



**Report and Advice on
Ontario Regulation 170/03
Smaller, Private Systems
Review and Recommendations**

*Prepared for the Honourable Leona Dombrowsky
Minister of the Environment*

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Executive Summary

In May 2004, The Honourable Leona Dombrowsky, Minister of the Environment, established the Advisory Council on Drinking Water Quality and Testing Standards (Council) and asked for recommendations regarding the province's drinking water standards and related measures that may be needed to improve the safety and quality of Ontario's drinking water supply.

On June 30, 2004, Minister Dombrowsky specifically asked the Council to provide advice on the Drinking Water Systems Regulation (O. Reg.170/03) ("Regulation" for the purposes of this report) with respect to the appropriateness of requirements for small water systems, and particularly private ones, keeping in mind the province's commitment to implement all of Commissioner O'Connor's recommendations. The *Safe Drinking Water Act*, the Regulation, and other regulations were developed to address those recommendations.

The Council, with the assistance of an internal working group, undertook an initial review and concluded that the Regulation, as it applies to smaller and private systems, is considered to be costly and complex. Although the Ministry of the Environment (MOE) is targeting information to specific groups, the Regulation is not well understood by the regulated community.

Therefore, the Council needed to gain a broader understanding of the range of issues arising from the Regulation as it relates to smaller, private systems, and its potential implications for affected and interested parties, before providing recommendations to the Minister. The Council also felt it needed more information on the health risks posed by small systems.

In its review, the Council examined the Regulation from a variety of perspectives, including:

- A review of the Walkerton Reports and discussions with people who participated in the development of the Part Two report. Particular attention was given to Chapter 14, Small Drinking Water Systems and the Recommendations in this Chapter.
- An extensive Consultation Process where Council members heard from over 120 presenters in 12 locations. In addition, the Council received over 100 written submissions. The Council heard a wide range of concerns with the Regulation and a number of suggestions for improvement.
- The Council collected information on how other jurisdictions and countries were endeavoring to enhance and regulate the safety of drinking water provided by small communal systems and systems that provide water to the public.
- The Council also heard from experts in the drinking water field in addition to the expert knowledge of the Council's own members. A number of actual cases of drinking water contamination were analyzed.

After this careful review of the current Regulation as it applies to smaller, private systems, the Council has concluded the problems with the Regulation cannot be remedied through specific changes to the current Regulation.

The Council found that the Regulation seemed to be effective for larger systems serving larger communities and even for larger private operations that had the scale and revenue base and size of business to manage the complexities of the Regulation and install and operate treatment systems. Very small services such as bed and breakfast operations, church and community centres, small lodges, camps and cabins, trailer parks, seasonal operations and a wide range small businesses did not have the resources, knowledge or skills to be able to follow or comply with the type of regulatory structure as set out in the Regulation. The Council believes that the approach it is recommending will ensure that small systems are robust with respect to the provision of safe drinking water.

As such the Council finds that an alternative approach is needed for these smaller systems. The basic drinking water quality standards and level of safety should not be reduced. However, they can be better implemented through an approach that addresses the capacities and abilities of the small service owners and operators

Through the development of a new regulation, under the Safe Drinking Water Act, the Public Health Units would be empowered to allow them to administer safe drinking water programs for these smaller systems.

The Council's recommended approach consists of the following key elements:

- **A risk-based, site-specific approach for 5 of the 8 “Categories of System” under Regulation 170/03, which include: Large Municipal Non-Residential, Small Municipal Non-Residential, Non-Municipal Seasonal Residential, Large Non-Municipal Non-Residential, and Small Non-Municipal Non-Residential; as well as any Designated Facilities within these 5 categories**
- **The remaining 3 categories under Regulation 170/03, which include: Large Municipal Residential, Small Municipal Residential, and Non-Municipal Year-Round Residential, are to continue to be regulated under the current Regulation 170/03**
- **Risk-based, site-specific approach to be outcome-based, anchored by compliance with the Ontario Drinking Water Quality Standards**
- **Transfer of responsibility to Public Health Units to administer the safe drinking water programs for all commercial and institutional systems that serve the public**
- **Extension of the provincial grant program to assist local municipalities in providing assistance to Non-Municipal, Year-Round Residential systems**

Additional recommendations are included in this report, and can be found in the “Summary of Recommendations” section.

The Council believes that implementation of its recommendations will help Ontario ensure that its drinking water meets the dual objective of placing the highest priority on health and safety, while ensuring that implementation is timely, effective and clearly understood by all involved.

Introduction and Issues

On June 30, 2004, the Minister of the Environment asked the Advisory Council on Drinking Water Quality and Testing Standards (Council) to provide advice on the Drinking-Water Systems Regulation (O. Reg. 170/03) (“Regulation” for the purposes of this report) with respect to the appropriateness of requirements for small water systems, and particularly private ones.

The government of Ontario has committed to implement all of Commissioner O'Connor's recommendations and the *Safe Drinking Water Act*, the Regulation, and other regulations were developed to address those recommendations.

However, the Regulation, as it applies to smaller and private systems, is considered to be costly, complex and not well understood by the regulated community. These factors, and the resulting inconsistent interpretations, may lead to either non-compliance or a withdrawal of service to the public. In either case, the quality of drinking water to consumers could be compromised.

The Ministry of the Environment (MOE) has made efforts to explain the regulatory requirements by targeting information papers to specific groups. However, greater efforts are needed to directly reach the regulated community, which are not represented by formal associations that generally assist in distributing and sharing information and advice. As well, regulated individuals need a point of contact in order to get consistent advice and support.

It has been determined that in developing the Regulation there has only been a limited assessment of the risk to public health, in regards to smaller and private water systems.

It has also been determined that there has been little research into how other jurisdictions have addressed risk for these types of systems.

The Part Two Walkerton Inquiry report made several recommendations with respect to small systems. However, these recommendations need to be reassessed, due to inconsistencies in interpretation.

The issues identified above have guided the Council in its assessment of this matter. The Council's advice presented in this report focuses on identifying solutions that address the need for safe drinking water and the protection of public health within the means and capability of water providers. This advice includes both broader policy recommendations on regulatory, administrative and economic approaches, and specific suggestions for amending aspects of the current Regulation.

Context

Risk in Relation to Small Systems

The risks from consuming drinking water can generally be classified as either acute (i.e. short term) or long term. Long term risks are normally associated with chemical contaminants for which health outcomes such as cancer may occur following long term exposure (perhaps over several decades) to low levels of the contaminant. Short term or acute risks are normally caused by microbial contaminants (bacteria, viruses or protozoans such as *Cryptosporidium* and *Giardia*). Illness occurs rapidly and may result from a single exposure. In severe cases with certain organisms death may occur, especially in susceptible groups such as immuno-compromised individuals, infants, and the elderly.

¹The following five elements can be considered necessary for the provision of safe drinking water:

- Start with the best possible source,
- Design and operate adequate treatment,
- Provide secure distribution,
- Conduct appropriate monitoring, and
- Respond appropriately to any adverse monitoring result.

The sufficiency of these elements is predicated on the existence of an appropriate regulatory framework.

To minimize risks to public health, drinking water systems must be robust. A robust system is one that performs well under normal conditions and maintains an acceptable level of performance under adverse conditions. The term 'adverse conditions' implies that there is some type of change or challenge to the system; a flood for example.

In the case of drinking water, a low level of robustness in one of the five elements must be compensated for by increased robustness in other elements to achieve a given level of robustness for the overall system. The robustness of systems includes human and institutional aspects as well as physical components.

In considering and defining the level of robustness required in drinking water systems, concepts from risk assessment and management are helpful. For example, the Ministry of the Environment proposal "Guideline for the Implementation of Air Standards in Ontario" (EBR Registry Number PA04E0010) states that the Ministry of the Environment "is proposing to adopt a risk-based decision making process that can be used to address implementation barriers associated with the introduction of new standards, new models and contaminants for which there are dose set limits."

Page 18 of that document notes that the concept of risk comprises five components:

- The hazard inherent in an activity that is otherwise deemed beneficial,
- A potential undesirable event, which brings out the hazard,
- Adverse consequences (and severity) of the undesirable event,
- Likelihood of whether the undesirable event will happen or not,
- Perception about the combination of the above components (perceptions arise because of the uncertainty about the hazard, likelihood and consequence components of risk)."

Page 19 of the document states that "Conceptually, risk decisions are made based on the premise that the higher the likelihood or consequence of the event, the greater the significance of it and the need for action." In other words, both the probability of failure and its consequence must be considered to define risk. Often risk discussions focus only or primarily on the former.

The application of risk considerations to drinking water systems is well illustrated in the approach used in New Zealand² (Details can be found in Appendix 4). Both a Likelihood Scale and a Consequence Scale are used to determine risk. For example, risk is defined as 'low' for an unlikely event (one which could occur once in 100 years) considered to be of minor consequence (i.e. having a minor impact on a small population). However, risk is defined as 'extreme' for a likely event (one that will probably occur once every one or two years) of major consequence (i.e. having a major impact on a small population).

The consideration of drinking water systems from a robustness perspective provides a framework for discussion of reducing the risk to acceptable levels. While the risks from all types of contaminants are important, of particular concern is the risk of an outbreak of microbial disease, i.e. a potential undesirable event.

To illustrate the consideration of drinking water systems using a robustness approach, two examples are shown in the accompanying figures. This is done in a simplified way for illustrative purposes only, so no numerical values are shown. To make the discussion more relevant to very small private systems, a distribution system has not been included – i.e. all the piping is contained within a single building, such as a church or bed and breakfast establishment. A 'required' level of robustness is shown, corresponding to some level of risk deemed to be acceptable.

Figure 1 shows a system where treatment is provided and all four elements contribute a component of the robustness such that the sum (i.e. the robustness of the overall system) exceeds the level required. Figure 2 shows a system where no treatment is provided. The source is considerably more robust than in Figure 1, and in fact provides almost the entire robustness of the system. (Because of the reduced monitoring that would be associated with the lack of treatment, the robustness of the monitoring and response components is reduced.) Overall, the robustness of the system is somewhat lower than the first system, but still meets the level required. The lower level of robustness in the second system means a somewhat increased risk, but this risk is still considered acceptable.

Systems with a distribution system are, other things being equal, at somewhat higher risk than systems without one, because of the opportunity for possible breaches in the system (broken pipes, cross connections, being struck by a backhoe, etc.) However, it is reasonable to consider that small distribution systems, such as might exist on a resort property, generally present fewer opportunities for contamination than municipal distribution systems because they are smaller and simpler.

In formulating the Regulation, the Ministry of the Environment required treatment for all systems unless, as a result of a fairly rigorous process, an exemption could be justified. It became evident to the Council that this meant, in practice, that individual systems had to undergo a costly procedure to demonstrate the high contribution to robustness provided by a secure groundwater source. As we will indicate, there must be a reliable yet feasible way of distinguishing between secure and non-secure sources.

Figure 1. A small system where all four elements contribute to robustness

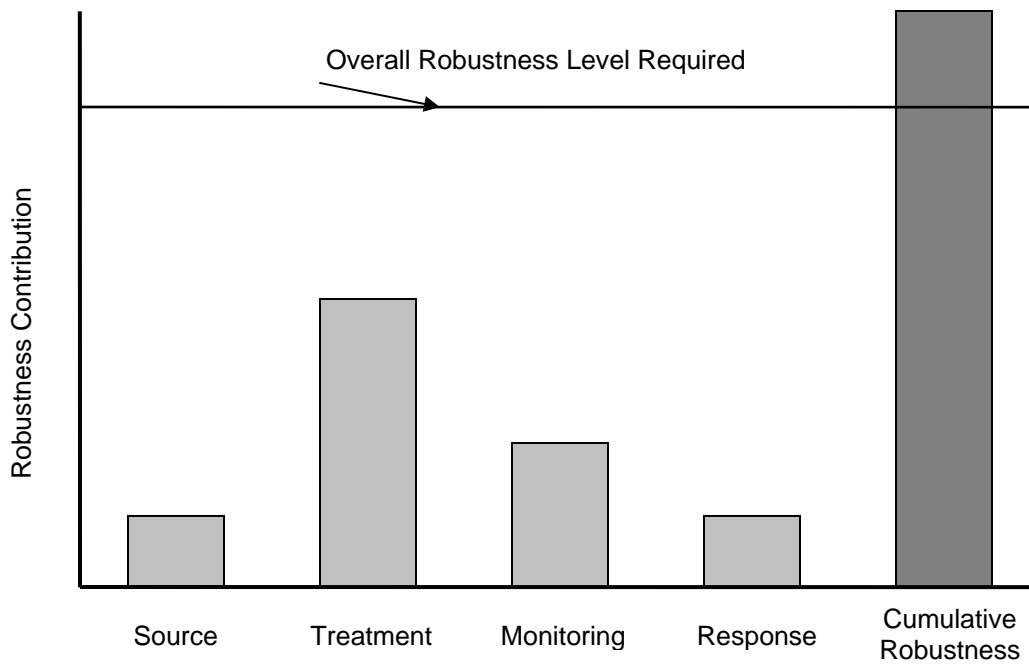
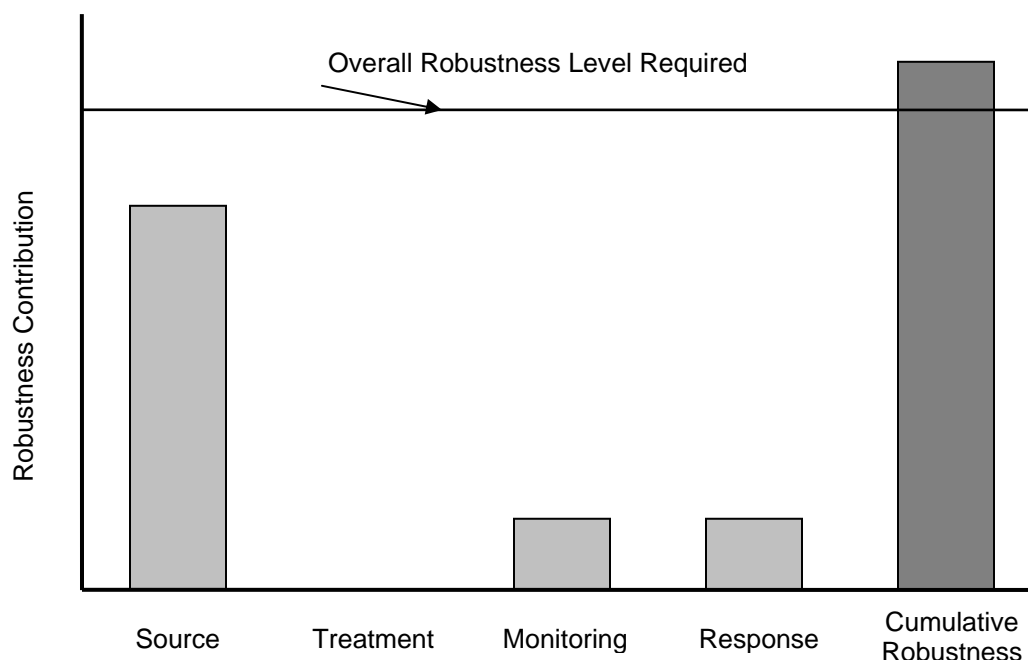


Figure 2. A small system without the treatment contribution to robustness



Regardless of the size of the system, a special set of unusual circumstances must normally occur for an outbreak to happen. Microbial disease requires a source of contamination, a route or vector of transmission, and a receptor population. The vector must be able to transmit an infectious dose to the receptor. Drinking water can be the vector when the source is/becomes contaminated and either there is no treatment or it is not adequate for the challenge. (In some cases, of course, contamination can occur directly in the distribution system.) Because outbreaks normally result from a combination of unusual circumstances, the simple fact that an outbreak has not occurred in a given system is no guarantee that one will not happen in the future.

The Council has utilized the concept of risk in its consideration of the Regulation as it applies to small systems. However, there has not been the opportunity for a formal risk assessment. As will be discussed in more detail later, one of our recommendations will be that the Ministry of the Environment conduct formal generic risk assessments for small systems going forward, to provide a more rigorous basis for an improved Regulation.

Special Challenges Faced by Small Systems

Small systems often face special challenges in the provision of safe drinking water. For small municipal systems, the challenges normally ultimately are based on the fact that such systems simply do not have the financial resources available to larger systems. For small non-municipal systems, these challenges are even greater than for the municipal systems. It is helpful to summarize these challenges in terms of each of the five elements mentioned above:

Source

Although the source for many small systems is groundwater, there may not have been the financial resources available to undertake the more extensive investigations and installations done for larger systems. A particular issue arises with respect to systems where the source is considered as GUDI (groundwater under the direct influence of surface water).

Treatment

Many small non-municipal systems have operated without treatment at all. Thus installation of treatment represents a capital cost, and operation of treatment is an ongoing cost and responsibility. Depending on the technology used, it may be difficult for small systems to provide the required level of operator skill for continuous reliable operation. Many treatment technologies are best suited to continuous operation and may face additional challenges when operated intermittently, for example in facilities such as churches and some recreational facilities.

Distribution

Some small systems do not have a distribution system in the traditional sense. In other cases it may be very small and the residence time of the water in it very short. This reduces the opportunity for intrusion of contaminants into the system and for deterioration of water quality.

Monitoring

The frequency of monitoring required in larger systems is not necessarily viable or practical in smaller ones.

Response

Small systems typically do not have the resources for response to an incident that larger systems do. An additional issue for remote systems is the logistics of getting samples to a laboratory in a timely manner.

One particular issue with respect to monitoring and response that is relevant for all systems bears particular mention for smaller systems. This is the distinction between operational parameters such as a disinfectant residual and turbidity that can be monitored in "real time" and microbiological testing for which the results are normally available several days later.

Because of the generally short retention time of water in small distribution systems (often on the order of hours or less) it is highly likely that contaminated water would have been consumed by the time microbiological test results were available.

Although microbiological testing plays an important role in providing safe drinking water, outbreak prevention in cases where treatment is provided must rely on the engineering surrogate parameters (disinfectant residual or UV dose, and/or turbidity) that can provide an assurance of adequate treatment as the water leaves the treatment facility.

Once the water leaves the plant it is essentially impossible in most cases to divert it from consumption. In other words "***There is no product recall for drinking water***". The lack of "real time" testing results is one reason that systems without treatment provide lower levels of robustness.

The point discussed just above becomes important later because, as will become apparent in the summary of the results of the public consultations, many participants advocated substantial reliance on testing. In almost all cases they were referring to bacterial testing. However, it was not always clear that they fully appreciated the significance of the 'after the fact' nature of such test results in the case of sudden contamination of a system.

Approach

Following receipt of the Minister's letter of June 30, 2004 the Council initiated its work on this matter by forming a Working Group. The Working Group began consideration of the matter, including holding an informal meeting with Ministry of the Environment staff. Based on this initial assessment, the Council concluded that it required more information to be able to make a recommendation to the Minister.

The Council therefore undertook additional activities in the fall of 2004. These included:

- Stakeholder / public consultation sessions all across Ontario. Twelve sessions were held from October 25 to November 8 (Arnprior, Dunnville, Chatham, Kemptonville, Goderich, Belleville, Elora, Bracebridge, Lindsay, Thunder Bay, Sudbury and Alfred), as well as well as another seven by videoconference (Geraldton, Nipigon, Fort Frances, Kenora, North Bay, Sault Ste. Marie, and South Porcupine). Interested parties were invited to make a presentation to a panel of the Council. In addition, other groups were welcome and the sessions were open to the public. A summary report for each of these consultations has been posted on the Council's website.
- Consultation with other experts in the area of drinking water, and specifically the area of risk presented by smaller systems;
- A review of how other jurisdictions address risk for smaller, private systems; and
- A reassessment of the Part 2 Walkerton Inquiry report regarding the interpretation of recommendations with respect to small systems.

The information obtained as a result of these activities is summarized in the next section.

Information Supporting Our Recommendations

This section summarizes the key information obtained by the Council over the several months that we have been engaged with this matter. We begin by summarizing relevant conclusions from Part 1 of the Walkerton Inquiry (O'Connor, 2002). We next provide insights obtained by informal discussions with staff of the Inquiry in relation to small systems. Following this, we provide several examples of microbial disease outbreaks that have occurred in small systems of the type we are considering. We then summarize the results of our public consultations and of our review of how small systems are dealt with in regulations in other jurisdictions. Finally we summarize the key points in all of the information – it is these that guide us in formulating our recommendations.

Summary of Relevant Conclusions from the Walkerton Inquiry (Part 1)

The report from Part One of the Walkerton Inquiry³ is sub titled "the Events of May 2000 and Related Issues", since Part One of the inquiry dealt with the circumstances that caused the outbreak. The most significant conclusions from Part One are summarized at the beginning of the report (pp. 3 to 5). Because of their relevance to the Council's evaluation of the Regulation, they are reproduced in appendix 1 of our report.

Of particular relevance to our considerations is the fact that the conclusions clearly state that a variety of factors contributed to the outbreak. These include human and institutional factors as well as physical factors such as the absence of continuous monitoring equipment on the well by which the contaminants entered the system. In fact, the only conclusion which speaks of preventing the outbreak, as opposed to reducing its scope, is the one relating to the continuous monitoring equipment. This is of significance in the current discussion because any system with a vulnerable source, regardless of its size or whether it is public or private, can only be made robust with appropriate treatment and monitoring.

Review of Walkerton Inquiry Part 2 Report and Recommendations

Chapter 14 of the Part Two Report of the Walkerton Inquiry addresses the issue of small drinking water systems. The report recognized three types of small systems: small communal residential systems, commercial and institutional systems that serve the public, and individual private systems. The report also noted that the cost for water treatment for small systems was significantly larger on a per unit basis and such systems need some special considerations.

For the small communal residential systems, the concept of a size limit or cut off was accepted and the Ministry of the Environment's current level of 5 or fewer residences was deemed reasonable. To further address the question of cost, the report recommended that an opportunity for variance should be provided, if justified. It was also noted that the Regulation of the time (O. Reg. 459/01) was "more rigid and universal than it needed to be".

Requirements could be relaxed for secure wells based on an assessment of risk. The report further noted that financial assistance should be made available for cases where all other opportunities had been explored.

For other water systems serving the public the requirements in Regulation 505 were appropriate. The public had a right to expect that the water supplied by these types of facilities should be safe. The application of this regulation should be expanded to cover all water supplies that serve the public. It noted that some form of relief would be needed and this could take the form of posting notices and providing alternate potable water.

With respect to private and individual systems the report noted the need to revise the well regulation and the need to provide information to owners about drinking water safety. Homeowners should have access to water testing facilities capable of testing for *E. coli*. Further, well drillers should be licensed.

Particular attention was given to technology. It was recognized that traditional water treatment systems were based on 'big-system' standards that may not be affordable or practical for small systems. There was an assumption that small appropriate technologies were either available or would soon be available such as membrane filtration and UV disinfection. These new treatment technologies could make water treatment affordable for the small commercial and institutional water systems that served the public.

The Council, as part of its review, followed-up with some people who had participated in the development of the Part Two Report to better understand the intent of the recommendations related to small systems. The response indicated that the Regulation went much further than was intended in terms of detail and the degree of prescription in law. There was a view that a more risk-based approach would be followed but that the regulation had taken a risk-adverse approach. Complexity had become an issue. There had been a real expectation that affordable treatment technology would be available and that assessment and system development cost would not be high.

Other organizations such as the Technical Standards and Safety Authority (TSSA) or local Health Units may be better structured to undertake the inspection and administration role for small systems rather than the Ministry of the Environment. Testing for small systems was not envisaged to be as comprehensive as required in the Regulation and that the application of a chlorine residual was not envisaged for these small systems. There was an outstanding need for public information on drinking water safety and access to technical advice to assist small system owners, and that those providing the advice would be separate from inspection and enforcement functions.

Examples of Disease Outbreaks in Small Systems

A recently published book titled *Safe Drinking Water – Lessons from Recent Outbreaks in Affluent Countries*⁴ provides information that is extremely relevant to the matter of small systems and the Regulation. The first author (Dr. S. E. Hrudehy) was a member of the Research Advisory Panel for Part Two of the Walkerton Inquiry. This book grew out of that experience and documents more than 70 waterborne disease outbreaks occurring in affluent countries since the 1970s. An additional 25 cases are listed but were not developed into case studies in the book for reasons of length.

As part of its work, the Council held a discussion with Dr. Hrudehy. In his presentation he discussed incidents described in the book that involve the types of small systems being considered by the Council. Incidents occurred in the following situations and locations:

- Trailer Park, Australia, 1989-90
- Nursery School, Japan, 1990
- Village, Scotland, 1995
- Restaurant/Motel, Yukon, 1995
- Resort Village (Wyoming), USA, 1998
- County Fair, USA, 1999
- Boarding School, New Zealand, 2001

A brief summary of these incidents is provided in Appendix 2. With the exception of the village in Scotland and the resort village in the US, all of these situations involved non-municipal systems. All of the incidents included substantial illness, and in two of them (the nursery school and the County Fair) deaths occurred. Three of the incidents, including two where deaths occurred, involved *E. coli* O157:H7, one of the organisms implicated in the Walkerton incident. One of the incidents where deaths occurred (the County Fair) also involved *Campylobacter jejuni*, the other organism implicated in Walkerton.

It is thus evident that serious outbreaks, although rare, can occur in small systems. In many cases these systems may have operated for a number of years without incident. However, special circumstances can overwhelm the system and have serious consequences. The more vulnerable the system is, the greater the likelihood of this happening.

Public Consultation Summary

As noted earlier, from October 25 to November 8, 2004, the Council held stakeholder / public consultation sessions all across Ontario in order to gather further input and insights on the Regulation, as it relates to smaller, private water systems.

Twelve sessions were held (Arnprior, Dunnville, Chatham, Kemptville, Goderich, Belleville, Elora, Bracebridge, Lindsay, Thunder Bay, Sudbury and Alfred), as well as well as another seven by videoconference (Geraldton, Nipigon, Fort Frances, Kenora, North Bay, Sault Ste. Marie, South Porcupine).

While the Council heard from a diverse range of groups and individuals, several key issues and concerns were common to both stakeholder organizations and members of the public; those issues tended to dominate the sessions, regardless of geographic location. Those key concerns are summarized briefly below. A more detailed summary of the consultations is provided in Appendix 3. Generally there did not seem to be a good understanding of the risks of unsafe water or the potential for health problems caused by a local water supply.

Cost

The cost of complying with the Regulation for small private systems was the major concern expressed at the consultation sessions. Many presenters indicated that costs related to initial system installation or upgrades (including the requirement for the involvement of a professional engineer), testing and monitoring and ongoing maintenance would be prohibitive. This concern was heard in regard to community centres, churches, fair grounds, conservation authorities, small businesses, mobile home parks, remote tourism operators, and camp grounds. Presenters indicated that the costs were sufficiently onerous that a number of these institutions or facilities would be forced to close. As well, people could become homeless if mobile home parks are forced to close.

Funding

A commonly expressed viewpoint was that, if the requirements of the Regulation for small systems were to go ahead, provincial funding should be provided. Several specific mechanisms were suggested for this.

Responsibility

A widely expressed opinion was that public health inspectors and Health Units (both part of the Ministry of Health and Long-Term Care (MOHLTC)) should have the lead role with regard to small systems. This would include providing advice, providing water testing and providing enforcement. Presenters who expressed this opinion acknowledged that these services would have a cost associated with them and were generally accepting of an appropriate user fee.

Implementation

Requests for extension of implementation deadlines were made.

Communication and Training

A number of presenters indicated that the Ministry of the Environment should considerably improve its communication with those impacted by the Regulation and that the Regulation should be made easier to understand. It was stated that Ministry of the Environment should provide, or arrange for, training for system operators and should also give advice and guidance on acceptable treatment systems.

Legislation

Opinions were expressed that bottled water should be better regulated and that the contribution of source water protection regulations should be taken into account for small systems.

Exemptions/Options

Exemptions were suggested for various organizations or entities (churches and community centres, remote tourism operators, bed and breakfasts, small businesses, and in certain cases mining operations). Cost was the primary reason for the request, but feasibility of obtaining laboratory analyses was also cited in some instances. The option of permanent sign posting was requested by some, although others were opposed. Some speakers asked for more flexibility in how the desired endpoint (safe water) could be arrived at.

Reporting

Requests were made to simplify the reporting process and make it less onerous.

Wells

Several recommendations were made in this area, including placing more emphasis on well inspections following construction, considering a well permitting system and more frequent testing of the structural integrity of wells.

Treatment Options

Some participants expressed concerns about chlorination, citing health and environmental effects as well as its potential impact on septic systems.

Liability

The matter of liability and insurance issues for operators and owners of small systems was raised.

In Appendix 6, a number of specific suggestions and proposals arising from the consultation sessions are noted, along with the Council's responses.

Review of Other Jurisdictions

The Council engaged an environmental consultant to undertake a review of the regulatory and risk management practices used in other jurisdictions, other than Ontario, to manage smaller, private water systems.

Multi-jurisdictional literature search and direct contact research was completed, including a description of approval by each jurisdiction found, the approach taken to assess or mitigate risk (if applicable), and information on how well the system works. This research served to complement the Council's broader review of the Regulation.

An e-mail transmission was sent to all of the selected jurisdictions, outlining in some detail the nature of the project and the type of information that was being sought.

Responses were obtained from six Canadian provinces (Alberta, Saskatchewan, Manitoba, Prince Edward Island, Nova Scotia, and Newfoundland and Labrador); the United States Environmental Protection Agency (USEPA); four U.S. States (Illinois, Indiana, New York and Washington); and New Zealand.

Although there is considerable variation among the approaches followed by the jurisdictions that were contacted, some common themes emerged.

Firstly, it was found that several jurisdictions impose less stringent requirements on small private drinking water systems than does Ontario, under the current legislative and regulatory framework.

Secondly, it was found that there is generally a lack of a requirement for a formal engineering report as part of the process.

Thirdly, some jurisdictions are currently reviewing their existing programs with a view to relaxing their current requirements, to make them less of a financial burden for small systems. Table 1 summarizes the practices governing smaller, private drinking water systems.

None of the other jurisdictions have taken as formal and detailed an approach as Ontario, but many of them have elements similar to Ontario’s legislative and regulatory framework.

Table 1

Jurisdiction	Type of Control	Definition of “Small”	Comments
Alberta	Regulation	Less than 15 connections or 3km of pipeline require registration only	<ul style="list-style-type: none"> ● Guidance document under development ● Some small private systems fall under provincial health jurisdiction
Manitoba	Proposed Regulations	Less than 15 service connections are exempt	<ul style="list-style-type: none"> ● 2 Supporting Regulations under development
Newfoundland and Labrador	None at present	Not defined	<ul style="list-style-type: none"> ● Requirements for small systems under development
Nova Scotia	Regulation	Less than 15 service connections or less than 25 or more individuals served at least 60 days in a year.	<ul style="list-style-type: none"> ● Small systems require registration only ● Amendment to Regulation to require systems that serve more than 500 people on a non-transient basis, to require certified operators
Prince Edward Island	None at present	Proposed definition is between 5 and 100 customers	<ul style="list-style-type: none"> ● Proposed regulations under development
Saskatchewan	Regulation	Less than 15 service connections	<ul style="list-style-type: none"> ● Self assessment under consideration for remote systems
USEPA	Act	Less than 15 service connections or less than an	

Advisory Council on Drinking Water Quality and Testing Standards

Jurisdiction	Type of Control	Definition of "Small"	Comments
		average of 25 individuals served for 60 days in a year.	
Illinois	State Code	Less than 15 connections or 25 individuals served for 60 days in a year	<ul style="list-style-type: none"> State health department jurisdiction for systems serving fewer than 25 people
Indiana	None	Less than 15 connections or 25 individuals	<ul style="list-style-type: none"> Rules under development to address current requirement for engineer's report for all construction permits, including small systems
New York	State Code	Less than 5 connections or 25 individuals served daily for at least 60 days per year	<ul style="list-style-type: none"> Small systems are only required to meet the standards, and are not subject to monitoring or treatment requirements
Washington	Regulation	2 – 14 connections	<ul style="list-style-type: none"> Two regulations; one mirroring USEPA SDWA; the other for 2-14 connections
New Zealand	Proposed Legislation	Less than 500 people, provided a risk management plan is in place	<ul style="list-style-type: none"> Legislation under development

Summary of Key Points

The following key findings from our work form the basis of our recommendations:

- The concept of risk (i.e. both the probability and the consequences of system failure) should provide the framework for making improvements to the Regulation for small systems.
- It is the Council's view that many small systems using secure groundwater sources may have sufficient robustness such that treatment may not be required.
- It is also the Council's view that all systems using surface water sources need some form of treatment.
- A key need is for a reliable and effective procedure for distinguishing between secure and non-secure sources (we focus particularly in this document on microbial contamination). In this regard, historical bacterial sampling results can provide part of the information required.
- The Ministry of the Environment should conduct generic quantitative risk assessments for small systems to provide a scientific basis for the future development of the management of these types of systems. It was also noted that there was not an accurate inventory of the numbers of water systems under the current Regulation.

- The fact that a number of factors (physical, human and institutional) contributed to the tragedy in Walkerton is not well understood by the community impacted by the application of Regulation 170/03 to small, private systems. This contributes to a lack of understanding of the need to improve the security of non-robust systems.
- Documented cases of serious waterborne microbial disease outbreaks have occurred in small systems of the type on which the Council's consultations were focused. In a number of cases these systems had functioned without incident for a number of years. Thus the historical absence of a problem in a system does not, per se, mean that the system is secure.
- Disease outbreaks from drinking water are rare in developed countries such as Canada. This is because they often require a particular combination of circumstances which, fortunately, does not occur very often. However, the consequences of an outbreak can be severe, including death.

Other jurisdictions have realized that managing smaller, private systems requires a unique approach. A particularly helpful example is the one used in New Zealand. As mentioned earlier, relevant information on this approach can be found in Appendix 4.

- With respect to the public consultations:
 - The cost and feasibility of the Regulation for small systems were the issues most frequently raised.
 - A commonly expressed opinion was that, if some type of requirement like the Regulation goes ahead, some type of financial support will be required for a number of types of systems.
 - Another very common point of view was that there should be a greater role for public health inspectors, the Health Units and public health laboratories. It was felt that the Ministry of the Environment needed to do a much better job of communication regarding the Regulation, and that it needed to provide more training for operators, and advice. Although these last two points would be redundant if the Ministry of Health and Long-Term Care takes responsibility, we urge the Ministry of the Environment to seriously consider these concerns.
 - It was felt that a new regulation should be flexible, and provide options, while maintaining public safety.
 - It was argued that the grand fathering of existing treatment systems, particularly those installed in the last several years, be allowed even if they did not meet all requirements of the Regulation. The Council supports this, provided it is for a defined period of time, and the risk evaluation does not reveal unacceptable risk to public health.
- The approach developed by Oxford County is generally consistent with the more comprehensive New Zealand model. See appendix 5 for details on the Oxford approach.

- In discussion with the Council, Dr. Hrudehy, the first author of the book on outbreaks referred to previously, stressed the following points:
 - Conditions for pathogen challenge to a system are often event-driven (beware of change)
 - Multiple factors must usually align to cause an outbreak, so multiple barriers can achieve a high degree of security by making probability of total system failure more remote
 - Monitoring methods for pathogens and useful indicators are usually neither sufficiently sensitive, nor sufficiently specific and are not available in real time
 - Population health surveillance is insensitive and likely blind to all but the largest outbreaks
 - Adaptation or tolerance in resident population may hide local, chronic problems while leaving visitors vulnerable, but visitors are difficult to track back to the source (e.g. Creston, B.C., Alpine, Wyoming)

The most critical elements to remember are:

- Pathogens are the greatest risk
 - Robust multiple barriers are essential
 - Trouble is preceded by change (i.e. flooding, drought, etc.)
 - Operators must be capable and responsive
 - Drinking water professionals accountable to consumers
 - Risk management equals sensible decision-making
- For whatever level of treatment and testing is prescribed for various types of systems in the Regulation, there must be a clear understanding of the technical and resource capabilities of the operators to maintain the treatment systems and testing programs over the long term. Otherwise the risk reduction achieved by these measures is not reliable.

In summary, although there was a wide range of concerns raised at the consultation sessions, the majority were from what could be characterized as very small or smaller systems. There were fewer responses from those that could be described as having a significant enough revenue base to support the cost of adding water treatment, regular maintenance, sampling and testing. There was not a clear line between these more substantial enterprises and the much smaller systems that described significant hardship if the full extent of the Regulation is applied to them.

Examples of smaller systems facing hardships include:

- Bed and Breakfast operations
- Rural churches, parishes and religious facilities
- Community cultural and recreational centres
- Small residential groupings (One house supplies water to other houses at cost)
- Remote camps and lodges

- Mobile home centres

For most of these smaller places, both the cost of treatment and the cost of testing were described as onerous and could result in the shutting down of operations although most attendees recognized the need for safe water. In response to questioning, many could accept the testing requirements and avoid treatment as long as bacterial contaminants were not present. There was still a strong interest in reducing the testing frequency. As noted previously, there was not a great deal of understanding of the health risks.

The challenge in identifying improvement or alternative approaches to the Regulation is to maintain a high level of drinking water protection, while allowing implementation to be both practical and affordable. It became clear that many of the water system owners were overwhelmed by the complexity of what they were being asked to do. Ironically, the risk to public health might actually increase if requirements become too complex, due to a lack of understanding or compliance avoidance.

Council Conclusions

Under this review, the Council examined the Regulation from a variety of perspectives, including:

- An extensive consultation process where the Council heard from over 120 presenters in 12 locations. In addition, the Council received over 100 written submissions. Stakeholders voiced a wide range of concerns with the Regulation and many suggestions for improvement.
- A review of the Walkerton Reports and discussions with those who participated in the development of the Part Two Report. Particular attention was given to Chapter 14, Small Drinking Water Systems and the recommendations therein.
- A review of information on how other jurisdictions and countries are endeavoring to enhance and regulate the safety of drinking water of smaller, private systems.
- Advice from experts in the field of drinking water, in addition to the expert knowledge of the Council's own members, including the analysis of several actual cases of drinking water contamination.

The Council found that the Regulation seemed to be effective for systems serving larger communities and even larger private operations that have an economy of scale to manage the complexities and costs of the Regulation's certification, treatment, and monitoring requirements.

However, very small entities, such as bed and breakfast operations, church and community centres, small lodges, camps and cabins, trailer parks, seasonal operations, and a wide range of small businesses may not have the resources, knowledge or skills to be able to follow or comply with the type of regulatory structure as set out in the Regulation.

After a careful deliberation process, the Council concluded that the current Regulation, as it applies to smaller, private systems, will not be able to adequately address the majority of concerns and issues, even if a number of specific amendments are made to the current Regulation. As such, the Council found that an alternative approach is needed for these types of systems. **The basic drinking water quality standards and level of safety should not be compromised**, but could be better implemented through an approach that addresses the capacities and abilities of the small service owners and operators.

The Council also noted that a new approach was needed to address the problems faced by small, residential systems; particular those that are privately owned such as residential mobile trailer parks. It should also be noted that the category "Non-Municipal Year-Round Residential" under the Regulation, is a special case, and the Council feels that these systems best fall under municipal responsibility, and the current requirements of the Regulation.

A Special Case: Non-Municipal Year-Round Residential Systems

The Council heard about the particular difficulties and hardships experienced by Non-Municipal Year-Round Residential systems, which include mobile home parks and other private residential developments. In many cases these residential communities offer low cost housing solutions and are the only housing options available to the residents. Cost increases in terms of rent or utility rates of any sort could have a significant impact. We heard from many presenters about the difficulties faced by these communities. Unlike the commercial and institutional systems that serve the public, these systems cannot be closed.

There is a definite need and desire for safe water for this category; not just a low-cost solution. These communities should have access to the same level of drinking water protection as any other communities in the province. To provide safe water, it is not sufficient to regulate and inspect; there also needs to be a means and capacity to establish, maintain and operate an effective treatment system. These systems exist within the structure of the municipal framework, and as such, come under the control of local planning, approvals and land use. However, simply transferring the responsibility of these facilities to the local municipality is not necessarily the answer either.

The Council feels that the conclusions of the Ministry of Public Infrastructure and Renewal's *Water Strategy Expert Panel* may be helpful in identifying a solution for these facilities. Many of the smallest municipalities are having difficulty meeting the Regulation for their municipal residential systems in terms of cost and resources, such as management and operators. Simply requiring the local municipality to take over operations is not the solution in a case where they already struggle to meet the Regulation for other systems.

The Council has concluded that the Regulation should remain substantially as is for this group of small systems. The Council also feels that the province and the local municipality need to be involved in the solution for facilities in this category that are not sustainable. Part Two of the Walkerton Inquiry, Recommendation #84, calls for provincial assistance for small water systems that cannot afford the costs of testing or upgrades. Local municipalities or the Ontario Clean Water Agency (OCWA) could also become involved with operation of these systems. Such an arrangement could be possible, for testing and operations, without transfer of ownership in a public/private partnership arrangement.

The Council concluded that the local municipality could be required to assist with upgrading these systems to the standards for Non-Municipal Year-Round Residential systems, as covered in the current Regulation. The requirement to assist would be in cases where the owner did not have the financial and / or technical resources to meet regulatory requirements. The province would have to set criteria as to when financial assistance would be available. In unorganized areas, this role would fall to the provincial authority that has traditionally taken this responsibility. Under some circumstances, the municipality may even elect to take over the operation of a system to protect public health.

The Council also recognizes that these small systems can be costly to upgrade and maintain. As such, the provincial grant program should be extended to support the local municipality to enable them to provide the required upgrades, and technical and operational assistance. The province will need to work in partnership with municipalities to develop a frame work for providing technical and financial assistance.

Proposal for Managing Smaller, Private Water Systems

Through the review process, the Council considered three optional approaches for addressing commercial and institutional water systems that serve the public:

1. Risk Assessment and Inspection by the Local Public Health Unit

The Oxford County Health Unit has developed a risk-based approach, involving assessments of each water system by dedicated, trained staff. Under this approach, these ‘Public Water Health Inspectors’ would develop specific requirements based on local conditions and water quality history. The cost would be shared between a user fee and a provincial subsidy. Several other Health Units support this approach. Relevant information on this approach can be found in Appendix 5.

2. Testing and Treatment: Self Administered Risk Assessment

This approach is similar to the approach currently used in New Zealand and further explained in the “Context” section, as well as in Appendix 4.

- This approach would entail a continuation of the testing requirements (for surface water sources); and the addition of treatment (for ground water sources) only if testing shows the source water to be unsafe.
- Ontario Drinking Water Quality Standards would remain in force.
- Some definition for very small systems would have to be developed.
- Province would develop a risk assessment guideline with training and technical assistance and an outreach program for owners and operators of these small systems.

3. Rules Specific for Each Sector

A number of submissions reviewed by the Council raised the concept of re-writing the Regulation to form new, individual regulations for different sectors.

- This approach would entail rewriting the Regulation to focus on each sector such as Bed and Breakfast operations or Remote camps.
- The object would be to respond to the concern that the current Regulation is very hard to interpret and to understand how it applies to particular systems.
- This option could also be combined with option 2 above.
- There could also be specific exemptions related to size.

After considering the above options, the Council recommends an approach that combines the features of options 1 and 2, representing a balance between the protection of public health and cost-effectiveness of implementation. The Council feels that application of this approach will result in water systems that are more robust.

Public Health Units should take the lead for all aspects of administering a safe drinking water program for the small, private sector (institutional and commercial systems).

The Council, however, feels that the responsibility for *overseeing* drinking water regulation should remain under the *Safe Drinking Water Act* (SDWA), and coordination by the Chief Drinking Water Inspector.

As such, a new regulation, under the SDWA, needs to be written to cover commercial and institutional systems as a whole. The complex and detailed requirements covering the 5 water system categories in the current Regulation would be moved to a new regulation, which would also empower Health Units with a new role as described below. Under this approach, a set of Protocols would need to be developed, in consultation with this Council, to guide Health Unit staff in undertaking inspections, evaluating risk and developing a site-specific drinking water protection plan. Health Units already operate under various Protocols concerning other areas of responsibility.

Under this recommended model, the local Health Unit would have responsibility for administering a new drinking water regulation for commercial and institutional systems that serve the public. “*Public Water Health Inspectors*” would have the power to administer site-specific risk evaluations, and plans for individual systems. The inspector would conduct a risk evaluation using an approach similar to New Zealand’s, by establishing a set of site-specific requirements and preventative measures, based on risk, and would then be available to advise the owner on how to implement these requirements. Compliance would also become the responsibility of the Health Units for all water systems that they administer.

The objective being to ensure that the water supply meets the Ontario Drinking Water Quality Standards. Specific aspects of this model are outlined below. These services would be financed with a user fee. Additional provincial assistance would also be required, particularly to facilitate start up and to augment costs where user fees may be unaffordable.

The Council heard that the public and owners of these small systems understood and appreciated the services provided by the local Health Units. There was a desire to have this same level of local support and knowledge applied to the administration of drinking water protection. We also heard from a number of Health Units and others in the public health area that they had a desire to play a role in protecting public health with respect to drinking water and that they were already active in addressing drinking water matters to varying degrees. For many of the system owners, they were already involved with the Health Units through their food serves activities.

Public Health Units have a history in protecting the health of the public, particularly in regard to prevention of food and water-borne diseases, and are the only authority given the mandate to issue a Boil Water Advisory.

The 37 Health Units in Ontario comprise approximately 800 Public Health Inspectors, who have been trained in water quality, health education and promotion, epidemiological investigation, and outbreak control. They must successfully pass a national exam to obtain the Certificate in Public Health Inspection (Canada) (CIPHI[C]). As well, Public Health Inspectors in rural areas have had many years experience taking water samples, advising homeowners, restaurant operators and others, to trouble-shoot problems with their water supplies. Public Health Inspector training, experience, and their presence over the entire province suggest that they may be in a unique position, with appropriate funding, to manage private water systems.

Testing should continue to be done by accredited laboratories, licenced by the Ministry of the Environment and current testing requirements should remain in place until the new approach could be implemented.

Risk Evaluation

Unlike the New Zealand approach of self-assessment, “*Public Water Health Inspectors*” would complete a prescribed risk evaluation to determine the level of risk for each drinking water source through checking records and a physical inspection, taking into account:

- Barriers:
 - Source type (Groundwater vs. Surface Water) and quality (Protocols to be developed)
 - Current level of treatment (Protocols to be developed)
 - Distribution system efficacy (Protocols to be developed)
 - Current monitoring program (Protocols to be developed)
 - Response to adverse results (Protocols to be developed)
- Well records (and well inspection information)
- Local source protection plan (based on Municipal and Conservation Authority watershed plans, as part of the Ministry of the Environment’s Drinking Water Source Protection initiatives)
- History of water quality
- Preliminary testing per Regulation 170/03
- Event-based module, as outlined in the New Zealand approach, to ensure that preventative measures are taken into account.
- The special circumstances of higher risk populations found in Designated Facilities

Risk Management

A list of necessary improvements would then be developed from the risk evaluation process and prioritized using cost-benefit analysis. For instance:

- A wellhead in a low lying area may have to be brought up to standards
- A well that has bacteriological problems after remedial work and testing over time would require the installation of additional treatment.
- Treatment systems installed should match the water quality test requirements.

Water sample collection and analysis

- Bacteriological testing to be conducted by the owner / operator on a reduced-frequency basis, if appropriate (i.e. change to monthly following a year of 'clean' data; then quarterly, etc.)
- Completed by a trained operator in liaison with the local Public Health Unit.
- Inspectors would take their own independent samples during site visits with analyses to be conducted at Provincial Public Health Laboratories.
- All commercial and institutional entities that provide water to the public should report to their local Health Unit.
- Samples would continue to be submitted to accredited laboratories, licenced by the Ministry of the Environment, as prescribed in the current regulation.

Training

- In addition to CIPHI certification, training of “*Public Water Health Inspectors*” should also be supplemented by mechanical, chemical, hydrogeological, and other aspects, and could potentially be coordinated by the Walkerton Clean Water Centre.
- Operator training could also be handled in this fashion, although curriculum would be much reduced from the health inspector training.

System records and inspections

- Reporting requirements of a water system’s operations and maintenance will be dependent on the system installed and analytical results. A risk level would be assigned; a high-risk system would require more frequent reporting and filing of records; a low risk system would be proportionately less frequent; criteria to be determined.
- Notification of adverse results would need to be reported to the owner as well as the local Health Unit.
- Test results and system records to be maintained by owner, and copied to the local Health Unit.
- Inspections by local Health Unit inspectors at an acceptable interval, based on risk, or some other trigger mechanism.

Funding

- The costs of the risk evaluation would be administered by the local Health Unit.
- A cost recovery fee could be adopted for these services and charged back to the owner for administration of the program. If a cost recovery fee were to be levied for each system, it would be estimated to be in the range of \$250 to \$375 per year annum. The local Health Unit may also require additional financial assistance to start up and maintain a safe drinking water program.

Compliance

- “*Public Water Health Inspectors*” should use an approach consistent and compatible with the food establishment inspections program, currently in place, under the Ministry of Health and Long-Term Care’s *Health Protection and Promotion Act*.
- “*Public Water Health Inspectors*” are to be responsible for following up on adverse results, with actions such as Boil Water and Closure Orders.

Phased Approach

- Consideration could be given to phasing in the transfer of responsibility from the Ministry of the Environment to the Public Health Units.
- The Public Health Units could initiate safe drinking water programs for facilities that they are already inspecting, under their current role.

Progress Reporting

- There should be regular reporting on the progress of implementing the Council's proposed new approach.
- This could be addressed as part of the Chief Drinking Water Inspector's Annual Report.

Key Issues Addressed by the Recommended Model

Through the review process, many issues with the Regulation were identified but several key issues, representing a change in approach, were deemed to be substantively addressed by application of the recommended model.

The Council also considered other issues, which are outlined in appendix 6, along with the Council's response.

- Complexity of the Regulation (mainly pertaining to scope of "Category of Systems")

The Council heard many complaints regarding the complexity and application of the categories of system under the Regulation. Generally speaking, owners / operators do not understand which category they fall under, and more importantly, what rules they have to follow in order to be in compliance. Further, there can be onerous responsibilities in terms of certification, treatment, and testing requirements under certain categories.

There are 8 system categories under the Regulation. The Council suggests that 5 categories could be managed by the model, including any Designated Facilities that may fall under the 5 categories. The Large Municipal Residential and the Small Municipal Residential systems should remain status quo with the current Regulation.

The Non-Municipal Year-Round Residential systems should continue to fall under the requirements of the current Reg. 170, since the Council feels that they are ultimately a municipal responsibility. Financial assistance would be required to make this change affordable for municipalities, as they could become responsible for certification, treatment and testing requirements. Non-Municipal Year-Round Residential systems, as well as Large and Small Municipal Residential systems all relate to permanent residences, and should be regulated by the Ministry of the Environment.

The remaining 5 categories (Large Municipal Non-Residential, Small Municipal Non-Residential, Non-Municipal Seasonal Residential, Large Non-Municipal Non-Residential, and Small Non-Municipal Non-Residential) could fall under a new regulation, in order to reduce further complexities involved with maintaining many categories. The new regulation would also enable the development of the Protocols and their application by the "*Public Water Health Inspectors*".

The "Category of System", responsibility, and proposed management approach are summarized in Table 2, below, illustrating the categories under the current Regulation that could be administered through the recommended risk-based approach.

Table 2 – Regulation 170 Category of System, Responsibility, and Management Approach

Category of System	Responsibility	Proposed Management Approach
1. Large Municipal Residential	Municipality	MOE - Regulation 170/03
2. Small Municipal Residential	Municipality	MOE - Regulation 170/03
3. Large Municipal Non-Residential	Owner/Operator	MOHLTC–Risk-Based Approach
4. Small Municipal Non-Residential	Owner/Operator	MOHLTC–Risk-Based Approach
5. Non-Municipal Year-Round Residential	Municipality	MOE - Regulation 170/03
6. Non-Municipal Seasonal Residential	Owner/Operator	MOHLTC–Risk-Based Approach
7. Large Non-Municipal Non-Residential	Owner/Operator	MOHLTC–Risk-Based Approach
8. Small Non-Municipal Non-Residential	Owner/Operator	MOHLTC–Risk-Based Approach

- Frequency of Bacterial Testing

The Council agrees that testing frequency could be altered under certain circumstances. The proposed risk-based approach would address the frequency of testing for 5 of the 8 categories of system, based on the security of the source water and the type of water protection. Testing frequency for the remaining 3 Ministry of the Environment-controlled categories would be subject to the current Regulation’s requirements.

The Council also recognizes the difficulties faced by remote facilities in getting water samples delivered on time and the extra cost of transporting samples. The Council requests that the Ministry of the Environment consider allowing the use of validated alternative testing methods (that indicate the presence / absence of bacteria), where traditional sampling and testing methods are not practical. Such testing kits are available and are reliable. The Ministry of the Environment should work with the suppliers of these kits to ensure quality and accuracy, through accreditation and licencing. In addition, users will need to be appropriately trained in the use of these kits and reporting of results.

- Need for Treatment

The Council agrees that the need for treatment may change under certain circumstances. The recommended model would address the degree of treatment needed for 5 of the 8 categories of the current Regulation, by matching the evaluated risk of the system with the level of treatment required to reduce the risk to a safe level. Both a form of filtration and bacterial inactivation are basic requirements for surface water sources. The need for treatment for the remaining 3 Ministry of the Environment-controlled categories would be subject to the current Regulation’s requirements. The Walkerton Inquiry Report clearly recommended that water supplied from secure wells be disinfected and the surface water sources also receive filtration treatment. A site-specific assessment should be able to identify an effective and affordable solution.

- Definition of “small” cut-off

A number of presenters proposed that an exemption, similar to the residential exemption could be instituted, whereby communal systems with 5 or fewer residences are exempt from the Regulation. There were suggested definitions for very small system such as B&BS with 5 rooms or 5 rental cottages etc.

The Council is concerned that the public that patronize these businesses may not be adequately informed about the state of water quality and have a right to expect safe water along with all other health and safety considerations. This could be related to considerations on the primary use of the facility. The recommended model would address the issue of size and primary use when assessing risk and setting out sampling and treatment requirements.

Protocols would need to be developed to assist the inspector in developing the site specific system plan.

- Sign Posting

The Council was concerned with the suggestion of allowing the ongoing use of posting signs and providing alternate sources of potable water. Water would still need to be available for hand washing and other uses. Children could still have access to unprotected tap water and safe water would be needed for food preparation. This option should be available to owners on a permanent basis; however its application should be part of the risk evaluation conducted by the “*Public Water Health Inspector*”. If the option is applied, then direct access to unprotected water would have to be removed to the greatest degree practicable.

- Options

The Council heard a desire that small system owners and operators be given options to meet their obligation of providing safe drinking water. As long as compliance with Ontario Drinking Water Quality Standards is achieved, owners and operators should have some flexibility to achieve this through means that work for them. The recommended model would provide an opportunity to develop a more flexible approach based on local conditions.

- Pre-approved Package Treatment Systems

A number of people who attended the consultation sessions recommended that the Ministry of Environment should pre-approve package treatment systems. Some presenters from the water industry indicated that such uncertified systems are available, but that similar systems certified in the United States by the National Sanitation Foundation (NSF) cost much more. Some form of pre-approval would avoid the need for an engineer’s review, which could cost several thousand dollars.

The Council agrees with this idea particularly for use in the smaller systems. Under the proposed model, the availability of such treatment systems would assist the inspector in recommending treatment options and should result in lower cost solutions for the owner. The Ministry of the Environment should work with the water treatment equipment industry to develop a set of certified treatment systems. The submission from the Association of Municipalities of Ontario outlined some key requirements that could be applied to such treatment systems. The “*Public Water Health Inspector*” and the owner could rely on the certified treatment systems to meet the site-specific requirements arising from the risk-evaluation process.

There will still be situations where package type treatment units will not be appropriate due to the condition of the source water or the scale of the operation. Such systems may have to be custom-designed and assessed by an engineer.

- Testing for Other Contaminants

There were many suggestions that the testing for a wide range of contaminants, as currently required by the Regulation, was unnecessary. The Council believes that these tests should be primarily directed to those contaminants that have a short-term health significance, such as nitrates/nitrites, THMs, arsenic and fluoride. The broader range of tests would be necessary if there is a suspicion that local sources of contamination may be present or changes may be occurring in the area. The Source Protection Planning activities may give guidance as to situations that would require a more extensive set of test requirements.

- Training Needs

Throughout the consultation, the Council tried to assess the level of understanding about the risks and potential for health problems. In general there was not a good understanding of the risks or an appreciation of what might cause unsafe drinking water. Owners of these systems need information on safe water practices in the same way as they need guidance on safe food handling practices. Such training and education could be provided through the local Health Unit with support and coordination from the Ministry of the Environment, the Ministry of Health and Long-Term Care, and the Walkerton Clean Water Centre.

The “*Public Water Health Inspectors*” will also need training on a wide range of water related subjects and on the use of the drinking water health Protocols. This training could be coordinated by the Walkerton Clean Water Centre as well.

Through out the consultation process the Council heard a number of specific suggestions and ideas for improving the current Regulation. These suggestions are summarized in Appendix 6, along with the Council’s response and comments. In many cases, the new approach recommended by the Council addresses the suggestions or concerns.

Summary of Recommendations

- 1. The Council recommends an alternative approach to managing smaller, private water systems, in that the current Regulation 170/03 will not be able to adequately address the majority of issues and concerns from smaller, private system owners and operators, even with specific amendments.**
- 2. The Council recommends that the Regulation 170/03 should remain status quo for Non-Municipal Year-Round Residential systems, notwithstanding specific regulatory amendments proposed by the Ministry of the Environment.**
- 3. The Council recommends that local municipalities should assist Non-Municipal Year-Round Residential systems in upgrading their systems to the standards for Large / Small Municipal Residential systems.**
- 4. The Council recommends that the provincial grant program be extended to support local municipalities to enable them to provide assistance to Non-Municipal Year-Round Residential systems.**
- 5. The Council recommends a risk-based, site-specific approach for 5 of the 8 “Categories of System” under Regulation 170/03, which include: Large Municipal Non-Residential, Small Municipal Non-Residential, Non-Municipal Seasonal Residential, Large Non-Municipal Non-Residential, and Small Non-Municipal Non-Residential; as well as any Designated Facilities within the 5 categories**
- 6. The Council recommends that the risk-based, site-specific approach be outcome-based, anchored by compliance with the Ontario Drinking Water Quality Standards.**
- 7. The Council recommends a transfer of responsibility to Public Health Units to administer the safe drinking water programs for all commercial and institutional systems that serve the public.**
- 8. The Council recommends a re-alignment of the current “Categories of System” under Regulation 170/03 to allow: Non-Municipal systems to be managed by a risk-based, site-specific approach; except for Non-Municipal Year-Round Residential systems, which are to be regulated under Regulation 170/03, through assistance from the local municipality.**
- 9. The Council recommends that the current Regulation 170/03 be replaced with a single regulation, which empowers the Health Units with the new role of the administration of safe drinking water programs for all commercial and institutional systems that serve the public.**

10. The Council recommends that a set of Protocols, in consultation with this Council, be developed to guide the Health Units in undertaking site-specific risk evaluations, requirements, inspections, and the development of site-specific risk management plans.
11. The Council recommends that the site-specific risk-based approach should be financed with a user fee, as well as additional provincial funding, where required, to facilitate start up costs, and to augment circumstances where user fees may be unaffordable.
12. The Council recommends that testing frequency could be altered under certain circumstances, but would be dependent upon the risk-based evaluation by the “*Public Water Health Inspector*”.
13. The Council recommends that all surface water source drinking water systems should require some form of treatment, to be determined by the site-specific risk evaluation process.
14. The Council recommends that the Ministry of the Environment consider allowing the use of validated alternative testing methods (that indicate the presence / absence of bacteria), where traditional sampling and testing methods are not practical.
15. The Council recommends that the Ministry of the Environment work with the analytical testing industry to ensure the efficacy of alternative testing methods (that indicate the presence / absence of bacteria), and that such companies be accredited and licenced by the Ministry of the Environment.
16. The Council recommends that the sign posting option be available on a permanent basis; however, its application should be part of the risk-based requirements.
17. The Council recommends that the Ministry of the Environment work with the water treatment equipment industry to develop a system to pre-approve or certify treatment equipment. Such pre-approved systems will assist the “*Public Water Health Inspector*” to identify appropriate treatment options and should reduce costs to owners.
18. The Council recommends that the Ministry of the Environment develop and implement an education and outreach program for the owners and operators of smaller, private systems, as well as municipal authorities, with the support and coordination of the Ministry of Health and Long-Term Care, and the Walkerton Clean Water Centre.
19. The Council recommends that the Ministry of the Environment develop and implement a training program for the specialized “*Public Water Health Inspectors*”, who will be administering the safe drinking water programs for smaller, private systems. This training could also be coordinated by the Walkerton Clean Water Centre.
20. The Council recommends that the Ministry of the Environment conduct formal generic risk assessments for all classes of small systems going forward, to provide a more rigorous basis for an improved risk evaluation by the “*Public Water Health Inspector*”.

- 21. The Council recommends that the Ministry of the Environment perform an inventory of the numbers of all categories of water systems in Ontario.**
- 22. The Council recommends that there be regular reporting on the progress of implementing the proposed new approach.**

Appendix 1: Summary of Conclusions (Part One Walkerton Inquiry)

- In May, 2000, Walkerton's drinking water system became contaminated with a deadly bacteria, *E. coli* O157:H7.
- Seven people died, and more than 2,300 became ill. Some people, particularly children, may endure lasting effects.
- The contaminants, largely *E. coli* O157:H7 and *Campylobacter jejuni*, entered the Walkerton system through Well 5 on or shortly after May 12, 2000. The primary, if not the only, source of the contamination was manure that had been spread on a farm near Well 5. The owner of this farm followed proper practices and should not be faulted.
- The outbreak would have been prevented by the use of continuous chlorine residual and turbidity monitors at Well 5.
- The failure to use continuous monitors at Well 5 resulted from shortcomings in the approvals and inspections programs of the Ministry of the Environment. The Walkerton Public Utilities Commission (PUC) operators lacked the training and expertise necessary either to identify the vulnerability of Well 5 to surface contamination or to understand the resulting need for continuous chlorine residual and turbidity monitors.
- The scope of the outbreak would very likely have been substantially reduced if the Walkerton PUC operators had measured chlorine residuals at Well 5 daily, as they should have, during the critical period when contamination was entering the system.
- For years, the PUC operators engaged in a host of improper operating practices, including failing to use adequate doses of chlorine, failing to monitor chlorine residuals daily, making false entries about residuals in daily operating records, and misstating the locations at which microbiological samples were taken. The operators knew that these practices were unacceptable and contrary to Ministry of the Environment guidelines and directives.
- The Ministry of the Environment's inspections program should have detected the Walkerton PUC's improper treatment and monitoring practices and ensured that those practices were corrected.
- The PUC commissioners were not aware of the improper treatment and monitoring practices of the PUC operators. However, those who were commissioners in 1998 failed to properly respond to a Ministry of the Environment inspection report that set out significant concerns about water quality and that identified several operating deficiencies at the PUC.

- On Friday, May 19, 2000, and on the days following, the PUC's general manager concealed from the Bruce-Grey-Owen Sound Health Unit and others the adverse test results from water samples taken on May 15 and the fact that Well 7 had operated without a chlorinator during that week and earlier that month. Had he disclosed either of these facts, the Health Unit would have issued a boil water advisory on May 19, and 300 to 400 illnesses would have been avoided.
- In responding to the outbreak, the Health Unit acted diligently and should not be faulted for failing to issue the boil water advisory before Sunday, May 21. However, some residents of Walkerton did not become aware of the boil water advisory on May 21. The advisory should have been more broadly disseminated.
- The provincial government's budget reductions led to the discontinuation of government laboratory testing services for municipalities in 1996. In implementing this decision, the government should have enacted a regulation mandating that testing laboratories immediately and directly notify both the Ministry of the Environment and the Medical Officer of Health about adverse results. Had the government done this, the boil water advisory would have been issued by May 19 at the latest, thereby preventing hundreds of illnesses.
- The provincial government's budget reductions made it less likely that the Ministry of the Environment would have identified both the need for continuous monitors at Well 5 and the improper operating practices of the Walkerton PUC.

Appendix 2: Summary of Selected Case Studies (Microbial Disease Outbreaks)

The following case studies taken from the book *Safe Drinking Water - Lessons from Recent Outbreaks in Affluent Nations* demonstrate just a few of many other cases of waterborne disease outbreaks from other jurisdictions, demonstrating that safe drinking water is a global concern, even in first world nations.

In a Trailer Park in Moama, NSW, Australia, December 1989 to January 1990, it was estimated that as many as 2,000 of the 2,500 – 3,000 visitors became ill from viral gastroenteritis. Untreated river water was supplied to the site for shower and laundry facilities. Rainwater tanks were supposed to be used for potable water, but easy access to untreated river water made for common usage. A sewage pipe broke and contaminated the underground water storage supply. Conditions in the trailer park with limited toilet facilities led to secondary transmission. Lack of foresight in providing access to unsafe water allowed this outbreak to occur.

*In a village in Fife County, Scotland, March 1995, at least 633 became ill with *E. coli* O157:H7, including 5 children, 2 with HUS, but no deaths occurred. The village of 1,100 drew water from a local stream and chlorinated before distribution, but back siphonage occurred when a vegetable processor, who was connected to the village water supply, was also using untreated stream water, allowing untreated water into enter the village distribution system.

At a restaurant / motel on the Alaska Highway, Yukon Territory, June-July 1995, an estimated 294 to 1056 bus travelers and an unknown number of auto tourists became ill from drinking water at this restaurant. This tourist stop is used by bus tours and was supplied by two onsite wells. A septic pit for sewage was located down slope from wells, but dye testing showed that dye flushed down toilet appeared in one well, because lake water levels were able to transport septic contamination back up the hill to contaminate the well.

*Two towns in British Columbia, Creston & Erickson, experienced a *Giardia* outbreak in 1985, and again in 1990, with their untreated surface water source (Arrow Creek). Residents had become immune from prior outbreak(s), but newcomers or visitors became ill in 1990. Contamination was tracked to a beaver that was killed when the dam was blown up with dynamite.

*In Alpine, Wyoming, USA June 1998, 157 visitors from 15 states became ill; 71 cases of *E. coli* O157:H7; 4 cases of HUS, but no deaths. Drinking water was supplied from an underground spring, stored in underground concrete tank, and distributed untreated to community. The supply evidently was contaminated by wildlife feces; likely deer and elk.

*In La Neuveville, Switzerland, 1998, 2200 out of 3300 residents experienced gastroenteritis caused by 5 or 6 different pathogens. Drinking water was supplied by 2 wells near Lake Biemme, but a sewage lift station was located near the wells. A sewage lift pump failed and the alarm was ignored. This was a massive epidemic, but politicians did not wish to cancel forthcoming wine festival, despite this being the second outbreak there in 11 months.

At the Washington County Fair, New York, September 1999, 2800 – 5000 fell ill; 127 cases of *E. coli* O157:H7, 45 Campylobacter, 14 HUS, 71 hospitalized, 2 deaths (a 3-year old and a 79-year old). Drinking water was supplied by 6 shallow wells, but only 2 were chlorinated (intended for drinking or food). The concessions used unchlorinated well water. The well responsible for the contamination was located less than 11m from the septic tank seepage field. The New York State Department of Health released its report in March 2000, 6 weeks before the Walkerton outbreak. The pathogens discovered here were the same as those in Walkerton, and this outbreak had a similar failure mode: fecal contamination of a shallow well.

In a boarding school at Hawkes Bay, New Zealand, May 2001, 95 – 185 people became ill with campylobacteriosis. There was a spring fed water supply treated with a sand filter, softening, cartridge filter and UV disinfection. The source, however, was in fractured limestone hills above the school. An operator failed change a UV bulb to maintain UV disinfection and outbreak ensued. Contamination was likely common in this scenario, but the UV failure triggered the outbreak.

**Denotes small municipal system*

Appendix 3: Summary of Key Concerns and Recommendations from Public Consultations

Detailed summaries of the consultation summaries are available on the Council's website at:

www.odwac.gov.on.ca.

Cost

General

- Costs related to initial system installation or upgrades, ongoing maintenance, testing and monitoring will be prohibitive for many small system operators, such as community centres, churches, fairgrounds, conservation authorities, small businesses, mobile home parks, campgrounds.
- Base treatment and testing requirements on assessed risk to the system, should be done as follows: assessment by Public Health Units, funded by the Ministry of the Environment.
- Costs cannot be so prohibitive as to force business closures.
- Systems that have been upgraded prior to the Regulation should not have to be upgraded again.

Equipment

- Require treatment for small-system operators only when adverse results are found.

Certification

- If a small system operator proves a long history of clean water test results, do not make them engage an engineer to produce a report or to upgrade their treatment system.
- Develop a pre-approved system template to help reduce engineering costs for small system operators.

Testing

- The lack of testing facilities in rural areas adds to the cost of testing.
- Testing in remote areas, especially for tourist operators is challenging and costly.
- Reduce the required frequency of testing in order to reduce costs.
- Reduce the required range of tests where there is little risk – e.g. testing for pesticides in the North may be unnecessary.
- Reduce the required frequency of testing for organizations with high technology filtration and security processes already in place.
- Allow operators of small systems to conduct the testing themselves and only require outside testing when there are adverse results.
- Allow daily turbidity monitoring versus on-line monitoring

Funding

- The province should provide funding for treatment equipment and testing for small system operators.
- The province should provide funding for smaller municipalities that can't afford the system upgrades.
- The province should provide provincial tax refunds on water treatment equipment and expenses.
- There should be a similar commitment from the government as was provided with the Nutrient Management Act – no organization will be forced to close because they can't afford the system upgrade costs.
- Mobile home owners should be subsidized due to low income and elderly, at –risk population

Responsibility

- There is a need for an arms-length body that can provide advice on compliance, equipment, monitoring, etc. without the fear of enforcement.
- Public Health Units should be responsible for water testing – under the purview of the Ministry of Health and Long-Term Care.
- Public Health Units have experience in testing small systems; are accessible to small operators; and can do the job for less cost.
- Public health inspectors should enforce Regulation 170/03.
- Public health inspectors are good sources of information for operators of small systems.
- Public Health Units will likely require additional human and financial resources to assume additional tasks under the Regulation.

Implementation

- Implementation timelines should be extended to allow organizations to absorb the treatment installation costs over two fiscal years.
- Some organizations felt the deadline of December 31, 2004 to notify the government of compliance or non-compliance should be extended.

Communication and Training

- The Ministry of the Environment should communicate more proactively with stakeholders that must comply with the Regulation, as many of them are unaware of the scope of the requirements.
- The Ministry of the Environment should provide a clearly worded summary of the Regulation, as most people do not understand the Regulation, how it applies to them, and what they must do to comply.
- A breakdown of the 8 categories would be useful, even to the point of splitting the Regulation up into 8 new regulations.
- The Ministry of the Environment should provide training for people who have not previously been responsible for water distribution.

- Operators of small systems may not know where to turn for advice when they receive adverse test results. More support is required from the Ministry of the Environment.
- Ministry of the Environment inspectors should provide advice to operators to reduce consulting costs.
- The Ministry of the Environment should provide further guidance on acceptable treatment systems and information on certified installers. Many small organizations are uncomfortable investing in treatment equipment if it will not be acceptable to the Ministry of the Environment
- The minimum requirement of a grade 12 education to become a certified system operator is problematic since many skilled system operators do not have a grade 12 education.
- Community Colleges may see this a new area of programming that they can develop
- Clean Water Centre of Excellence in Walkerton could / should be involved in training.

Legislation

- Bottled water should be as closely monitored and regulated as small non-municipal, non-residential systems.
- Source water should be regulated in conjunction with drinking water.

Exemptions / Options

- A number of organizations suggested that they should be exempt from the Regulation, including:
 - Churches and community centres, because many said they will be forced to close because they can't afford the necessary system upgrades;
 - Remote tourism operators, especially because of the difficulty and cost of frequent testing;
 - Small bed and breakfasts, who are on residential water systems;
 - Small businesses, because many said they can't afford the necessary system upgrades; and
 - Mining operations, which fall under the Regulation because they exceed the cut-off limit in pumping capacity, but not the actual distribution volume.
- A number of organizations asked to be allowed the option of permanent sign posting rather than treat the water, although several suggested that this would have effects on tourism and posed potential risks (i.e. for children who can't read).
- Generally provide some options so that owners / operators can have a choice that suits their needs while still providing safe water.

Reporting

- Simplify the reporting process and make it less onerous by requiring only annual summary reports of water test results, except for adverse results, which must immediately be reported to the local Medical Officer of Health.

Wells

- Well inspections should be emphasized to a greater degree; greater diligence in this area would reduce improper installation and susceptibility to potential groundwater contamination.
- Consider a well permitting system.
- Put greater emphasis on more frequent testing of the structural integrity of wells.

Treatment Options

- Participants expressed concerns about chlorination treatment due to its unknown effects on health, environment and septic systems.

Liability

- Clarify liability and insurance issues for small system operators, such as churches, community centres, etc.
- Clarify liability and insurance issues for private owners of communal wells.

Appendix 4: Relevant Information on the New Zealand Risk-Based Approach

Background: Development of Drinking Water in New Zealand Since 1992⁵

In 1992, the public health oversight of drinking-water management in New Zealand became evident after seven years of central and local government restructuring. An independent survey in 1989 had shown that 45 to 50 percent of water supplies did not monitor their chlorine dosage satisfactorily, 28 percent never tested the bacteriological quality of water after it entered the distribution system, and another 30 percent carried out testing only four times per year.

The Department of Health was restructured into the Ministry of Health in 1993, and an initial appraisal of the public health safety management of the drinking-water industry was carried out. The opportunity was taken to fundamentally review and restructure the process of public health management of drinking-water.

In 1998, nearly 99 percent of the supplies, that failed to comply with the bacteriological requirements of the drinking-water standards, were systems that serviced fewer than 5,000 people. Many of these systems were or still are in poor, dispersed rural communities that do not have ready access to laboratory facilities, and also have relatively high per capita costs for both treatment and monitoring, compared to larger urban systems.

The existing legislative framework for drinking-water was found to be fragmentary and outdated, reflecting its roots in English legislation from the 1800s and the redistribution of portions of the health portfolio amongst numerous agencies between 1987 and 1993. Consequently, New Zealand's Ministry of Health chose to develop a management approach based on non-regulatory intervention.

The Management Approach

To improve the public health management of its drinking-water supplies, New Zealand's Ministry of Health developed an integrated management system in which the various components complement, and mutually reinforce each other.

The management programs are designed to promote maximum interaction and mutual support amongst the various stakeholders, the public, the drinking-water supplier, and the public health officer. Emphasis is on using risk management planning techniques to promote a quality assurance approach.

This approach is complemented by a monitoring program, used as a final quality control, which also acts as a feedback loop and provides a trigger for remedial action where necessary.

Some of the key public health management tools used:

- Enforceable drinking-water standards
- Monitoring of water supplies by owners / operators for drinking-water standards compliance, with surveillance by designated health protection officers
- Guidelines for drinking-water quality management, which provide information and advice on managing drinking-water supplies
- Guides for the preparation of public health risk management plans for drinking-water supplies and a 30 minute video to introduce risk management concepts to small drinking-water suppliers

Public health risk management plans

Traditionally, management of drinking water systems relied largely on monitoring the quality of the water produced to check that it complied with standards. While monitoring is always important, public health risk management plans for drinking-water supplies provide the additional benefit of reducing the likelihood of contaminants entering supplies in the first place. By the time monitoring shows that contaminants are present, something has already gone wrong and a hazard is already present in the water.

New Zealand's public health risk management plans encourage the use of risk-management principles during treatment and distribution so that monitoring is not the only technique used to reduce the risk of contamination. These plans are encouraged and are currently being proposed to become a statutory requirement.

No difficulties are anticipated with the larger systems, but a substantial proportion of the smaller suppliers will not have the resources to facilitate a public health risk management plan.

To assist owners / operators in developing and implementing public health risk management plans, New Zealand's Ministry of Health has developed public health risk assessment module guides that cover the major elements of drinking-water quality protection. These guides provide the basis for the development of specific public health risk management plans for individual systems by selecting the components that are relevant to that supply. The owners / operators undertake this in a self-assessment process

The approach used is to provide a set of module guides for each individual stage of a particular drinking-water supply, including:

- Catchment management
- Raw water storage reservoir management
- Pre-treatment
- Coagulation and flocculation
- Preliminary solid / liquid separation
- Filtration
- Disinfection
- Final treatment
- Distribution system
- Treated water storage

For each stage in a water supply, information is developed on:

- Risk assessment
- Risk causes
- Potential preventative measures and controls
- Comparative level of risk
- Corrective action
- Indicators of performance in preventative measure controls and corrective actions
- Process management
- Contingency plans

By selecting the modules that apply to their particular circumstances, each drinking-water owner / operator can develop a risk management plan for their whole supply that identifies their specific risks and the associated controls. From this, management priorities can be established, taking into account the overall benefits and costs. Guidance for this stage of the development of the public health risk management for the supply is provided in an overview document. As well, the 39 public health risk management plan guides were trialed by desk exercises in the four major centres and given three months' public consultation before being published. The guides are intended to be living documents and are updated as new information becomes available.

Accredited Drinking-Water Assessors

To promote consistent application of the new drinking-water legislation, the draft Bill provides for assessors who will monitor compliance with the Act. These assessors are to be approved by New Zealand's Ministry of Health. The Act will also provide that only laboratories that have been recognized may issue certificates that a specified parameter was in compliance with the drinking-water standards.

To enable the assessors to develop appropriate competencies, a list of their functions and requirements has been agreed upon and was used by the Water Industrial Training Organization to develop unit standards for a national New Zealand Qualifications Authority post-graduate diploma for drinking-water supply assessors.

Legislative Developments

The non-regulatory interventions in drinking-water management practice have resulted in improved drinking-water quality. In 2000, 81 percent of the population received drinking-water that is fully compliant with New Zealand's drinking-water standards.

To consolidate this progress, Cabinet instructed the Ministry of Health in December 2000 to prepare a Health Act Amendment Bill that will provide a statutory framework for the non-regulatory interventions that are presently operating. The amendment will strengthen and improve the existing legislation by:

- Placing duties on drinking-water suppliers to take all practicable steps to comply with drinking-water standards (and various other duties and powers ancillary to that)
- Providing a statutory framework for the promulgation of drinking-water standards
- Putting duties on the general public not to contaminate drinking-water supplies
- Requiring drinking-water systems to implement public health risk management plans
- Providing for officers designated by the Ministry to act as assessors to verify:
 - Compliance with standards
 - Implementation of public health risk management plans
 - Competence of water supply staff carrying out process and field analyses
- Requiring designated assessors to have their competence accredited by an internationally recognised conformance accreditation agency

To enable the drinking-water suppliers to adjust to the requirements of the new legislation, the Act will be phased in over five years. The larger water suppliers will have two years to comply and the smaller suppliers will have five years. Because it is expected that some of the smaller suppliers will have difficulties in developing the necessary resources, a working party consisting of central government, local government and small water suppliers has been formed to monitor and evaluate the impact of the legislation. This party will report back annually to the Minister on those suppliers not complying with the legislation, including the reasons for their non-compliance, and actions taken to effect compliance.

The Act will empower the Minister of Health to grant variations to the compliance requirements for a particular drinking-water supply, having regard to the potential risks to public health, the views of the local community, and the costs and benefits involved in cases where the working party set up to oversee the implementation of the Bill is satisfied that such variation is warranted.

Appendix 5: Relevant Information on the Oxford County Risk-Based Approach

On May 12, 2004, Oxford County Council endorsed a proposal for Public Health Units to monitor small municipal non-residential and small non-municipal, non-residential water systems in support of the concept of a reasonable testing procedure for small water systems, with alternatives to the current requirements of the Regulation. Several municipalities and organizations have voiced their concerns on the difficulties they will experience in trying to meet the current requirements of the Regulation.

Basic Issues and Concerns

- The costs are prohibitive for many of these facilities. For example: engineering evaluation, installation of treatment equipment, weekly water testing, reporting of adverse samples, annual reports, and training for the operators. The costs of compliance are estimated to be \$10,000 to \$20,000 per system initially and up to \$5,000 per year to operate.
- The Regulation assumes that all systems are causing health problems. Fortunately, there is no supporting evidence.
- There is no evidence that the investments proposed in the required upgrades and testing will do anything to improve water quality for most small facilities. Many of these systems serve facilities that are used sporadically. The water systems operate as needed.
- Upgrade concerns for intermittent use. Chlorination equipment can be prone to air locks, degradation of chlorine strength over time and oxidation of iron. UV equipment can provide excellent disinfection, but the units are prone to fouling if the water is hard or has high iron. This can make the unit ineffective quickly without frequent maintenance. Testing for Heterotrophic Plate Counts is an interpretation of general water quality. Using this test on an infrequently used system treated or not, is a guarantee of adverse results under the Regulation. Fortunately, this test is an indication of water quality and not an indication of health related problems.

Options and Management Consideration

County of Oxford staff feels that the Public Health Units can deal quite effectively with small water systems. A Protocol and a memorandum of agreement between the Ministry of Environment and the Ministry of Health and Long-Term Care needs to be developed that would facilitate the program. In order to minimize the analysis costs to the facility owner it is strongly recommended that the Ministry of Health and Long-Term Care amend current policy to enable regional public health laboratories to process water samples.

The Protocol would use a risk-based approach to evaluate and test small systems. The cost would be much less than the requirements of the current version of the Regulation.

Elements of the Protocol

- Risk assessment and inspection by the local Public Health Unit
 - Public Health Inspector completes a prescribed checklist to determine risk level
 - Training of public health inspectors in mechanical, chemical and other aspects potentially at the new Walkerton Training Centre
- Testing to be completed as per Regulation 170/03
- Based on the inspection and testing, follow-up requirements are to be conducted i.e.
 - A wellhead in a pit may have to be brought up to standards
 - A well that has bacteriological problems after remedial work and testing over time will require additional treatment works installed
 - Treatment systems installed will match the water quality test requirements
- Water analysis
 - Completed by a trained operator that liaises with the Health Unit
 - Analysis conducted at the Provincial Public Health Lab
 - Bacteriological testing to be conducted following a reduced frequency basis i.e. monthly following a year of 'clean' data then quarterly
- System records and inspections
 - Reporting requirements on treatment system operations and maintenance will be dependent on system installed and test results. A risk level would be assigned; a high-risk system would require more frequent reporting and filing of records. Low risk would be proportionately less frequent, criteria to be determined. Notification of adverse results to Health Unit required
 - Test results and system records to be maintained by owner
 - Biannual inspections by local Health Unit.
- Funding
 - The costs of the risk assessment, inspection and water analysis would be administered by the local Health Unit and resources provided by the Ministry of Environment through a Memorandum of Understanding. Alternatively, a cost recovery fee could be adopted for these services and charged back to the owner for administration of the program. Other models could be explored. If a cost recovery fee were to be levied for each system it would be estimated in the range of \$250 to \$375 per year annum.

Conclusion

The proposed Protocol represents a balanced approach to public health concerns that is cost effective and risk based. The proposed Protocol may require some fine-tuning but hopefully promote positive discussion and exploration of the options. It should be noted that the proposed Protocol is similar to the water sampling that was undertaken by Health Units twenty years ago.

Appendix 6: Summary of Specific Issues and Council Responses from Review

The Council also heard and considered many other issues, which are outlined here, along with the Council's response. These issues are consistent with the model being able to address them, but do not necessarily represent a significant change in approach.

- The Regulation should be rewritten in a form that lays out requirements for each water service or sector.

Council Response:

This suggestion formed option three as noted above. Although such an approach would make the regulations easier to understand, it would not address many of the concerns and difficulties.

- Many owners / operators have already installed treatment but may now be required to install *new* systems. Current treatment should remain in place unless testing indicates that improved treatment is required.

Council Response:

The Council agrees that systems that have already installed disinfection or treatment equipment should receive some form of credit for making the effort ahead of requirements under the Regulation. However, a time limit should be placed on them, and the system should be reviewed in 5 years or sooner if testing indicates that the treatment system is not effective. Under the proposed model, the need for upgrading equipment would be assessed as part of the risk review by the "Public Water Health Inspector".

- Remove the need for Heterotrophic Plate Count (HPC) testing and reporting of adverse results.

Council Response:

Currently, the Regulation does not require HPC testing for raw water, unless specified in a Certificate of Approval. The Council agrees that this testing should not normally be required, and is currently reviewing the appropriateness of HPC as an indicator of adverse water quality.

- Reduce the frequency of testing. This is based on the suggestion that testing is an indicator of the quality of the source water or effectiveness of the treatment system and not an assurance of safe water. The question remains what frequency of testing is appropriate.

Council Response:

The Council agrees that testing frequency could be altered under certain circumstances. The Council's proposed risk based approach would address the frequency of testing based on the security of the source water and the type of water protection, and may result in less frequent or more frequent testing than the current requirements of the Regulation.

- Reduce testing frequency for remote locations.

Council Response:

The Council recognizes the difficulties faced by remote facilities in getting water samples delivered on time and the extra cost of transporting samples. In fact, recommendation #40 of the Part Two Report of the Walkerton Inquiry suggests that the Ministry of the Environment determine the feasibility of alternate means of providing microbiological testing.

The Council requests that the Ministry of the Environment investigate the use of validated alternative testing methods (that indicate the presence / absence of bacteria), including the use of pre-packaged commercial test kits, where traditional sampling and testing methods are not practical.

- Establish a principle of significant usage. This would apply to residences where the frequency of public access is low, possibly less than 25% of the time, and where the family is the primary consumer of the potable water.

Council Response:

This could be considered by the local "Public Water Health Inspector" under the recommended model. The inspector, as part of the initial risk assessment, could address whether there was a significant level of public access to a facility.

- Implement recommendation #84 of the Walkerton report, which concerns financial assistance for water treatment system installations. It was noted that this was done for farms under the *Nutrient Management Act*. There is a likelihood that some facilities, such as small churches, bed and breakfasts and small tourist establishments will have to shut down. This will have an economic impact on small communities across the Province.

Council Response:

Recommendation #84 of part 2 of the Walkerton report noted that financial assistance should be available if other steps had already been explored to find the most economical solution. It would appear that this recommendation had in mind small residential and communal water systems and did not anticipate that the regulations would also be applied to small private and other non-residential systems. Some form of financial assistance should be available for the small residential systems. Assistance for the tourism industry could also be considered on a sectoral basis. The proposed model should help reduce the cost by matching the level of risk with the appropriate level of treatment.

- Remove the requirement for engineer's review for *smaller* systems

Council Response:

The Council recognizes that there are disproportionate costs for the very small systems needing an engineer's review and reporting on the treatment system. This could be resolved if there were pre-approved small systems available tied in with the risk-based evaluation by the local "Public Water Health Inspector". For larger, more complex treatment systems that require customized design, the role of the engineer should be maintained.

- Renew the testing services by the local Public Health Units for very small systems and businesses.

Council Response:

*Health laboratories may not have the capacity to handle the volume of tests, but would be expected to at least process the samples taken by the health inspectors. As such, the use of private laboratories is a practical alternative. If the health laboratories took on such testing, it would be expected that they would charge commercial rates for the service. There may be a shortage of services in northern Ontario. If so, the Province should support the development of additional capacity. The use of commercially available test kits previously mentioned should also be reviewed as a means of increasing capacity and simplifying screening for *E. coli* and total coliforms.*

- Reduce the use of Chlorine in smaller systems.

Council Response:

Systems that require only primary disinfection have options other than chlorine (such as UV). Chlorine and related products are only required for use with distribution systems. Chlorine and other related (disinfection) products could be reduced as a function of the original risk assessment.

- Provide an exemption similar to the residential exemption whereby communal systems with 5 or fewer residences are exempt from the regulation. Suggest definition for very small system such as Bed and Breakfasts with 5 rooms or 5 rental cottages, etc.

Council Response:

The Council is concerned that the public that patronize these businesses may not be adequately informed about the state of water quality and have a right to expect safe water along with all other health and safety considerations. This could be related to considerations on the primary use of the facility. The recommended model would address the issue of size and primary use when assessing risk and setting out sampling and treatment requirements. A guideline would need to be developed to assist the inspector in arriving in developing the site specific system plan.

- Need for inspectors with real field experience with water systems.

Council Response:

The Council agrees that inspectors should have practical experience in the field of water supply and treatment systems, and not rely only on experience and training in areas of inspection and enforcement. Under the proposed model, inspectors should be fully trained and have past experience with small drinking water systems and sources.

- Enhance source water protection as a first step. Improve well protection activities.

Council Response:

The Council agrees that source water protection and well protection are an essential part of the multi-barrier approach to risk evaluation as outlined in the “Proposal for Managing Smaller, Private Water Systems” section of this report. Inspections of new well installations could also be considered to complement the Council’s recommended approach.

- The exemption processes need to be simplified. They are seen to be too complex and costly.

Council Response:

The Council feels that the exemption processes currently available in the Regulation could be too complex and costly to pursue for small systems. The cost of seeking of an exemption could be greater than the cost of installing treatment. The proposed risk-based approach would address this issue.

- Need to clarify the exemption for facilities not on electrical service. This should mean not on a commercial grid rather than use of a private generator.

Council Response:

This does require clarification. The real question would appear to be whether there is full time power provided or whether the local generator is available only for brief time periods. A water treatment system would require a continuous power source.

- Special credit in terms of sampling frequency and reporting should be given to systems that have automatic shut off capability.

Council Response:

The proposed model addresses sampling frequency, reporting and other requirements based on an evaluation of risk and the capability of the system to meet the Provincial standard. Adjustments could be possible for systems with alarms and shut off capability.

- The regulation introduces unfair competition with similar businesses that receive water from a municipal system.

Council Response:

The Council heard that a number of small municipal systems were facing significant financial hardships as well. Under the current regulation these systems must comply with additional requirements.

- The paper trail for reporting and following up on adverse results is cumbersome and complex. It should be simplified.

Council Response:

Under the proposed model reporting requirements would be simplified. Reporting would be through the local Health Unit.

- Permit the use of approved commercially available test kits for bacteria samples.

Council Response:

The Council understands that special purpose test kits are available for the required bacteriological sampling and that these kits have proven to be effective and accurate. As elements of testing quality control are designed into the products at the manufacturing stage, complexity of analysis and potential for erroneous results are greatly reduced. This enables the effective use of such products outside of the confines of a full laboratory setting. As such, the Council recommends that the Ministry of the Environment permit the use of specific products, based on their proven effectiveness, in remote areas where access to laboratories is difficult.

- There should be an exemption for small churches and other social centres that are not for profit.

Council Response:

The Council does not agree that such systems should be automatically exempted. This is why the Council is recommending the risk evaluation approach administered by local Health Units. Under this approach local conditions can be taken into account. Frequent sampling and / or additional treatment may be required, based on local conditions.

- Don't require treatment if there is a proven history of safe water. Apply an "outcome-based" approach. Others suggested a "risk-based" approach.

Council Response:

The Council endorses a risk-based approach with the objective of drinking water supply systems being capable of meeting the Ontario Drinking Water Quality Standards. Our recommended approach built on this concept of evaluating risk.

- Make the requirements clearer. There is still confusion even among professionals and Ministry of the Environment inspectors.

Council Response:

The Council considered this option and agrees that the current regulations are complex and hard to understand. This in itself can lead to potential unsafe water supply situations. However rewriting the regulation in a form that clarifies the requirements will not address many of the concerns raised.

- Liability, insurance and mortgage issues need to be clarified.

Council Response:

The Council heard that these issues are occurring more frequently. Our recommended approach should make it easier for owners and operators of water supply systems to demonstrate that they have addressed any drinking water issues raised by financial institutions.

- There should be improved access to training and education programs.

Council Response:

The Council agrees with this suggestion and will discuss this issue with the Walkerton Clean Water Centre. The Council does not believe that the status of a “Trained Person” with formal training is the best approach for owners of very small systems that have been assessed by an inspector from the local Health Unit. If they are using a pre-approved treatment system under a maintenance contract, then an information and guidance program would be more useful.

- Allow point of use (POU) systems as an option for small communal water supplies.

Council Response:

There is a range of efficiency for POU devices. Health Canada has in the past assessed these and found many are not able to fulfill the claims of the manufacturer and in some cases, the device facilitated the colonization of bacteria. The efficacy of these units would have to be demonstrated. The other issue is that they require proper maintenance and for the end user to consistently follow the manufacturer’s directions.

- Discontinue testing requirements for pesticides and other contaminants that have long-term health affects.

Council Response:

The Council agrees that the full range of testing is not necessary for all small water supplies unless it is suspected that they are in a vulnerable area where these substances may be expected to be present or where significant changes may have occurred that could affect the source water. Regular but infrequent testing does not provide useful information about the current safety of the water supply. It does however provide the Ministry of the Environment with a useful information base on long-term water quality trends.

- Establish drop off centres for water samples to reduce the cost of delivering samples to laboratories (Particularly in the north).

Council Response:

The Council recognizes the difficulties faced by many owners in delivering their water samples to laboratories in a timely fashion, particularly in northern Ontario. The Council has recommended the use of testing packs to partially address the concern. The Ministry of the Environment, in consultation with the laboratory industry, should look into the potential of setting up sample drop off centres.

- For small residential systems with distribution systems, the operator must check the chlorine residual every day. This is often not practical. Suggest that the chlorine residual be checked weekly when other samples are taken.

Council Response:

This issue can be addressed by the Council's recommended risk-based approach administered by local Health Units. Under this approach, site-specific conditions can be taken into account, to adjust the required frequency of chlorine residual testing. It should be noted, however, that the Council feels strongly that chlorine residual checking is a valuable tool in assessing the effectiveness of a chlorination system, even when no distribution system is present.

- The provision that small drinking water system operators must provide notification of boil water advisories should be removed from the Regulation.

Council Response:

The Council disagrees with this suggestion on the basis that a Boil Water Advisory provides an immediate response to preventing water borne illness. This is an appropriate response to a potentially very serious event. The local Medical Officer of Health can then advise if the advisory should continue.

References

- ¹ Huck, 2000. Testimony to Walkerton Inquiry, October 16, 2000.
- ² New Zealand Ministry of Health, 2001. How to Prepare and Develop Public Health Risk Management Plans for Drinking-Water Supplies. Wellington, NZ (www.moh.govt.nz)
- ³ O'Connor, D., 2002. Part One Report of the Walkerton Inquiry.
- ⁴ Hrudey, S.E. and E.J. Hrudey, 2004. Safe Drinking Water – Lessons from Recent Outbreaks in Affluent Countries. IWA Publishing, London, UK, 486 pp.
- ⁵ Development of Drinking-Water Management in New Zealand since 1992. October, 2002.