the mandate established by Section 8 of the Auditor General Act. Our audit was performed in accordance with auditing standards established by the Canadian Institute of Chartered Accountants, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

5.8 Our audit focused on the Provincial drinking water safety system in the areas of standards and qualifications, compliance and enforcement. Specifically, the objectives of this assignment were to assess:

- the Department's process for developing and promulgating standards to ensure safe, clean drinking water;
- the process used to ensure the appropriate qualification of individuals involved in drinking water quality and safety activities;
- the Department's monitoring, inspection and other activities as they relate to drinking water quality and safety requirements of legislation, regulations and/or policy; and
- the adequacy of systems for the enforcement of Provincial legislation and regulations related to drinking water quality and safety.

5.9 The audit did not address water bottled and sold for human consumption. Bottled water quality is a Federal responsibility regulated through the Canada Food and Drug Act. Monitoring and inspection is conducted by the Canadian Food Inspection Agency.

5.10 Audit criteria were developed to assist in our assessment of the systems and practices of the Department. The audit criteria were discussed with and accepted as appropriate by senior management of the Department, and are outlined in Exhibit 5.1. Our audit procedures included interviews with management and staff, testing of inspection files, as well as examination of other documents.

PRINCIPAL FINDINGS

Standards and Qualifications

5.11 *Background* - A multiple-barrier approach is advocated as the best means of assuring safe drinking water. This involves a series of safeguards or barriers at different points in the water supply to minimize the possibility of contaminants entering the water and being consumed. The Department of Environment and Labour groups the safeguards into three categories:

- source water protection;
- proper treatment and system operation; and
- monitoring and testing.

5.12 The safeguards can be applied to different systems, from large public water supplies to private wells. There are Regulations and programs in place to facilitate each component of multiple-barrier protection.

5.13 The primary requirements related to drinking water safety are outlined in the Environment Act and its related Regulations. The Act provides for designated source water protection areas (i.e., watershed lands) for public supplies. The Well Construction Regulations provide protection for private wells. Various Regulations address water treatment and other system operations, as well as monitoring and testing requirements. The Environmental Assessment Regulations and some contaminant-specific Regulations also have water protection as an objective (Exhibit 5.2).

5.14 *Drinking water strategy* - The Department released its new drinking water strategy in October 2002. The strategy is based on the principles of sustainability and integrated management, and the premise that everyone has a responsibility to maintain and protect the environment. It builds on current legislation and incorporates the multiple-barrier approach to ensuring drinking water safety.

5.15 The key elements identified in the strategy are the clarification of the roles and responsibilities of all stakeholders, strengthening the multiple-barrier approach to water management, and the creation of an interdepartmental drinking water management committee to implement and manage the strategy. The strategy also identifies four main challenges in managing water resources:

- continuing to protect drinking water sources;
- ensuring adequate treatment;
- ensuring the safety of small systems; and
- balancing social and economic interests.

5.16 The accompanying multi-year action plan includes activities to address some of the main components in each of the three stages of the multiple-barrier approach.

5.17 *Standards development* - There are drinking water guidelines for a number of microbiological, chemical, physical and radiological parameters. The guidelines were developed and are updated periodically by the Federal-Provincial-Territorial Committee on Drinking Water and are outlined in the publication *Guidelines for Canadian Drinking Water Quality* produced by Health Canada. The Committee meets twice each year and has been involved in the development of drinking water guidelines since its inception in 1983. It is composed of representatives of each provincial and territorial government, as well as representatives of Health Canada and Environment Canada. Officials from Health Canada act as scientific advisors to the Committee. A Department of Environment and Labour staff member sits on the Committee as the Nova Scotia representative.

5.18 The process used to develop Canadian drinking water guidelines is well established and generally follows approaches used in many other countries. The Committee revises the guidelines on a regular basis to reflect current scientific research.

5.19 Provincial Regulations require the monitoring and testing of public drinking water supplies by their owners. They establish a regime and frequency for microbiological testing and list 30 chemical and physical parameters that must also be monitored on a regular basis. Health Canada's health-based *Guidelines for Canadian Drinking Water Quality* are stated as the standard for evaluating water tests. Additional parameters for testing may be specified by the Department of Environment and Labour for a public water supply where circumstances warrant (e.g., proximity to certain industries).

5.20 In January 2001, the Sierra Legal Defense Fund published *Waterproof: Canada's Drinking Water Report Card*. The report is a survey of drinking water protection in Canada and provides an analysis of how each province fares in a number of key areas. The report was critical of the *Guidelines for Canadian Drinking Water Quality* because the guidelines do not include all of the substances included in the American *Safe Drinking Water Act* administered by the United States Environmental Protection Agency. The United States is considered to have some of the most stringent drinking water standards in the world. (Exhibit 5.3) The report also notes that some of the allowable concentration limits in Canada are higher than in the United States. In addition, the report states that no province requires that all parameters in the Canadian drinking water guidelines be monitored as part of the regulation of public drinking water supplies.

5.21 However, officials of the Department of Environment and Labour believe the Canadian guidelines are adequate and the process for determining standards is rigorous and diligent. The difference in the number of substances included in the guidelines may be due, in part, to differences in hazardous products that are allowed to be used in each country. As for requiring analysis of all parameters in the guidelines, the Department considers this to be an impractical and unnecessary measure. Many microbiological and chemical parameters would not be a risk factor for certain water supplies due to the nature of the supply, such as groundwater not under the direct influence of surface water, or the absence of certain types of industry near the watershed area.

5.22 Water treatment facilities are assigned a classification based on a point-rating scale that considers water supply source, population served and treatment methods employed, among other factors. The classification is used in determining the qualifications needed by individuals operating the systems. The Association of Boards of Certification – located in Ames, Iowa and governed by individuals from various countries – is the organization recognized by the Province for setting classification standards. The Association's activities, carried out by volunteer committees and professional staff, seek to define and maintain internationally-recognized qualifications for certification, and promote uniformity of standards and practice.

5.23 Standards for well construction, as well as certification requirements for well drillers, well diggers and pump installers, are specified in Provincial Regulations. The standards are based on input from the Well Construction Advisory Board, a Provincial body that provides advice on standards and guidelines based on practices advocated by other provinces, the well construction industry and groundwater associations. The standards for well construction materials are based on guidelines of the American Society for Testing Materials, the American Water Works Association and the National Sanitation Foundation.

5.24 Standards and guidelines set out in Provincial Regulations are reviewed periodically. The Water and Wastewater Facility Regulations were last amended in 2000. The Well Construction Regulations were last revised in 1995.

5.25 There are no Regulations or guidelines concerning the safe collection, transport and discharge of water by tank trucks to wells or storage tanks for domestic consumption. Draft guidelines were developed in 2001, but they have not yet been approved and issued. We were informed that the risks associated with bulk transportation of drinking water are borne mainly by private well owners, who are responsible for their own water quality and can mitigate the risk through testing of delivered water.

5.26 The January 2001 Sierra Legal Defense Fund report also made specific recommendations to improve water protection in Canada, including:

- filtration for all surface water supplies;
- binding standards for the design, construction and operation of water treatment and distribution facilities; and
- public reporting on water testing results and the state of water supplies.

5.27 The Department recognizes there is a need for proper treatment, such as filtration, for surface water supplies, but believes that making it a requirement without sufficient lead-time would place an undue financial burden on municipalities. The Department's approach has been to encourage and work with municipalities to bring about the needed upgrades to their systems (see paragraph 5.44). The Department considers the engineering standards specified in Nova Scotia Regulations to be sufficient for designing and building safe water treatment facilities and systems. However, it has committed, in collaboration with the other Atlantic provinces, to the development of a standards and guidelines manual for all of Atlantic Canada. Public reporting by public water supply owners is not a requirement, but the information is generally available to members of the public upon request. The Halifax Regional Water Commission and the Town of New Glasgow have produced and distributed informative water quality reports even though they are not required to do so.

5.28 *Public education* - The Department provides ongoing public education and promotion relating to drinking water quality and safety standards through its internet website; with a specific section - Clean Water Watch - dedicated to water issues. The Department also initiated a clean water week in 2000 and was involved in the promotion of National Drinking Water Week in 1999. The Department has produced brochures and booklets on drinking water safety issues, and has used the print media to deliver messages on the need for regular testing of well water. Department staff are available for consultation and attend community fairs and school events.

5.29 *Qualifications* - The Department has a staff of 73 inspectors to address its environmental monitoring and compliance responsibilities, including drinking water safety. Inspectors must have an educational background sufficient to be eligible for certification as an environmental technologist or public health inspector, but need not seek the actual certification. Approximately half of the Department's inspection staff are Certified Public Health Inspectors certified through the Canadian Institute of Public Health Inspectors. Most of the other staff are Certified Environmental Technologists belonging to the Society of Certified Engineering Technicians and Technologists of Nova Scotia, or are eligible to write exams for attaining the designation.

5.30 The Department also has five hydrogeologists on staff and expects to have two more by the end of 2002. The hydrogeologists act as resource persons and provide expertise on groundwater and wells, and assistance in investigating water contamination. The Department recently hired two watershed planners, a drinking water supervisor, a water monitoring technician, a water treatment facilities specialist, a facilities engineer, and a GIS/database management specialist.

5.31 As discussed in paragraph 5.22, water treatment and distribution systems are classified based on criteria such as water treatment methods and population served. Persons responsible for operating such systems must be certified for the classification level of the system. The higher the classification, the more education and/or experience required by the operator. Qualification and certification standards for operators are determined by the Association of Boards of Certification and incorporated into Provincial Regulations. The Association provides certification exams and marks the results. The Department administers the exams on the Association's behalf for individuals seeking certification in Nova Scotia.

5.32 Well drilling and digging practices and qualifications are administered by the Well Construction Advisory Board and monitored by the Department through periodic inspection. To carry out well construction, well drillers and diggers must be licensed through the Department and comply with the Well Construction Regulations. They must meet certain requirements to be licensed and must renew their licences annually. The Department encourages the public, through publications and other public pronouncements, to ensure well drillers and diggers are licensed before hiring them to construct a well.

5.33 In 2001 the Department developed a policy on the use of accredited laboratories for water testing. Effective January 1, 2002, all analytical testing for chemical contamination required for public water supplies is to be conducted by accredited laboratory facilities or facilities maintaining an acceptable standard in a proficiency testing program. Laboratories have until January 1, 2003 to achieve accreditation for testing for microbiological contamination.

5.34 Certification and proficiency testing of laboratories is carried out by the Canadian Association for Environmental Analytical Laboratories, under agreement with the Standards Council of Canada. The Association certifies that laboratories meet specified standards and it conducts periodic audits to ensure continued compliance.

5.35 We were informed that Nova Scotia laboratories, where applicable, have achieved the required certification for chemical analysis and all laboratories are working toward completion of requirements for certification for microbiological analysis. However, completion of the certification process for most of the public laboratories (hospitals) has been delayed and is not likely to be completed within the time frame specified in the policy. The Department and hospital laboratories have been exploring other options to ensure testing standards are met during the time it takes to have the laboratories certified.

5.36 The Department prepared Memorandums of Understanding outlining the respective responsibilities of laboratories and the Department with respect to water testing. All of the laboratories have signed a Memorandum.

5.37 *Training* - Newly hired inspection staff at the Department of Environment and Labour receive training in their job responsibilities by accompanying an experienced inspector on a variety of inspections. This 'on-the-job' training generally takes several weeks. Other training is provided to inspection staff, as required, through in-house and external facilities. The annual performance appraisal process also provides an opportunity for staff and management to establish training needs as individual goals for the year.

5.38 Currently, there is no requirement for continuing training for certified water system operators, although such training is encouraged. However, the Department has drafted revisions to the certification requirements that would have operator certificates expire three years from the date of issue. Operators would be eligible for recertification by accumulating acceptable training and experience during the three years, or be required to rewrite the certification exam. The revised standards are in draft form and await finalization of plans for the implementation process.

5.39 There is no mandatory ongoing training for well drillers and diggers, but opportunities are available through the Nova Scotia Groundwater Association and the Canadian Ground Water Association. The Department has been working with the Nova Scotia Groundwater Association to develop a mechanism to provide funding for training, education and upgrading of operators in the industry.

Compliance

5.40 *Background* - The Department has a broad mandate under the Environment Act and associated Regulations, which includes the protection of drinking water supplies. As well, sections of other legislation (Health Act and Municipal Government Act) govern matters relating to drinking water. Although the Department of Environment and Labour is the lead agency in ensuring compliance with legislation pertaining to drinking water safety, there are roles and responsibilities defined for other Provincial departments and the Federal government, as well as public and private water supply owners.

5.41 *Municipal water supplies* - There are 82 municipal water systems in the Province. The operation of a municipal water treatment or distribution facility requires the approval of the Minister of Environment and Labour. An application for approval must be supported by documentation describing the facility. Department engineers classify the facility according to the rating system set out in Regulations and perform a technical review to ensure the proposed system adheres to the Department's standards, policies and guidelines. If all criteria are met an approval is issued, generally for a ten-year term, renewable upon application by the owner.

5.42 The approval for a new municipal water system lists any terms and conditions the applicant must satisfy, such as specific monitoring requirements and preparation of a contingency plan. Monitoring requirements may be more stringent than the minimum level of testing provided for in Provincial guidelines. Each facility has its own particular set of circumstances, such as geographic location and nearby industries, and testing requirements may be adjusted to reflect these. Municipal water supply operators must do microbiological testing weekly, if not more frequently, and many have a chemical analysis performed every six months. Operators are required to submit a monthly report to the Department outlining the results of testing.

5.43 It is the responsibility of each municipality to have a contingency plan in place to respond to emergencies such as chlorination failure and power outages. As well, there must be a strategy to communicate disruptions to the public and the Department.

5.44 As part of its new water strategy, the Department has identified the need for a review of municipal water system approvals. It has developed an implementation plan which will result in a new or updated 'Approval to Operate' issued to all municipal water systems to verify that they provide the best quality water product. The plan includes advising the municipalities of the requirement to complete a source water assessment report from which a comprehensive treatment and operational strategy is to be developed. It is anticipated that it will take six years before all construction is completed and operational systems are in place. The review process will also result in minimum levels of treatment for source water. The minimum level of treatment for surface water, and groundwater under the influence of surface water, will be filtration and disinfection. The minimum level of treatment for groundwater will be disinfection.

5.45 We obtained a listing of municipal water supplies including facility and operator classifications. We noted 13 facilities where the operator classification was at a level lower than the facility classification. We were informed that a number of the municipalities have had recent upgrades to systems, but there has been insufficient time for operators to achieve the higher certification level. In February 2002, the Department contacted each municipality where there was such a discrepancy, requesting an action plan to address the deficiency. The Department will be following up during its review of municipal water system approvals.

5.46 *Registered water supplies* - Effective October 2000, public drinking water supplies other than municipal systems must be registered with the Department. Regulations stipulate criteria for determining which supplies must be registered. Public water supply owners must complete a

registration form and provide details about the water system, such as the number of connections and the population served. The information is entered into the Department's registered water supply database and a letter is sent to the owner noting the assigned registration number and summarizing the owner's responsibilities as a provider of drinking water to the public. Owners are also provided with an information package including the Province's *Guidelines for Monitoring Public Drinking Water Supplies*.

5.47 The Department estimates there are approximately 1,800 public drinking water supplies requiring registration and implementation of a water quality monitoring program. To handle the volume and ensure all required supplies are registered, the Department employed a phased approach based on risk. Public water supplies were classified into four groups, with group one including supplies deemed to be of higher risk (e.g., schools, day care centres, hospitals, nursing homes) and group four for lower risk supplies, such as campgrounds. The Department focused on registering the higher risk supplies before moving on to the other groups. The Department originally estimated that it would have all public water supplies registered by October 1, 2002. As of November 5, 2002, approximately two years after the regulatory requirement for registration was approved, there were 1,512 supplies registered.

5.48 Registered water supply owners are required to take a water sample every three months for microbiological testing. Chemical analysis of water is required every one or two years, depending on the water's source. Water supplies in each registration group were assigned a different monitoring period in order to smooth the workload of laboratories and Department staff.

5.49 To ensure all public drinking water supply owners complete the registration process, the Department, in cooperation with other government departments such as Health and Community Services, and industry organizations such as the Retail Gasoline Dealers Association, sent letters to owners informing them of the change in the Regulations and the requirement to register water supplies. The Department also provided information sessions for various affected groups and used the print media to inform the public of the new Regulations and registration requirements.

5.50 *Monitoring and inspections* - The Department has committed to auditing each of the 82 municipal water systems in the Province at least twice a year. Audits are unannounced and the length of the audit will vary depending on the complexity of the system and type of review conducted. Audits may involve water testing only or include an extensive review of the entire waterworks system.

5.51 We examined a sample of files to determine if the Department's monitoring and audit systems were operating effectively to provide for compliance with water safety requirements outlined in legislation, regulations and policies. We were able to examine audits of municipal water supplies, but not audits of registered water supplies. The Department has performed over 360 inspections of registered water supplies because of the presence of contamination and the issuance of boil water advisories, but there have not yet been any audits because registration is still in progress.

5.52 We have a number of observations to report from our testing of municipal supply audits. We selected 60 municipal water supplies and reviewed the related audit files for the 2001 calendar year. We noted that semi-annual audits were carried out at 56 of the facilities. Only one audit was carried out during the year at the other 4 facilities. This was explained to us as the result of misinterpretation of Departmental policy. At all 60 facilities there was evidence of weekly microbiological testing and at least annual chemical analysis.

5.53 We observed that most of the audits involved water sampling only. When a more detailed audit was carried out and an audit report prepared, we could not determine the extent of the audit

work performed. The audit form used by the Department did not provide details on how an audit should be performed.

5.54 When we returned in October 2002 to follow up on some of our audit findings, we found that the Department had developed an audit checklist for waterworks systems and used it for audits carried out in the summer of 2002. We were told that inspection staff were to complete only certain sections of the checklist because of the type of review being carried out in 2002 (i.e., water sampling). We remained concerned that audits of municipal water supplies were not very comprehensive. However, we found that the Department had introduced guidelines for scheduling and determining the extent of audits based on a risk assessment evaluation process. Also, there are plans for complete reassessments of all municipal water supplies starting in the fall of 2002, as described in paragraph 5.44.

5.55 We also noted that documentation such as laboratory reports was missing from some of the files, and inconsistency among the regional offices in the manner in which files were organized and maintained. Also, there was minimal review of the quality of audit documentation by management. During our follow-up visit, we noted that the Department was finalizing a policy on preparing and tracking files, and that periodic reviews by management of the quality of audit documentation will be required.

5.56 As noted in paragraph 5.51, the Department is still in the process of registering non-municipal public drinking water supplies and no audits have yet been performed for these supplies. However, owners are still required to perform quarterly sampling as set out in Provincial guidelines. Department officials indicated they could rely on being notified by a laboratory if a registered water supplier was not submitting quarterly samples or if a sample came from a supplier that was not registered.

5.57 The Department expects to begin auditing registered supplies early in 2003. It is planning to coordinate its efforts with other government inspection programs to maximize efficiency. For example, food safety inspectors with the Department of Agriculture and Fisheries, as part of their existing mandate, check that a food service establishment with its own water supply has registered and is testing its supply. Inspectors can also take a water sample for analysis.

5.58 We believe, however, that there has been insufficient planning relating to the compliance monitoring process for registered water supplies. The Department has not yet formally determined and documented how it will carry out the audits, including the procedures and forms to be used. It has not prepared an analysis of how audits of registered supplies will be allocated among the various departments and whether there are sufficient resources available to do the work. The Department has not adequately considered how it will ensure other departments' inspectors are providing adequate compliance monitoring coverage.

> ***Recommendation 5.1***
>
> *We recommend that the Department develop audit procedures and forms, study resource issues, establish coordination mechanisms and implement quality control standards for the audit of registered water supplies.*

5.59 *Boil water advisories* - Since October 2000, public water supply owners have been fully accountable for the safety of their waterworks systems. Public water supply owners and operators have been informed of their responsibilities, which include a quick response to any deficiency in the water system. The Department has developed a coordinated approach to ensure boil water advisories are initiated in an appropriate and timely manner. The Province's *Guidelines for*

Monitoring Public Drinking Water Supplies include a list of deficiencies that would require a boil water advisory (Exhibit 5.4), an advisory protocol, a suggested communication plan, and information on when an advisory can be removed. The Department must be notified of any cases of drinking water contamination on boil water advisories issued. Only the Department can remove an advisory once it has been initiated.

5.60 If an emergency occurs outside of regular business hours, the Department can be contacted through a 1-800 number. Inspectors are 'on call' 24 hours a day, on a rotational basis, to respond to emergency calls. Laboratories are required to notify the Department, in addition to the water supply owner, when a water sample analysis indicates the presence of microbiological contamination - a *positive test result*. The Department is to notify and coordinate with medical officers of the Department of Health in such situations.

5.61 When a laboratory or supply owner notifies the Department of a positive test result, the information is recorded and an investigation commences. Depending on the results of the test, a boil water advisory may or may not be issued immediately. For example, if a water sample test shows positive results for fecal coliform bacteria, a boil water advisory is issued immediately. However, if the test shows positive results for total coliform bacteria only, a second water sample is taken because the positive test result may have been due to improper sampling. If the second test is also positive, a boil water advisory is issued. An advisory is not removed by the Department until remedial action is taken, such as flushing the system with chlorine, and there have been two consecutive days with negative test results.

5.62 During our examination of municipal water system audit files, we noted where positive test results had occurred and determined whether follow-up water testing was performed as required by Provincial guidelines. We noted 55 cases where positive results for total coliform bacteria were found, of which 50 were followed up with a second water sample. There was no documentation in the files describing why follow-up samples were not taken for the other five positive test results. Of the 50 that were followed up, we could not find the laboratory results for eight of the follow-up samples. Among the 55 cases we examined, there were 11 where boil water advisories were issued. We noted that required procedures were followed in each situation where a boil water advisory was issued.

5.63 The Department has implemented a system to record boil water advisories issued (Exhibit 5.5) and removed. We reviewed files for registered (non-municipal) water supplies where boil water advisories had occurred during calendar year 2001. We found that the boil water advisory procedures were followed, although in some cases copies of laboratory test results or other supporting documentation were not in the file. We also noted two cases where the removal of the boil water advisory was not documented in the file. Documentation was subsequently obtained for one of the cases. In the other case, we were informed that the lifting of the advisory had been communicated verbally and Department records were not updated.

> ***Recommendation 5.2***
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> *We recommend that Departmental requirements for the documentation and follow up of boil water advisories be complied with.*

5.64 *Private drinking water supplies* - Responsibility for ensuring safe drinking water from private supplies, mostly wells, rests with the supply owners. Well drillers and diggers are required to submit a report to the Department on each well constructed. Details from the reports are entered into a database of all wells constructed in the Province. Department inspectors may inspect a well on private property in the course of inspection of an on-site sewage system, upon

complaint of inadequate well construction, or in response to a report of contamination from a source outside of the owner's property.

5.65 *Complaints* - The Department has a process to record and investigate environmental complaints, including those relating to drinking water. A file is set up for each complaint unless the complaint relates to a matter where a file already exists. The type and extent of follow up by an inspector is dependent on the nature of the complaint. The Department is developing a file tracking system which will permit monitoring of the follow up of complaints.

Enforcement

5.66 *Roles and responsibilities* - Responsibility for the enforcement of drinking water safety is clearly set out in legislation and regulations, as well as in policy directives and guidelines issued by the Department to staff. Documented roles and responsibilities are consistent with relevant legislation and appropriately referenced to the Environment Act and Regulations. Policies and guidelines are issued to staff as developed, and the Department is finalizing an investigation reference manual for inspectors.

5.67 *Enforcement procedures* - The Department's operational bulletin on law enforcement sets out the parameters for enforcement actions. Although primary authority for enforcement is derived from the Environment Act, inspectors are also appointed as special constables under the Police Act. Where there has been a breach of legislation or regulations concerning drinking water safety, a warning or summary offence ticket can be issued; a Ministerial order can be issued to stop, prevent or require certain actions; or prosecution can be pursued.

5.68 The decision to take enforcement action begins with the inspector. The inspector considers a number of factors, such as the seriousness of the violation, the compliance history of the operator and the type of enforcement which will be most effective. The decision to pursue a Ministerial order or prosecute requires involvement of Department management. If a decision is made to prosecute, sufficient evidence must be gathered and discussed with a Crown prosecutor.

5.69 The Department recently acquired the ability to issue summary offence tickets for offences relating to public drinking water. It already had this ability for certain other violations of the Environment Act and Regulations. Fines for non-compliance are generally $675 per infraction.

5.70 At the time of our audit, the Department was changing the role and emphasis of its inspectors with regard to enforcement. Previously, inspectors performed a number of roles including consultation, education, inspection, sampling and enforcement. With such varied responsibilities, there was less emphasis on enforcement. This approach was not always appropriate when enforcement action was required. Prior inspector assistance in the form of consultation could later lead to difficulties obtaining sufficient evidence for prosecution.

5.71 The new approach emphasizes monitoring and compliance. Site visits are carried out only in the course of an inspection or audit. If the inspection or audit indicates there are no compliance violations, the assignment is complete. The inspector is not there for consultation or other services. If a compliance violation is noted, the inspector documents the violation and obtains evidence.

5.72 *Managing workloads* - The Department has initiated a formal status reporting process. Inspectors complete a weekly status report in cases where an enforcement action has occurred or there are other significant issues. The reports are reviewed by managers, compiled and forwarded monthly to head office for information purposes.

5.73 The Department maintains a database including a module for environmental registration and approvals information. The database also records enforcement information such as the name of the offender, location, type of violation, status, case outcome and fines levied. We concluded that appropriate data is being captured by the system, but the system does not have the ability to generate complete, comprehensive status reports on enforcement activities by year, by region or by type of action.

> ***Recommendation 5.3***
>
> *We recommend that the Department upgrade the reporting function of its environmental registration and approvals system so that it can provide all of the types of information helpful for monitoring enforcement activities.*

5.74 *Appeals* - Specific appeal procedures are provided in the Environment Act. A decision or order from Department staff can be appealed to the Minister of Environment and Labour by notice in writing. Other appeals are made directly to the Supreme Court of Nova Scotia.

CONCLUDING REMARKS

5.75 The Department has good processes for developing and promulgating standards for safe drinking water and ensuring appropriate qualifications for individuals with responsibilities relating to safe drinking water.

5.76 There have been no audits of registered water supplies to date and audits of municipal water supplies have not been comprehensive during the last two years. The Department has suitable plans for improving its monitoring and audit of municipal water supplies, but needs to put more effort into planning for the monitoring and auditing of registered water supplies.

5.77 The Department has satisfactory systems for pursuing infractions of Provincial legislation and regulations relating to drinking water safety.

Exhibit 5.1

AUDIT CRITERIA

Audit criteria are reasonable and attainable standards of performance and control, against which the adequacy of systems and practices can be assessed. They relate to the audit objectives developed for an assignment and are used to design detailed tests and procedures.

The following criteria were used in our audit of the Nova Scotia drinking water safety system.

Standards and qualifications - There should be sufficient knowledge to determine where drinking water safety standards are in need of development or change. There should be systems and procedures in place to develop appropriate safety standards on a timely basis. There should be ongoing public education and promotion of safety standards. Personnel should have appropriate education and qualifications to administer the laws for which they are responsible. Changes to legislation, regulations and policies should be communicated to personnel on a timely basis. There should be a process to ensure personnel receive ongoing training in drinking water safety standards and technologies and other relevant areas.

Compliance with legislation - There should be compliance with applicable provisions of Provincial drinking water safety legislation and regulations. Policies should be consistent with legislation and regulations. There should be a process which enables management to know whether or not key provisions of legislation and regulations are being complied with. There should be a system to ensure that monitoring, inspections and other activities are carried out on a regular and timely basis. There should be a system to follow up on the implementation of inspection recommendations.

Enforcement of the Act and Regulations - There should be a system to ensure Provincial legislation and regulations are appropriately enforced. Authorities, roles and responsibility for enforcement of legislation and regulations should be clear.

Exhibit 5.2

LEGISLATION AND REGULATIONS IMPACTING ON DRINKING WATER SAFETY

Environment Act

- Activities Designation Regulations
- Water and Wastewater Facility Regulations
- Well Construction Regulations
- Emergency Spill Regulations
- Environmental Assessment Regulations
- On-site Sewage Disposal Systems Regulations
- Pesticide Regulations
- Petroleum Management Regulations
- Sulphide Bearing Material Disposal Regulations
- Dangerous Goods Management Regulations
- Solid Waste Resource Management Regulations

Water Resources Protection Act

Health Act

Municipal Government Act

- Statements of Provincial Interest

Exhibit 5.3

COMPARISON OF STANDARDS FOR SELECTED PARAMETERS

Parameter	Standards				
	Canada	US EPA	EU	WHO *c*	UK
Bacteria					
E. Coli	0 per 100 ml	0 per 100 ml	0 per 100 ml	(1)	0 per 100 ml
Fecal Coliforms	0 per 100 ml	not detected	0 per 100 ml	(1)	0 per 100 ml
Total Coliforms	0 per 100 ml (2)	(3)	0 per 100 ml	(1)	0 per 100 ml
Chemicals					
Antimony	0.006 mg/l	0.006 mg/l	0.005 mg/l	0.005 mg/l	0.01 mg/l
Arsenic	0.025 mg/l	0.010 mg/l	0.01 mg/l	0.01 mg/l	0.05 mg/l
Boron	5 mg/l	-	1 mg/l	0.5 mg/l	2 mg/l
Fluoride	1.5 mg/l	4.0 mg/l	1.5 mg/l	1.5 mg/l	1.5 mg/l
Nitrate	10 mg/l	10 mg/l	50 mg/l	50 mg/l	50 mg/l
Selenium	0.01 mg/l	0.05 mg/l	0.01 mg/l	0.01 mg/l	0.01 mg/l
Metals					
Aluminum	0.1 to 0.2 mg/l (7)	0.05 to 0.2 mg/l *b*	0.2 mg/l	< 0.2 mg/l	0.2 mg/l
Barium	1 mg/l	2 mg/l	-	0.7 mg/l	1 mg/l
Cadmium	0.005 mg/l	0.005 mg/l	0.005 mg/l	0.003 mg/l	0.005 mg/l
Chromium	0.05 mg/l	0.1 mg/l	0.05 mg/l	0.05 mg/l	0.05 mg/l
Copper	≤ 1.0 mg/l	TT (6)	2 mg/l	2 mg/l	3 mg/l
Iron	≤ 0.3 mg/l *a*	0.3 mg/l *b*	0.2 mg/l	0.3 mg/l	0.2 mg/l
Lead	0.01 mg/l	TT (6)	0.01 mg/l	0.01 mg/l	0.05 mg/l
Manganese	≤ 0.05 mg/l *a*	0.05 mg/l *b*	0.05 mg/l	0.05 mg/l	0.05 mg/l
Uranium	0.02 mg/l	30 ug/l	-	0.002 mg/l	-
Zinc	≤ 5 mg/l *a*	5 mg/l *b*	-	3 mg/l	5 mg/l
Appearance and Taste					
Color	15 TCU *a*	15 color units *b*	(4)	15 TCU	20 mg/ lPt/Co scale
pH	6.5 - 8.5 *a*	6.5 - 8.5 *b*	-	(5)	5.5 - 9.5
Turbidity	1 NTU	TT	(4)	5 NTU	4 FTU

Exhibit 5.3 (Cont'd)

Notes:

(1) Must not be detectable in any 100 ml sample
(2) No sample should contain more than 10 total coliform organisms per 100 ml. Not more than 10% of the samples based on a minimum of 10 samples should show the presence of coliform organisms
(3) No more than 5% samples total coliform-positive in a month
(4) Acceptable to consumers and no abnormal change
(5) No health-based guidelines set, preferably <8.0 for effective disinfection with chlorine
(6) Lead and copper are regulated by a treatment technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/l, and for lead is 0.015 mg/l
(7) No health-based guidelines set, operational guidance values only

a = Aesthetic objective
b = US secondary drinking water regulation that is a non-enforceable federal guideline regarding cosmetic or aesthetic effects
c = WHO standards are guidelines and not enforced

mg/l = milligrams per litre
FTU = Formazin Turbidity Units
NTU = Nephelometric Turbidity Unit
TCU = True Color Unit
TT = Treatment Technique (a required process intended to reduce the level of a contaminant in drinking water)

The table compares the drinking water quality standards set out in:

- *Guidelines for Canadian Drinking Water Quality - April 2002*
- *United States Environment Protection Agency (US EPA) Drinking Water Standards and Health Advisories - July 2002*
- *European Union (EU) Council Directive on the Quality of Water Intended for Human Consumption (98/83/EC) - 1998*
- *World Health Organization (WHO) Guidelines for Drinking Water Quality 1998*
- *United Kingdom (UK) The Water Supply (Water Quality) Regulations 1989 (as amended to 1999)*

Exhibit 5.4

DEPARTMENTAL GUIDELINES FOR MONITORING PUBLIC DRINKING WATER SUPPLIES

Deficiencies That Require a Boil Water Advisory

1) Water that does not meet the Guidelines for Canadian Drinking Water Quality requirements for bacteriological quality;

2) Lack of disinfection (equipment breakdown, emergency water supply from unchlorinated source etc.), failure of key water treatment process, or loss of pressure;

3) Fecal contamination of drinking water evidenced by fecal coliform positive samples;

4) Suspected cross connection or negative pressure;

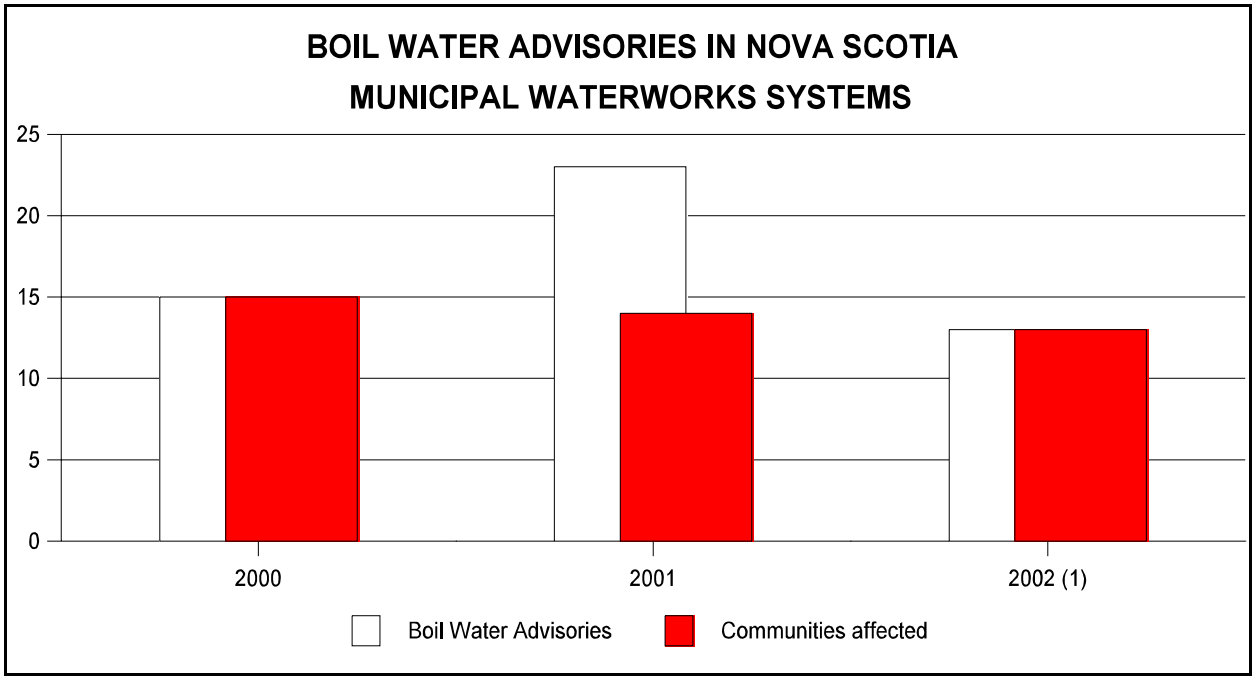
5) Ineffective disinfection due to high turbidity, temporary equipment malfunctions, high chlorine demand, etc. evidenced by coliform positive water leaving the treatment plant and generally poor bacteriological water quality;

6) Other circumstances which in the opinion of the Department or the medical officer constitutes a risk to public health (e.g. Giardia, Cryptosporidium contamination, etc.);

7) Evidence of outbreak of waterborne illness (the risk to young children, elderly and immuno-compromised people should be considered in a decision); or

8) A serious incidence of raw water contamination.

Exhibit 5.5



(1) Data for January to September 2002

DEPARTMENT OF ENVIRONMENT AND LABOUR'S RESPONSE

General Comments

The Department recognizes the audit findings that show there are good provincial processes in place for drinking water systems including: developing and promulgating standards; certifying operators; inspecting and monitoring activities; and enforcing compliance with the legislative framework. Nova Scotia's record of continuous improvement in water quality protection is reflected in these findings.

The Department acknowledges the three recommendations of the auditor's report for improving drinking water safety even further:

We recommend that the Department develop audit procedures and forms, study resource issues, establish coordination mechanisms, and implement quality control standards for the audit of registered water supplies. (Recommendation 5.1)

We recommend that Departmental requirements for the documentation and follow up of boil water advisories be complied with. (Recommendation 5.2)

We recommend that the Department upgrade the reporting function of its environmental registration and approvals system so it can provide all of the types of information helpful for monitoring enforcement activities. (Recommendation 5.3)

Initiatives are already underway to address the issues reflected in the recommendations, from inspection checklists to auditing systems to documentation procedures. We provide the following information and updates on the issues raised as a result of the broad scope audit.

Standards and Qualifications

5.20

The Sierra Legal Defense Fund publication Waterproof: Canada's Drinking Water Report Card was critical of the Guidelines for Canadian Drinking Water Quality not including all of the substances in the American Safe Drinking Water Act. However, as the auditor indicates in 5.21, the Canadian standards are appropriately rigorous without the inclusion of substances that are an issue in the United States, but not found or used to the same extent in this country.

Canada and the United States basically work with the same data set of health-related information, but develop guidelines or standards that are slightly different. The Guidelines for Canadian Drinking Water Quality (GCDWQ) provide limits for twenty-one substances that the US Environmental Protection Agency and the World Health Organization do not include. The GCDWQ also have a much more extensive list of parameters than most other countries for radioactive parameters.

5.6 (second bullet) and 5.25

Draft guidelines for trucks collecting, transporting and discharging water for domestic consumption have been developed, but are not yet approved and issued. Guidelines are a priority item, and are

on the agenda for the first meeting of the Inter-Departmental Drinking Water Management Committee (established under the new Drinking Water Strategy for Nova Scotia).

5.27

Public reporting by public water supply owners is not mandatory, as in Ontario or the United States, but is generally available to members of the public. In addition, the Department sent a letter in August of 2001 urging municipal utilities to adopt policies on sharing water quality related data. A policy and position statement from the Canadian Water and Wastewater Association was provided, which advocated the sharing of water quality related data through annual reports. Several utilities are providing this information to their customers, thereby showing themselves to be open and accountable for their actions.

5.30

Staffing levels have been increased to address the requirements of the departmental drinking water program. The Department has five hydrogeologists, and expects to hire two more by the end of 2002. Also, as indicated in A Drinking Water Strategy for Nova Scotia, the Department has recently hired two watershed planners, a drinking water supervisor, a water monitoring technician, a water treatment facilities specialist, a facilities engineer, a GIS/Database Management Specialist. Four inspectors were also hired in the fall of 2001.

5.35

The certification process for most of the public laboratories at hospitals that conduct bacteriological analyses of water samples has been delayed. However, the Department is committed to working with the hospital laboratories to achieve certification, as they provide good public access, have years of experience, and are still responsible to notify the Department of any positive test results. The Department and hospital laboratories will work cooperatively to complete the certification process in 2003.

5.38

Continued training for water system operators is not mandatory at this time. However, as indicated by the auditor, revised Department standards have been drafted which will require re-certification of operators every three years. Municipalities are cooperating to achieve operator training standards. Implementation of the new standards will be coordinated with the establishment of new or updated approvals for municipal water systems (as described by the auditor in 5.44).

Compliance

5.45

Municipal water supply operator classifications must match their facility classifications. As indicated by the auditor, municipalities have been asked to address known deficiencies in operator certification levels. As new or updated approvals for municipal water systems are established (described in 5.44), the Department will confirm appropriate operator classifications requirements are met.

5.6 (bullet 4) and 5.47

The target date for registration of all non-municipal public drinking water supplies was October 2002. This target date was a reasonable estimate as the total number of supplies was unknown. During the past two years, department staff have worked with groups to identify and register public drinking water supplies. As of 5 November 2002, 1512 public drinking water supplies have been registered, representing eighty-four percent of the estimated 1800 public supplies.

As most public drinking water supplies have now been identified and registered, regional staff are moving from a voluntary compliance phase into the mandatory compliance phase. Enforcement tools such as Summary Offence Tickets, Long Form Informations, or Ministerial Orders will be issued to enforce registration requirements of the Water and Wastewater Facility Regulations.

5.6 (bullet 5), 5.51 and 5.56

An audit is a comprehensive evaluation of a regulated facility to determine if the entire operation is in compliance over an extended period of time with terms, conditions and regulatory standards prescribed in an approval or departmental legislation. The Department consciously allocated resources to the registration of public drinking water supplies, and the immediate inspections generated with the initiation of the registration process. The auditing function of the department begins after the initial phases of registration and inspection. The details of that process, which will include risk assessment evaluations, are under development and will be implemented in 2003.

5.6 (bullet 6), 5.52, 5.62 and 5.63

Of sixty municipal water supplies reviewed by the auditor, fifty-six were audited twice in 2001. A misinterpretation by staff of the new procedure led to four facilities receiving one audit. In 2002, all municipal water systems were audited twice.

Continuous improvements to file tracking, boil water advisory procedures, and periodic audits will occur. The Department has established a file tracking policy. Staff are currently evaluating file tracking systems in three of four regions within the province to track complaints, inquiries and investigations. The most suitable tracking system will be chosen and used in all regions as per the monitoring commitment in the Drinking Water Strategy. In addition, four positions for compliance staff will be established by June 2003. These inspectors will be assigned to each of the regional offices to coordinate the tracking of files.

In addition, supporting information technology will enhance compliance tracking. The departmental Environmental Information Management Access System (EIMAS) is used to record and track approvals for activities and facilities such as municipal water treatment plants. As this computerized system becomes fully operational in all regions, auditing and enforcement actions are easier to schedule and monitor.

5.53 and 5.54

Forms and procedures used for municipal water system audits have been revised as indicated by the auditor in 5.54. In addition, a departmental risk assessment process is underway which evaluates systems based on categories such as watershed protection levels, discharges, treatment levels, monitoring frequencies, and compliance records. Risk assessments are used to determine the appropriate comprehensiveness of audits.

5.55

Consistency of file organization and maintenance will improve under the new file tracking policy and system (see 5.52). A review of documentation quality is built into the file tracking systems under evaluation. Files assigned to each inspector will be reviewed by supervisors on a short-term periodic basis to facilitate handling in a timely manner.

5.6 (bullet 5), 5.57 and 5.58
The Department is investigating options for auditing a sample of all registered supplies annually in coordination with other government departments.

Provincial food safety inspectors do, and will continue to, check that a food service establishment with its own water supply has registered and is testing its supply each year. We are piloting an operational agreement to ensure that the Department is informed of annual water tests. In addition, the Department has worked with tourism department staff regarding public drinking water supplies associated with tourism establishments. In the course of their duties, tourism staff will identify any establishments which have not completed water tests and inform environmental inspectors.

With the release of the Drinking Water Strategy in October 2002, an interdepartmental committee on drinking water has been established. This committee has the mandate to coordinate governmental activities on drinking water. The issues identified by the auditor will be addressed in 2003.

Enforcement

5.73
The departmental Environmental Information Management Access System (EIMAS) is used to record and track approvals for activities and facilities such as municipal water treatment plants. As all regional staff become fully versed in this computerized system, auditing and enforcement actions are easier to schedule and monitor. The system has the capability to provide comprehensive summary reports. Once enhanced staff training is completed over the coming months, staff will be able to produce reports consistent with the auditor's recommendations.