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Our File No. 20035
September 7, 2001

VIA ELECTRONIC MAIL

The Honourable Dennis R. O'Connor
Commissioner
The Walkerton Inquiry
180 Dundas Street West, 22nd Floor
Toronto, Ontario
M5G 1Z8

Dear Commissioner O'Connor:

Re: Walkerton Inquiry - Part II - Ontario Water Works Association ("OWWA") and Ontario Municipal Water Association ("OMWA") - Summary Statements of Recommendations for Public Hearing # 6 on Issues 3 - Drinking Water Outbreaks; 5 - Drinking Water Standards; 7 - Measurement of Raw and Finished Water Quality; and 8 - Production and Distribution of Drinking Water

I am attaching four documents for Public Hearing # 6, on September 11, 2001.

1. A summary statement of recommendations prepared by Ms. Judy MacDonald, P. Eng. for Michael Brodsky on behalf of OWWA/OMWA. (The attached statement is based on a larger review prepared by Mr. Brodsky that was filed with the Commission in June 2001 on Issue 3).

2. A summary statement of recommendations prepared by Les Gammie, Ph.D. on behalf of OWWA/OMWA. (The attached statement is based on a larger review prepared by Dr. Gammie that was filed with the Commission in August 2001 on Issue 5).

3. A summary statement of recommendations prepared by Erika Hargesheimer, Ph.D. on behalf of OWWA/OMWA. (The attached statement is based on a larger review prepared by Dr. Hargesheimer that was filed with the Commission in August 2001 on Issue 7).

4. A summary statement of recommendations prepared by Ms. Judy MacDonald, P. Eng. on behalf of OWWA/OMWA. (The attached statement is

based on a larger review prepared by Ms. MacDonald that was filed with the Commission in August 2001 on Issue 8).

The recommendations contained in the attached statements are the same as those contained in the larger reviews. We would ask that each of these summary statements also be placed on the Commission website.)

I trust the above is satisfactory.

Yours truly,

"Joseph Castrilli"

Joseph F. Castrilli

Encl.
c.c. James Van Loon
c.c. Erika Hargesheimer, consultant to OWWA/OMWA
c.c. Les Gammie, consultant to OWWA/OMWA
c.c. Rod Holme, OWWA
c.c. Jim Craig, OMWA
c.c. Judy A. MacDonald, OWWA
c.c. John Braam, OWWA
c.c. Max Christie, OMWA
c.c. Doug James, OMWA
c.c. R.L. Beck, OMWA
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SUBMISSIONS BY THE
ONTARIO WATER WORKS ASSOCIATION ("OWWA")
AND THE
ONTARIO MUNICIPAL WATER ASSOCIATION ("OMWA")
BEFORE
MR. JUSTICE DENNIS O'CONNOR, COMMISSIONER
RESPECTING
PART II OF THE WALKERTON INQUIRY

STATEMENT ON ISSUE 3 - DRINKING WATER OUTBREAKS

FOR

PUBLIC HEARING 6
SEPTEMBER 11, 2001

PRESENTED BY

JUDY MACDONALD, P. ENG.
ON BEHALF OF MICHAEL BRODSKY
COUNSULTANT TO OWWA/OMWA

In Summary:

1. **Water utilities should engage in constant monitoring of performance parameters, such as turbidity, particle counting, free and residual chlorine and pH, as these measures offer a more preventative approach than intensive microbiological monitoring activities.**

   Ms. Hargesheimer has highlighted the need for water quality monitoring in her paper and her statement today.

2. **Drinking water must be kept pathogen-free water by (a) selecting high-quality, uncontaminated source waters, (b) applying efficient treatment**

and disinfection measures to water, and (c) protecting water from contamination during distribution to the user.

This represents the multiple barrier concept which the OWWA/OMWA has endorsed in the Issue 8 Response Report.

3. **Public health protection requires a preventive approach to detect and correct problems before they affect the quality of the finished water supply. The development of a formal framework for water quality management incorporating preventive management principles and elements of internationally recognized risk management systems such as Hazard Analysis Critical Control Point (HACCP) is paramount.**

   This entails implementing the best management practices and continuous improvement programs that the OWWA/OMWA has endorsed in the Issue 8 Response Report.

4. **Consideration should be given to establishing "sentinel systems" to enhance microbiological monitoring in smaller communities and to complement DWSP. These "sentinel systems" would require the collection of water potability data from various "high risk" locations (e.g. loops, end of line, etc.) throughout the distribution system on a more frequent basis. These samples would be analyzed for microbial parameters with results communicated accordingly.**

   The distribution system is the last barrier before the consumer's tap. A better understanding of the reasons for water quality deterioration in the distribution system is important because research suggests that the rate of gastrointestinal illnesses increases with water quality degradation in the system. Requiring "sentinel systems" or sanitary surveys for small systems and distribution system water quality modeling for larger systems to select

sampling and monitoring locations would be an enhancement to the process. This was also discussed in the Issue 8 Response Report.

STATEMENT ON BEHALF OF THE
ONTARIO WATER WORKS ASSOCIATION ("OWWA")
AND THE
ONTARIO MUNICIPAL WATER ASSOCIATION ("OMWA")
BEFORE
MR. JUSTICE DENNIS O'CONNOR, COMMISSIONER
RESPECTING
PART II OF THE WALKERTON INQUIRY

STATEMENT ON ISSUE 5 - DRINKING WATER STANDARDS

FOR

PUBLIC HEARING 6
SEPTEMBER 11, 2001

PRESENTED BY

LES GAMMIE, Ph.D.
CONSULTANT TO OWWA/OMWA

INTRODUCTION

Good morning Commissioner O'Connor. I am appearing before you today as a consultant to the OWWA/OMWA.

I will be making a statement to you this morning related to Issue 5 – Drinking Water Standards. As you know, Issue 5 arose from the Commission's original list of Part II Issues released in August 2000 and amended in December 2000.

My comments to you today on Issue 5 matters are based on a larger report that was filed with the Commission by OWWA/OMWA in August 2001. That report and the recommendations that follow address a number of concerns including the need for adequate standards for microbiological contamination, assessment of parameters as standards, certification of materials, explanation on pesticide limits, and a stakeholder review of proposed guidelines/standards.

DRINKING WATER STANDARDS

The recommendations of OWWA/OMWA contained in my report urge the Commission to recommend adoption of the following actions by the Ontario Government regarding drinking water standards:

1. **That the Government of Ontario develop an overall management strategy for drinking water supply from the source to the customer's tap and encourage the federal government to do the same.**

   There is an absence of an overall management strategy for drinking water protection from the source, through treatment to the customer's tap, to ensure that drinking water always meets the required standards. Current areas of responsibility are housed in diverse areas of government including environment, health, municipal affairs, industry and agriculture. The strategy should include reference to standards as an essential part of an overall "multiple barrier" approach, adequate monitoring to identify problems, source water protection, level of treatment required, ongoing system evaluation, corrective actions and emergency response when required, defined responsibilities for all players, and adequate training of personnel. In addition, water providers should be encouraged to supply water that is far better than required by the standards as part of a continuous improvement and best management practices approach.

2. **That the Government of Ontario maintain one set of standards for water quality for all waterworks systems in the province, but also ensure that small systems have the technical and financial capabilities to meet the standards.**

   All customers are entitled to the same quality of water. Smaller systems with fewer resources will likely need more technical and financial assistance to meet the required standards.

3. **That the Government of Ontario request Health Canada to provide clear public information on the rationale for setting of water quality standards, particularly for pesticides, since standards vary widely between countries.**

   There are wide variations between countries on the regulated types and acceptable levels of pesticides (and other trace organics). The public requires more of an explanation as to why this occurs, and also some assurance that levels of pesticides lower than the stated limits are of little concern.

4. **That the Government of Ontario continue to support the current system of development of Drinking Water Guidelines with Health Canada providing the assessment and supporting documentation and the federal-provincial drinking water sub-committee setting the guidelines.**

   It makes more sense to have one central authority setting overall water quality guidelines, than for each Province to individually be determining acceptable toxicity levels for a wide-range of contaminants. The current approach should be departed from only where a substance may be found or used in a particular province but not all provinces or where an emergency situation dictates provincial reliance on standards only found in the laws of other countries or in the protocols of recognized international bodies.

5. **That the Government of Ontario request Health Canada to apply more resources to the task of evaluating the risks and setting of guidelines for the backlog of contaminants on their drinking water priority list.**

   The Federal-Provincial sub-committee on drinking water currently have a large number of parameters on their priority list for review, and it often takes 2-3 years for a review to be completed, with the result that only the very high priority items will likely be resolved in the near future. Current assessment parameters include turbidity, algal toxins, MCPA, haloacetic acids,

trihalomethanes, protozoa and viruses, and the future priority list includes arsenic, chloral hydrate, copper, dichlorprop, haloacetonitriles and MTBE. Further suggested assessments include acrylamide, chlorine, nitrate and nonylphenols. Health Canada also has recently announced a study into the presence of pharmaceutical compounds in water.

6. **That the Government of Ontario request that Health Canada proceed with the re-introduction of the Drinking Water Materials Safety Act which would require accreditation of materials that come into contact with drinking water.**

   Implementation of this act would provide formal protection against contaminants such as acrylamide and epichlorohydrin in polymers, lead content in brass fixtures, and other contaminants in piping materials, coatings, caulking materials, lubricants, and treatment chemicals. Originally introduced into Parliament in 1996 (died on the order paper).

7. **That the Government of Ontario maintain an online database of waterborne outbreaks for the province, and request Health Canada to do the same for the whole of Canada.**

   An online database should provide information on historical and current outbreaks, with information on causative organisms, number of people affected, dates of duration, and actions taken, so as to highlight the incidence of waterborne disease, and help justify improvements in treatment and watershed protection.

8. **That the Government of Ontario look at setting more formal requirements for control of protozoan parasites and viruses through watershed protection measures and adequate treatment processes.**

   A minimum 3-log Giardia and 4-log virus inactivation requirements are listed in an appendix to the current version of the Ontario Drinking Water Standards (January 2001), but little information is provided on how to decide if the

minimum requirement is adequate, and how different treatment options could be used to meet the requirements. No requirements for control of protozoans or viruses are required in current Canadian Drinking Water Guidelines (March 2001). Water utilities need guidance on the level of treatment required for adequate protection against different levels of microbiological contaminants. Any approaches should recognize existing requirements such as those set out in the USEPA Surface Water Treatment Rule.

9. **That the Government of Ontario set requirements for adequate monitoring of microbiological risks for each water system, so that the treatment systems can be designed to meet the full range of actual contaminant loadings.**

   Source water for each water system should be adequately monitored for a number of years for microbiological risk, so that the range of seasonal variations and peaks during rainfall or runoff events can be characterized. Once the full range of microbiological challenge is identified then the treatment system can be designed or optimized to meet standards even in the worst case conditions.

10. **That the Government of Ontario institute an ongoing formal review by stakeholders in the province for any proposed drinking water standard.**

    To ensure that any proposed drinking water standard is achievable and meets the need that it is addressing, a formal review process should be set up to include representatives of all stakeholders (water utilities, environmental groups, government, industry, agriculture, etc).

11. **That the Government of Ontario set out a clear definition of "surface water", "groundwater", and "ground water under the influence of surface water", to allow setting of required treatment standards for each type of source.**

Any groundwater source which is characterized by rapid changes to water quality indicators such as turbidity, conductivity, or any microbiological parameter must be classed as directly influenced by surface water, and treatment based on surface water requirements.

STATEMENT ON BEHALF OF THE
ONTARIO WATER WORKS ASSOCIATION ("OWWA")
AND THE
ONTARIO MUNICIPAL WATER ASSOCIATION ("OMWA")
BEFORE
MR. JUSTICE DENNIS O'CONNOR, COMMISSIONER
RESPECTING
PART II OF THE WALKERTON INQUIRY

STATEMENT ON ISSUE 7 - MEASUREMENT OF SOURCE AND FINISHED WATER QUALITY

FOR

PUBLIC HEARING 6
SEPTEMBER 11, 2001

PRESENTED BY

ERIKA HARGESHEIMER, Ph.D.
CONSULTANT TO OWWA/OMWA

INTRODUCTION

Good morning Commissioner O'Connor. I am appearing before you today as a consultant to the OWWA/OMWA.

I will be making a statement to you this morning related to Issue 7 – Measurement of Source and Finished Water Quality. As you know, Issue 7 arose from the Commission's original list of Part II Issues released in August 2000 and amended in December 2000.

My comments to you today on Issue 7 matters are based on a larger report I prepared that was filed with the Commission by OWWA/OMWA in early August 2001. That report and the recommendations that follow address a number of concerns including monitoring parameters, laboratory testing methods, design of monitoring programs, small systems issues, and related matters.

MEASUREMENT OF SOURCE AND FINISHED WATER QUALITY

The recommendations of OWWA/OMWA contained in my report urge the Commission to recommend adoption of the following actions by the Ontario Government regarding measurement of source and finished water quality:

1. **That the Government of Ontario conduct a gap analysis for monitoring and analysis requirements, including consideration of the roles of on-site analysis, contract/provincial laboratories, as well as the use of test kits and online monitoring. Consider monitoring requirements for distribution system integrity, source water protection and optimizing treatment processes (e.g., disinfection/contact time).**

The new drinking water standards and associated regulations are a big step towards ensuring safe and reliable drinking water supplies in Ontario. After the programs have been in place for a period of time, a gap analysis to determine whether regulations are effective or need to be expanded should be conducted. This assessment would also include a value audit. Sections 3, 4 and 5 of my report provide detailed background on practices in other jurisdictions and other monitoring needs for which regulations have not been developed.

2. **The Government of Ontario should evaluate the criteria used to define small systems. The impacts of the regulations and standards on small systems and their ability to comply should also be evaluated. The Government of Ontario should consider whether small systems need more time to comply with new regulations.**

Section 7 of my report discusses small systems issues. According to Allen *et al.* (2000), more than 75% of Canada's public water systems serve communities with populations under 10,000. Clearly, there are municipal systems included in Ontario's definition of large waterworks that will have considerably more difficulty meeting the requirements of Ontario's Drinking Water Protection Regulation than municipal systems run by large cities such as Toronto, Ottawa or Hamilton.

Ontario's definitions of large and small waterworks are very different from those currently used by the U.S. EPA. In the United States, small systems are defined as those utilities serving less than 10,000 people. Small systems were given more time to make improvements and get ready to comply with the regulations before these regulations became applicable to these systems. In the

United States, there is a great deal of information available to small systems to help explain the regulations as well as present case studies of the cost of small system compliance, such as:

- http://www.dep.state.pa.us/dep/deputate/watermgt/WSM/Facts/EPA-LT1ESWTR.htm;
- http://www.epa.gov/safewater/smallsys.html;
- http://www.epa.gov/safewater/smallsys/ndwac/regfinal.pdf

The proposed new U.S. EPA Long Term 1 Enhanced Surface Water Treatment Rule applies to public water systems using surface water or ground water under the direct influence of surface water that serve less than 10,000 people. Effective 2004, small systems in the United States will be required to meet the same turbidity requirements that have been in force for large and medium systems since 1998. The U.S. EPA will require systems serving (http://www.dep.state.pa.us/dep/deputate/watermgt/WSM/Facts/EPA-LT1ESWTR.htm) between 3,300 and 10,000 populations to meet the same requirements as large systems. Also, two other categories being considered are systems less than 3,300 population, but with more than 2-3 filters and then those with less than 2-3 filters.

As part of the development process for the U.S. EPA's Long Term I Enhanced Surface Water Treatment Rule, EPA spent a considerable amount of time and effort in evaluating the impact of any rule on small systems. Perhaps most importantly, the U.S. EPA asked what kind of technical assistance would be most beneficial to small surface and "groundwater under the influence of surface water" systems. The U.S. EPA also recognized that small systems face data gathering, record keeping and reporting issues under the proposed new regulations. Further issues facing small utilities are issues surrounding instrument installation, and maintenance to ensure reliable operation.

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3. The Government of Ontario should investigate whether the number of samples collected is adequate to characterize a distribution system and the quality of the water reaching consumers in that system. The factors that should be considered include:

a) whether one sample per week is adequate protection for the population served,

b) When water utilities collect the samples (i.e. are samples evenly spread throughout the month or is a utility that serves up to 100,000

people choosing to take one sample per week for three weeks of a month and the remainder in the fourth week)

c) How many water utilities have voluntarily increased the number of samples taken and at what cost? What benefits have been attained from extra sampling and are costs offset?

d) What level of monitoring does the public expect and are they prepared to pay a premium for additional monitoring?

e) Are there differences between surface water and groundwater systems, small systems and large systems?

f) The analysis should assess what types of analysis are required in distribution systems and question the rationale of testing only 25% of the samples for Heterotrophic Plate Count.

Several sub-sections in Section 4 of my report deal with sampling issues. Section 5 describes the elements of monitoring program design. The issue of sample collection and cost of monitoring programs must be balanced against the protection of public health and customer assurance of consistently excellent water quality. Evaluating the above points would better clarify the sampling practices in Ontario and provide scientific justification for the level of sampling stipulated in the regulations.

4. The Ontario Government should expand Section 13 of Ontario Regulation 459/00 regarding the water works reviews in the manner suggested by the OWWA/OMWA in this Review. In particular, the province should focus on:

a) Development and implementation of a monitoring program that includes plant process control requirements as well as distribution system requirements

b) A review of the "state of readiness" of the utility to undertake the recommended plant process control and distribution system monitoring program should be completed, including a physical

inspection of existing online instrumentation, a review of their installation, maintenance and operation.

c) **A review of standard operating procedures for flushing, main replacement programs, main repair procedures, including chlorination practices and sampling strategies should be included in the water works review.**

d) **Development and implementation of a monitoring program that distinguishes between compliance monitoring, process optimization monitoring and response monitoring. It should include details of sampling sites and frequencies, the rationale for the sampling sites, collection methods and field analyses.**

e) **Development and implementation of a monitoring program that includes "chain of custody" protocols. The protocols should consider the feasibility of requiring that staff not associated with the treatment plant process be responsible for collection of distribution system samples.**

f) **Consider implementing monitoring program reforms in the next 18 months to three years**

The Ontario Ministry of the Environment Terms of Reference for Engineers' Reports for Waterworks (August 2000) describes the requirements of the engineering review of water treatment facilities. These engineering reviews and reports are an excellent step towards ensuring high quality treatment processes and consistent drinking water quality. The points listed above should be evaluated as possible future focus for changes and additions to the scope of work in Engineers' Reports. Engineers' Reports will be completed by utilities at considerable expense and it will be important to do a "value audit" on these reports as well as how they might be improved.

5. **The Government of Ontario should work with appropriate stakeholders to develop the above noted "chain of custody" protocols for drinking water sampling and "standard operating procedures" for flushing, chlorination, sampling/analysis during any distribution system main**

disruption, etc. The sampling protocols and standard operating procedures will need to address field test kit and online monitoring requirements, as well as training, installation and maintenance requirements. In addition, consideration must be given to issues and challenges relating to small systems.

6. **The Government of Ontario should ensure the Ministry of the Environment's testing methods comply with standard methods (i.e., 48-h storage time for microbial tests be revised to the accepted Standard Methods) and ensure that standard methods for monitoring turbidity, disinfection residual and other regulated parameters.**

An Ontario Ministry of the Environment Technical Brief entitled "Water sampling and testing for microbiological parameters" (November 2000), indicates that:

> *"Samples for microbiological analysis should be analyzed within 48 hours, to ensure the most reliable results. Samples that have not been refrigerated must be analyzed within four hours of sample collection."*

These specifications for holding time are not consistent with those specified in *Standard Methods (1999).* It is important to ensure that all methods used for regulatory compliance conform to standard reference methods or the deviations have been scientifically assessed to ensure that results are not compromised by the changes.

7. **The Government of Ontario should consider the value of seasonal source water monitoring programs for *Giardia* and *Cryptosporidium,* except in cases where clear evidence exists that the source water is not at risk from contamination by these pathogens.**

8. **The Government of Ontario should work with stakeholders to clearly define criteria for "Ground Water Under the Direct Influence of Surface Water".**

In the documents I reviewed, I was not able to find a clear definition of the criteria used to categorize groundwater as "groundwater under the direct

influence of surface water." Clearly defined indicators for making a determination in this matter are needed, such as variations in turbidity or color with rainfall or runoff events, presence of Coliform bacteria or E. coli or presence of nitrates. Information gathered through Ontario's Drinking Water Surveillance Program may be a useful long-term database that may help identify key indicators of surface water intrusion. Because of the significant difference in treatment requirements for groundwater and groundwater under the direct influence of surface water, drinking water utilities are looking for clear direction and guidance on this issue.

9. The Government of Ontario should review whether the public is reading the water quality reports, and if not, how they should be improved.

Section 8 of my report discusses water quality reports. Water quality reports have been required in the United States for several years. Review of the U.S. experience with consumer understanding and value of the reports could be enlightening. In Ontario, it would also be useful to assess whether members of the public read and understand water quality reports. The information would enable changes to be made to enhance the value of the reports.

SUBMISSIONS BY THE
ONTARIO WATER WORKS ASSOCIATION ("OWWA")
AND THE
ONTARIO MUNICIPAL WATER ASSOCIATION ("OMWA")
BEFORE
MR. JUSTICE DENNIS O'CONNOR, COMMISSIONER
RESPECTING
PART II OF THE WALKERTON INQUIRY

STATEMENT ON ISSUE 8 - PRODUCTION AND DISTRIBUTION OF DRINKING WATER

FOR

PUBLIC HEARING 6
SEPTEMBER 11, 2001

PRESENTED BY

JUDY MACDONALD, P. ENG.
COUNSULTANT TO OWWA/OMWA

INTRODUCTION

Good morning Commissioner O'Connor. I am appearing before you today as a consultant to the OWWA/OMWA.

I will be making a statement to you this morning related to Issue 8 – Production and Distribution of Drinking Water. As you know, Issue 8 arose from the Commission's original list of Part II Issues released in August 2000 and amended in December 2000.

My comments to you today on Issue 8 matters are based on a larger report I prepared that was filed with the Commission by OWWA/OMWA in late August 2001. That report and the recommendations that follow address a

number of concerns including best management practices, treatment and distribution, as well as capacity development.

Best Management Programs

1. **That any proposed legal or regulatory regime on drinking water in Ontario should recognize and encourage the identification and implementation of best management practices, including continuous improvement programs, while having regard for the programs developed by the American Water Works Association, including but not limited to: QualServe™, the Partnership for Safe Water and the International Water Treatment Alliance.**

AWWA's formal standards process has been used for more than ninety years to produce ANSI registered material standards that are used by the water utility industry. These standards are recognized worldwide and have been adopted by many utilities and organizations.

The AWWA further applies its knowledge and expertise to help water utilities enhance their performance and customer service by developing policies, white papers, manuals - many of these were appended to my report.

The above noted best management programs were developed by water works professionals for the water works industry. The Government of Ontario should therefore have regard for these programs when introducing any new laws respecting protection of drinking water.

The OWWA/OMWA encourages the identification and implementation of best management practices, including continuous quality improvement programs, by water utilities in the province to ensure operational issues are addressed prior to regulatory standards not being achieved.

As the OWWA/OMWA paper authored by Mr. Allan Davies indicates: "Water utilities should consider water quality regulations and standards as the minimal acceptable level of performance, and always strive to go beyond this basic level of performance." Mr. Davies will be before you on September 20 to expound on the benefits of continuous improvement programs.

And further, that the Government of Ontario work with the OWWA to implement the International Water Treatment Alliance in Ontario.

The International Water Treatment Alliance (IWTA) is a program adapted from the US Partnership for Safe Water for use in other jurisdictions such as Canada and Australia. As part of the program, utilities voluntarily adopt proven operational and administrative practices designed to improve treatment plant performance. It is noteworthy that the Quebec Section of AWWA received provincial funding to implement the IWTA program. The program has been a major success - within two years more than half of the Quebec population is served by plants that have joined the program.

The implementation of this program would help to re-build the public's trust in Ontario's drinking water supplies.

And further, that the OWWA/OMWA be consulted with respect to the implementation of other developing programs such as accreditation.

It is AWWA's vision that accredited water and wastewater utilities be recognized worldwide as well operated and efficiently managed. The accreditation program that AWWA is developing is intended to serve water and wastewater utilities and their customers, owners and government regulators by promoting improvements in the quality of services and efficient management

through the establishment of standards and formal recognition of accrediting bodies.

The OWWA/OMWA stand ready to share their collective experience and expertise with the Government of Ontario to ensure best management practices and policies are considered in any future government program.

Treatment and Distribution

2. **That the Government of Ontario continue to support the practices of filtration of surface water used as sources of public water supply, disinfection of public water supplies, including the maintenance of residual disinfectant in the distribution system, and adequate monitoring to assure conformance with water quality standards.**

The application of multiple barriers to prevent contaminants from entering the water supply system and/or control transmission through the system, is universally recognized as a critical and fundamental tenet for effective drinking water quality management and for ensuring the supply of safe drinking water. The strength of multiple barrier systems is that the failure of one barrier may be compensated for by effective operation of the remaining barriers. This minimizes the likelihood of contaminants passing through the entire treatment system and being present in sufficient amounts to cause harm to consumers.

The OWWA/OMWA support the multiple barrier concept, namely:

- selection of the purest sources of water;
- source protection to prevent or control contamination;
- filtration or removal of contamination;
- effective operation and monitoring of drinking water treatment facilities;

- disinfection to inactivate microorganisms, including an adequate disinfection residual;
- operation and maintenance of distribution systems (including storage) to preclude contamination or degradation of treated water; and
- monitoring and response to detect possible breakdowns in the barriers.

As the population continues to increase and put pressure on natural resources, finding high-quality source water will become more difficult and water treatment systems will increase in importance as a barrier to waterborne illnesses.

3. That the Government of Ontario encourage utilities to implement best management practices for water distribution systems as outlined in this review.

The water distribution system is the last protective barrier before the consumers' tap that needs to be operated and maintained to prevent contamination of water. To ensure delivery of high quality water to each consumer, water utilities must be continually vigilant to any intrusion of contamination or occurrences of microbial degradation in the system - I found the Commission's report did not adequately discuss distribution system needs.

To avoid water quality problems, water utilities must:

- maintain positive pressures and fire flows;
- manage water age;
- maintain a chlorine residual;
- keep the distribution system clean;

- provide treatment that does not allow water to degrade in the system; and
- monitor water quality.

The best management practices recommended by AWWA to achieve the above and optimize distribution system water quality are discussed in detail in my report.

4. That there be created, by statute, the position of Chief Water Official for each water authority in the Province.

It is envisioned that this position would be comparable to that of the Chief Building Official required under the Building Code Act. This position - that is the Chief Water Official - is required because water utilities in Ontario currently do not have the statutory authority to take the measures necessary to control backflow hazards from private property to the public distribution system. Although plumbing codes have always prohibited any connection whereby potable and non-potable water could mix, there are few details as to the specific device to use to prevent cross connections and many connections are overlooked.

Cross connection protection is not new, but incidents of contamination and concern for legal action - in the event that a public system becomes contaminated and a death or serious illness occurs that could have been prevented by the installation of a backflow prevention device - have heightened the concern of water authorities in this regard. Water utilities should therefore have the statutory mandate to inventory and ensure cross connection control.

In addition to dealing with cross connection control issues with the Chief Building Official, the Chief Water Official should work with the Fire Chief

regarding fire protection and the local Medical Officer of Health regarding water quality.

Due to the technical nature of this position and the responsibilities vis-à-vis public health and safety, this person should likely be a Professional Engineer. Professional engineers are bound, first and foremost, to protect the public per The Professional Engineers Act of Ontario. It is important that the person responsible for water understand all the ramifications of their actions and that they regard their duty to public welfare as paramount.

And further, that the Government of Ontario clarify, by statute or regulation, the roles and responsibilities of the Chief Water Official as they relate to cross connection control and other areas of potential jurisdictional conflicts related to private property.

It is important to clarify the roles and responsibilities of the water utility with regard to the approvals of cross connections and other related matters.

5. **That the Government of Ontario and municipalities participate in drinking water research and that participation in the AWWA Research Foundation be encouraged.**

The risk chain for drinking water involves contaminant sources, a vector (water), treatment for removal, transmission to the population, ingestion, infection and finally disease. Without a thorough understanding of this entire chain, neither the public nor the government decision-makers have a solid basis on which to judge the safety of drinking water. It is with the above in mind that the AWWA Research Foundation has, since 1986, supported nearly 450 research projects valued at more than $100 million (US). I am proud to say that many of these projects have been or are being conducted by Canadian researchers - including Ms. Erika Hargesheimer who is before you today.

The foundation's research agenda addresses a broad spectrum of water supply issues. The ultimate purpose of the coordinated effort is to assist water suppliers in providing the highest possible quality of water economically and reliably.

6. **That the Government of Ontario support the consumer principles outlined in this review.**

Water utilities have traditionally measured their success by the quality of the water they provide, with limited emphasis on customer satisfaction. It is important to realize and respect that customers define satisfaction not only by the product but by the services and related information they receive. The consumer principles are outlined in Appendix P of my report.

Capacity Development

7. **That an analysis be conducted to determine how much additional investment will be needed over the coming decades for infrastructure upgrades. These infrastructure needs should encompass both what is required to comply with Ontario Regulation 459/00 (Drinking Water Protection), as well as what will be needed to replace and rehabilitate aging water treatment and distribution facilities regardless of regulatory mandates.**

Infrastructure replacement is an emerging issue that water utilities need to address. The Commission's report acknowledged this by stating on page 30 that "it is critical that investments in system rehabilitation be a normal part of water system expenditures. To determine whether current levels are sufficient or what the levels should be, more detailed information on water systems is needed."

The need to finance the replacement of pipes in the coming decades may challenge many utilities financially, particularly those that currently do not include an infrastructure renewal allowance in their rates. In some communities, the concurrent need to finance pipe replacement along with treatment plant upgrades will significantly increase the challenge.

The OWWA/OMWA agree that this analysis should be conducted to determine how much additional investment will be needed over the coming decades for infrastructure upgrades. The central question for policy makers and utilities is whether the rate of infrastructure spending that utilities will face over the next 30 years can be financed by the utilities themselves at rates consumers can afford.

8. **That a system viability analysis be performed and in conjunction with, or pending the results of, that analysis regulations be developed that would permit municipalities to decide how to achieve a legislative obligation to have sufficient financial, technical, managerial, and operational expertise and capacity through such options as retaining consultants, sharing resources with adjacent municipalities, or voluntarily entering into amalgamations having regard to the need to potentially protect drinking water quality on a watershed basis.**

The viability of drinking water systems is critical to the protection of public health and the conservation of public resources. Viable systems are defined as self-sustaining systems that have the financial, technical, managerial, and operational expertise and capacity necessary to reliably meet all present and future requirements in a comprehensive manner that assures the continued delivery of safe drinking water. Given the number of small systems in Ontario, a system viability analysis to ensure all systems are self-supporting entities is needed. Accordingly, amalgamation of systems may be necessary to ensure the

viability of some systems. The problem, as outlined in the Commission's report, is likely the 89% of the plants serving 11% of the population. In some instances, these plants/systems may not be viable and may be the cause of varying levels of service across Ontario.

And further, that the costs necessary to develop the financial, technical, managerial, and operational expertise and capacity of water utilities be included in the cost of service.

With the increasing complexity of water treatment and environmental conditions and more stringent drinking water regulations, system viability assessments must not only address financial considerations, but also the technical, managerial and operational expertise and capabilities of the water utility to satisfy public health and safety requirements on a long-term basis. All training and education necessary to develop the technical, managerial and operational expertise and capabilities of the water utilities must be included in the service cost.

Without the appropriate investment in human resources, the implementation of the Walkerton Inquiry recommendations will not be possible.