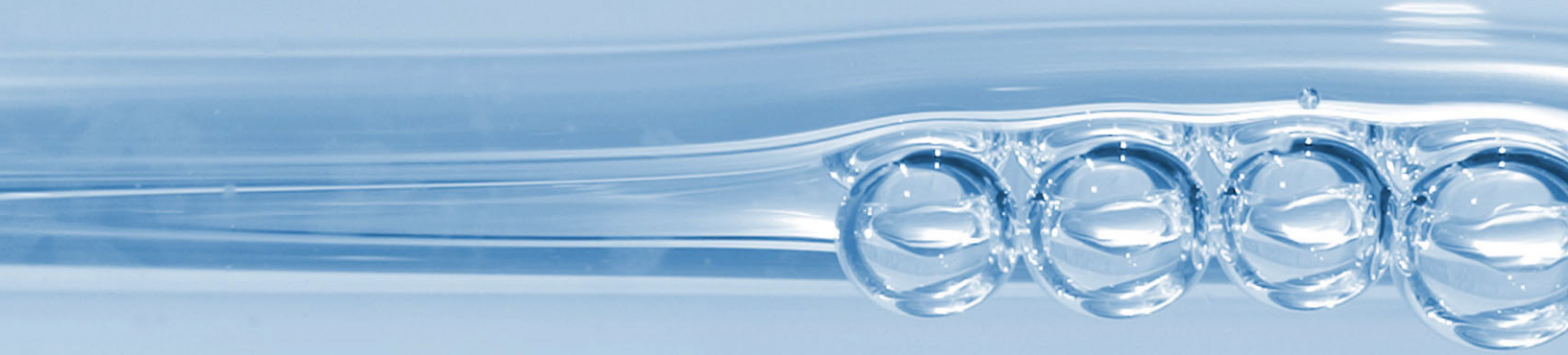


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ODWAC
Ontario Drinking Water Advisory Council

Advisory Council on Drinking Water Quality and Testing Standards

An Agency of the Government of Ontario



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Advising Ontario on Drinking Water Quality

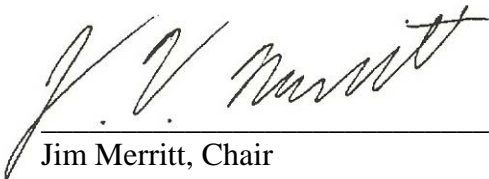
July 31, 2006

The Honourable Laurel C. Broten
Minister of the Environment
135 St. Clair Avenue West, 12th Floor
Toronto, Ontario M4V 1P5

Dear Ms. Broten:

As Chair of the Advisory Council on Drinking Water Quality and Testing Standards, I am pleased to submit the Council's Annual Report of activities and accomplishments for the period of May 12, 2005 to May 11, 2006, pursuant to Section 9 and Schedule 2 of our Terms of Reference.

Sincerely,



Jim Merritt, Chair
Advisory Council on Drinking Water
Quality and Testing Standards

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1.0 Message from the Chair

On behalf of the Advisory Council on Drinking Water Quality and Testing Standards, I am pleased to provide our second annual report outlining our achievements from May 12, 2005 to May 11, 2006. It has been a pleasure to work with the Council members, the staff of the Ministry of the Environment and the Minister's office. The members are a group of professionals in the drinking water sector with a sincere desire to protect and improve the safety and quality of drinking water in Ontario. I would also like to recognize and thank the staff of the Ministry of the Environment and the Ministry of Health and Long-Term Care for their hard work and support of the Council's activities.

The overall role of the Council is to provide the Minister of the Environment with advice on all matters related to the health and safety of drinking water in Ontario. The Council, with the support of its staff, meets formally each month to consider current drinking water issues and standards, and the members bring their collective knowledge and experience together to reach conclusions and formulate recommendations.

Over the past year, the Council has addressed a number of drinking water issues and standards and has summarized its advice in 12 letters to the Minister of the Environment. The Council completed its review of Regulation 170 and Regulation 903. We also addressed a number of matters and questions that were raised in Justice O'Connor's *Part Two Report of the Walkerton Inquiry* that he specifically referenced for the attention by this Council. In addition, we gave consideration to 18 Guidelines for Canadian Drinking Water Quality that were or are proceeding through the national process for inclusion or update as Ontario Drinking Water Quality Standards. In the case of Total Trihalomethanes, the Council recommended a more stringent standard.

The Council also considered other matters related to drinking water quality such as the proposed Clean Water Act, the proposed Drinking Water Quality Management Standard and the *Procedure for Disinfection of Drinking Water in Ontario*. This annual report summarizes the work of the Council on these important measures to improve drinking water safety in Ontario, and I am pleased to note that the Ministry of the Environment has positively received the advice of the Council and is actively in the process of implementing most of our recommendations.

I look forward to a very active new year and the continued support of both the Minister of the Environment and Ministry staff, and I would like to thank the members who have taken the time from their very busy schedules to selflessly support the work of the Council.

Jim Merritt

2.0 Council Mandate

On May 23, 2002, Justice O'Connor, in the *Part Two Report of the Walkerton Inquiry*, made six recommendations regarding an "Advisory Council on Standards". Specifically, Recommendation 25 states that "*In setting drinking water standards for Ontario, the Minister of the Environment should be advised by an Advisory Council on Standards*".

In recommending an Advisory Council on Standards, Justice O'Connor also noted that:

- It is reasonable to seek expertise from the Advisory Council on Standards from the broader public, as it may not reside in the Ministry of the Environment.
- The benefits of an Advisory Council on Standards include transparency in process and increased public participation.
- The Advisory Council on Standards should establish its own process.
- Recommendations made to the Minister of the Environment should be made public and should be supported by the Advisory Council on Standards' rationale.
- The Advisory Council on Standards should also advise the Minister of the Environment with respect to management, treatment, testing, materials, and reporting standards.

The *Safe Drinking Water Act* was promulgated in 2002, and on May 12, 2004, The Minister of the Environment announced the establishment of the "Advisory Council on Drinking-Water Quality and Testing Standards" (Council).

Enabled under Section 4 of the *Safe Drinking Water Act, 2002*, the Council is "*to consider issues relating to standards for drinking-water quality and testing and to make recommendations to the Minister*" of the Environment, which are to be "*taken into consideration in establishing and revising standards under this Act for drinking-water quality and testing.*"

See Appendix B for an Overview of Relevant Legislation and Regulations.

The Minister of the Environment appointed members from key professional fields representing a cross-section of academia, industry and municipalities, with expertise in the areas of microbiology, toxicology, engineering, utility operations, public health, and others with a record of interest and accomplishment related to drinking water. They are all active in their areas of knowledge and bring their current and direct experience to the Council.

See Appendix E for the Council Members' Biographies.

On June 10, 2004, the Council held its inaugural meeting. The Minister of the Environment was in attendance and asked the Council to focus on the *Part Two Report of the Walkerton Inquiry* Recommendations that pertain to the Council:

- Recommendation 27: *“The Advisory Council on Standards should consider whether to replace the coliform test with an E. coli test.”*
- Recommendation 28: *“No formal maximum contaminant level for protozoa should be established until real-time tests are available. The objective, as with bacteriological and viral pathogens, should be zero, and the regulations should so state; but the standard should be a treatment standard, specified in terms of log removal dependent on source water quality.”*
- Recommendation 29: *“The provincial government should seek the advice of the Advisory Council on Standards regarding the desirability of a turbidity limit that is lower than the limit specified in the federal-provincial Guidelines.”*
- Recommendation 31: *“The Advisory Council on Standards should review Ontario’s standards for disinfection by-products to take account of the risks that may be posed by the by-products of all chemical and radiation-based disinfectants.”*

See Section 5.0 for more information.

The Minister of the Environment also asked the Council to provide advice on the Drinking-Water Systems Regulation, O. Reg. 170/03, with respect to appropriate requirements for small water systems, and particularly private ones; and on the Wells Regulation, O. Reg. 903, with respect to disinfection requirements.

See Section 4.0 for more information.

The broad mandate of the Council is to provide advice and make recommendations to the Minister of the Environment on drinking water quality and testing standards, as well as other drinking water matters. The role of the Council includes, but is not necessarily limited to, the following core activities:

- **Requests for Advice from the Minister of the Environment:**

Providing advice on drinking water policies, practices, procedures, standards, testing methods, and related research, as requested by the Minister of the Environment.

See Section 4.0 for more information.

- **Standards Review and Prioritization:**

Reviewing research, scientific, and technical documentation related to drinking water quality and testing standards, including Federal-Provincial-Territorial priorities, in order to provide advice to the Minister of the Environment on standards and their applicability in Ontario. In addition, the *Part Two Report of the Walkerton Inquiry* noted in Recommendation 26, that “*The Advisory Council on Standards should have the authority to recommend that the provincial government adopt standards for contaminants that are not on the current federal-provincial agenda.*”

See Section 6.0 for more information.

- **Matters Under Consideration:**

Making proactive recommendations on drinking water matters the Council has become aware of and has identified as being a priority and which merit the attention of the Minister of the Environment.

See Section 7.0 for more information.

- **Stakeholder Consultation:**

Publishing information on the Environmental Registry and undertaking additional consultations on standards, regulations, or other drinking water matters, to solicit views from the general public in order to provide recommendations to the Minister of the Environment.

3.0 Summary of Activities and Accomplishments

Following is a summary of activities and accomplishments for the Advisory Council on Drinking Water Quality and Testing Standards for its second fiscal year (May 12, 2005 to May 11, 2006):

Advice Letters Transmitted to the Minister of the Environment:

- Microbiological Indicators (See Section 6.1)
- Reg. 903 (Wells) (See Section 4.2)
- *Procedure for Disinfection of Drinking Water in Ontario* Review (See Section 5.2)
- Drinking Water Source Protection (See Section 7.1)
- *Clean Water Act* (Bill 43) (See Section 7.2)
- Reg. 248 (Drinking-Water Testing Services) (See Section 7.3)
- Drinking Water Quality Management Standard (See Section 7.4)
- Treatment of Surface Water Used for Private Water Supplies (See Section 7.5)
- Definitions and Use of Terminology for Chlorine (See Section 7.6)
- Trichloroethylene (TCE) (See Section 6.1)
- Total Trihalomethanes (THMs) and Bromodichloromethane (See Section 6.1)
- Suggested Priorities (NDMA) (See Section 6.3)

Standards Reviews Completed: (See Section 6.1)

- 1,4-dioxane
- Arsenic
- Microbiological Quality of Drinking Water:
 - Bacterial Waterborne Pathogens Current and Emerging Organisms of Concern
 - Heterotrophic Plate Count
 - Total Coliforms
 - *Escherichia coli*
- Trichloroethylene (TCE)
- Total Trihalomethanes (THMs) and Bromodichloromethane
- Turbidity
- Standards Currently under Review: (See Section 6.2)
 - 2-Methyl-chlorophenoxyacetic Acid (MCPA)
 - Chloral Hydrate
 - Chlorite / Chlorate
 - Corrosion Control
 - Haloacetic Acids (HAAs)
 - Methyl *tertiary*-butyl ether (MTBE)
 - Potassium
 - Radiological Characteristics

4.0 Requests for Advice from the Minister of the Environment

4.1 Regulation 170 Requirements for Smaller, Private Systems

On June 30, 2004, the Minister of the Environment asked the Council to provide advice on the Drinking-Water Systems Regulation (Regulation 170) 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 Council undertook an initial review and concluded that the Regulation, as it applied to smaller and private systems, was considered to be costly and complex. Although the Ministry of the Environment targeted information to specific groups, the Regulation appeared to be 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, relating 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 its Recommendations.
- 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 concluded the problems with the Regulation could not 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 of 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.

As such the Council found that an alternative approach, which addressed the capacities and abilities of the small service owners and operators, was needed for these smaller systems, without compromising the basic drinking water quality standards and level of safety.

The Council recommended that a new regulation be developed and promulgated, to empower Public Health Units to administer safe drinking water programs for these smaller systems.

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

- **A risk-based, site-specific approach for 5 of the 8 “Categories of System” under Regulation 170, 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, 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**
- **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**

On February 8, 2005, the Council delivered its final report on Regulation 170, with 22 recommendations, to the Minister of the Environment, and the report was subsequently released to the public on March 22, 2005.

The full report (in Adobe PDF format) can be found on the Council's website at:

http://www.odwac.gov.on.ca/reports/020805_Reg_170_Final_Report.pdf

As a result of the Council's final report on Regulation 170, the Ministry of the Environment posted a Notice of Proposal for Policy on the Environmental Bill of Rights Registry, on May 17, 2005, for a 90-day public comment period. The Notice was entitled "Broad Policy Proposal for the Regulation of Drinking Water Systems in Ontario" and outlined what was planned in terms of the regulation of drinking water systems as a result of consultations on Ontario Regulation 170 completed over 2004 and 2005, by both the Council and the Ministry of the Environment. The Ministry of the Environment also sought public feedback on a risk-based site-specific assessment approach, as recommended by the Council.

Also on May 17, 2005, the Ministry of the Environment posted a Notice of Proposal for Regulation on the Environmental Bill of Rights Registry for a 12-day public comment period. The purpose of this proposal was to have in place a new regulation, as proposed by the Council, for non-residential systems and non-municipal seasonal residential systems, which were to meet Ontario Regulation 170 requirements on June 1, 2005.

The purpose of this interim approach was to ensure public health was protected as the Ministry of the Environment continued to work with the Ontario Ministry of Health and Long-Term Care to develop a new legislative and regulatory framework, as proposed by the Council.

On June 3, 2005, the Ministry of the Environment posted a Notice of Decision for Regulation on the Environmental Bill of Rights Registry, in order to proceed with the new Regulation under the *Safe Drinking Water Act, 2002* to regulate non-residential and privately-owned seasonal residential systems currently regulated under Ontario Regulation 170, but not those that serve designated facilities, and to proceed with consequential amendments to Ontario Regulation 170 and several other regulations. The new Regulation was named Ontario Regulation 252/05 (Non-Residential and Seasonal Residential Systems that Do Not Serve Designated Facilities).

On June 22, 2005, the Ministry of the Environment posted a Notice of Proposal for Regulation on the Environmental Bill of Rights Registry for a 90-day public comment period. The purpose of this posting was to propose amendments that would update, clarify, add flexibility to the regulatory requirements, and in some cases, address affordability concerns of stakeholders and owners of drinking water systems, which continue to be regulated under Regulation 170.

On June 7, 2006, the Ministry of the Environment posted a Notice of Decision for Regulation on the Environmental Bill of Rights Registry, to proceed with amendments to Ontario Regulation 170, in order to add clarity and flexibility to the testing and operational regimes. As well, subsequent amendments were made to Ontario Regulations 252, 169, and 248, and associated documents.

The changes, consistent with many of the recommendations made by the Council over the last fiscal year, included:

- The elimination of testing requirements and standards for Fecal Coliforms, Background Colony Counts, and Heterotrophic Plate Counts; all of which are outdated since they are now not considered to be health-related indicators of bacterial contamination of drinking water;
- A more stringent Ontario Drinking Water Quality Standard for Trichloroethylene (TCE);
- An updated *Procedure for Disinfection of Drinking Water in Ontario*; and
- An updated *Technical Support Document for Ontario Drinking Water Standards, Objectives, and Guidelines*.

4.2 Regulation 903 Disinfection Requirement

On June 30, 2004, the Minister of the Environment formally asked the Council to provide advice on the disinfection (chlorination) requirement of Regulation 903 (Wells).

The Council decided to take on a broader review of this issue. As such, the scope of its advice was not limited exclusively to the concerns raised by the Canadian Environmental Law Association (CELA) in their 2003 Environmental Bill of Rights Application for Review.

The overarching principle for our focus on this issue is that water from private drinking water wells needs to be verified to be microbiologically safe, prior to human consumption.

The Council heard from experts on wells and Regulation 903, including Ministry of the Environment staff, the Ontario Ground Water Association, and CELA; reviewed literature on disinfecting wells and; has drawn from our own Council members' expertise in this area, and has discussed a variety of technical issues related to drinking water safety and practical applications for well disinfection.

The Council's final advice letter on Regulation 903, which made a number of recommendations to improve the current Regulation, was transmitted to the Minister of the Environment on June 16, 2005, and the Ministry of the Environment continues to develop amendments, taking into consideration the Council's advice.

5.0 Walkerton Recommendations Pertaining to the Council

At the Council's inaugural meeting on June 10, 2004, the Minister of the Environment asked the Council to first focus on the recommendations pertaining to the Council, as noted by Justice O'Connor in the *Part Two Report of the Walkerton Inquiry*.

Following is an update on the status of the Council's progress, as of May 11, 2006, on the *Part Two Report of the Walkerton Inquiry* recommendations pertaining to the Council:

- Recommendation #27 (Replacing Total Coliform test with *E. coli* test)
- Recommendation #28 (Protozoa Treatment Standard)
- Recommendation #29 (Desirability of a lower Turbidity limit)
- Recommendation #31 (Disinfection By-Products Review)

5.1 Recommendation #27 (Replacing Total Coliform test with *E. coli* test)

Recommendation 27 states that:

*"The Advisory Council on Standards should consider whether to replace the coliform test with an *E. coli* test."*

The Council interpreted this recommendation in a broader fashion and reviewed the appropriateness of several microbiological indicators of adverse water quality, as defined in the Ontario Drinking Water Quality Standards and Drinking Water Systems Regulations.

In reviewing these indicators, the Council drew upon various technical documents including those prepared by Ministry of Environment staff and those posted for public comment in support of the Guidelines for Canadian Drinking Water Quality. The Council also drew upon the extensive knowledge and experience of its own members in developing its recommendations.

See Appendix A1 for the Council's final advice letter on microbial indicators of adverse water quality, which was transmitted to the Minister of the Environment on April 5, 2005.

On June 3, 2005, the Ministry of the Environment posted a Notice of Decision for Regulation on the Environmental Bill of Rights Registry, in order to proceed with Ontario Regulation 252 (Non-Residential and Non-Municipal Seasonal Residential Systems That Do Not Serve Designated Facilities) under the *Safe Drinking Water Act, 2002* to regulate non-residential and privately-owned seasonal residential systems previously under Ontario Regulation 170.

Ontario Regulation 252 took into consideration the Council's advice on microbiological indicators of adverse water quality, in that only *E. coli* and total coliforms were required to be sampled and tested. As well, fecal coliforms, general bacteria population expressed as background colony counts on the total coliform membrane filter, and heterotrophic plate count were all removed as reportable adverse results.

On June 22, 2005, the Ministry of the Environment posted a Notice of Proposal for Regulation on the Environmental Bill of Rights Registry for a 90-day public comment period. Included in this proposal was the elimination of fecal coliforms, general bacteria population expressed as background colony counts on the total coliform membrane filter, and heterotrophic plate from Schedule 1 of Ontario Regulation 169 (Ontario Drinking-Water Quality Standards).

On June 7, 2006, the Ministry of the Environment posted a Notice of Decision for Regulation on the Environmental Bill of Rights Registry, to proceed with amendments to Ontario Regulation 170, in order to add clarity and flexibility to the testing and operational regimes. As well, subsequent amendments were made to Ontario Regulations 252, 169, and 248, and associated documents, including the elimination of testing requirements and standards for Fecal Coliforms, Background Colony Counts, and Heterotrophic Plate Counts.

5.2 Procedure for Disinfection of Drinking Water in Ontario Review

The Council decided to review the *Procedure for Disinfection of Drinking Water in Ontario*, which was posted for public consultation from April 5, 2005 to June 13, 2005, in order to provide broad advice on improvements that could be made to enhance and clarify the content and intention.

The Council identified that the *Procedure for Disinfection of Drinking Water in Ontario* encompassed three inter-related recommendations pertaining to the Council, as noted by Justice O'Connor, in the *Part Two Report of the Walkerton Inquiry*: (Recommendation #28: Protozoa Treatment Standard; Recommendation #29: Lower Turbidity Limit and; Recommendation #31: Disinfection By-Products Review). As such, the Council determined that a holistic review of the *Procedure for Disinfection of Drinking Water in Ontario* would serve its purposes in addressing the above-noted three recommendations.

See Appendix A4 for the Council's final advice letter on the "Procedure for Disinfection of Drinking Water in Ontario", which was transmitted to the Minister of the Environment on September 20, 2005.

On June 7, 2006, the Ministry of the Environment posted a Notice of Decision for Regulation on the Environmental Bill of Rights Registry, to proceed with amendments to Ontario Regulation 170. Also included was an updated *Procedure for Disinfection of Drinking Water in Ontario*, as adopted by reference by Ontario Regulation 170.

5.2.1 Recommendation #28 (Protozoa Treatment Standard)

Recommendation 28 states that:

“No formal maximum contaminant level for protozoa should be established until real-time tests are available. The objective, as with bacteriological and viral pathogens, should be zero, and the regulations should so state; but the standard should be a treatment standard, specified in terms of log removal dependent on source water quality.”

Even though public consultation on a proposed Guideline for Canadian Drinking Water Quality (GCDWQ) for Protozoa was undertaken in 1998, Ontario decided to address the implementation of a Protozoa Treatment Standard through its inclusion in the *Procedure for Disinfection of Drinking Water in Ontario*, which underwent public consultation from April 5, 2005 to June 13, 2005.

The Council decided that, since a Protozoa Treatment Standard was already being addressed by the Ministry of the Environment, a separate review was not deemed necessary. The Council chose, however, to review the Protozoa Treatment Standard in the context of a holistic review of the *Procedure for Disinfection of Drinking Water in Ontario*.

See Appendix A4 for further advice on a Protozoa Treatment Standard, as included the Council’s final advice letter on the “Procedure for Disinfection of Drinking Water in Ontario”, which was transmitted to the Minister of the Environment on September 20, 2005.

5.2.2 Recommendation #29 (Desirability of a Lower Turbidity limit)

Recommendation 29 states that:

“The provincial government should seek the advice of the Advisory Council on Standards regarding the desirability of a turbidity limit that is lower than the limit specified in the federal-provincial Guidelines.”

The Council conducted an initial review of Turbidity and endorsed Health Canada’s proposed Guideline on October 15, 2004, but requested more time to review the impacts on Ontario systems and the implications for implementation prior to providing formal advice to the Minister of the Environment.

The Council then chose to address *“the desirability of a turbidity limit that is lower than the limit specified in the federal-provincial guidelines”* through its review of the *Procedure for Disinfection of Drinking Water in Ontario*.

See Appendix A4 for further advice on Turbidity, as included the Council's final advice letter on the "Procedure for Disinfection of Drinking Water in Ontario", which was transmitted to the Minister of the Environment on September 20, 2005.

5.2.3 Recommendation #31 (Disinfection By-Products Review)

Recommendation 31 states that:

"The Advisory Council on Standards should review Ontario's standards for disinfection by-products to take account of the risks that may be posed by the by-products of all chemical and radiation-based disinfectants."

Having undertaken a preliminary review of issues relating to Disinfection By-Products (DBPs), the Council concluded that the list of different DBPs is actually not as large as was originally envisaged. This resulted from the relatively limited number of treatment technologies used across the province. It was also noted that if circumstances warranted unique monitoring, the Certificate of Approval system would build in any DBP monitoring requirements and limits.

As such, it was concluded that a process of providing overall advice on DBPs, on an on-going basis, would be addressed by reviewing individual DBP Standards, based on the review of the associated treatment technology.

See Appendix A4 for further advice on Disinfection By-Products, as included the Council's final advice letter on the "Procedure for Disinfection of Drinking Water in Ontario", which was transmitted to the Minister of the Environment on September 20, 2005.

6.0 Standards Review and Prioritization

Part of the Council's mandate is to provide advice to the Minister of the Environment on proposed drinking water standards and their applicability in Ontario. (Recommendation 25 of the *Part Two Report of the Walkerton Inquiry*, states that "In setting drinking water standards for Ontario, the Minister of the Environment should be advised by an Advisory Council on Standards". In addition, Recommendation 26 states that "The Advisory Council on Standards should have the authority to recommend that the provincial government adopt standards for contaminants that are not on the current federal-provincial agenda."

In order to provide comprehensive advice on these standards, the Council reviews Health Canada's Documents for Public Comment, Guideline Technical Documents, comments from public consultation processes, and information on the occurrence and impact that a particular substance is likely to have on the delivery of safe drinking water in Ontario.

As a result of this review, the Council may recommend endorsement of a Guideline for Canadian Drinking Water Quality (GCDWQ) as an Ontario Drinking Water Quality Standard (ODWQS), Objective, or Guideline or consider a more stringent standard for Ontario, where appropriate, and may conduct independent consultations with stakeholders and technical experts as deemed necessary to recommend a standard.

See Appendix D for the Council's Standards Review Protocol.

Following is an update of the status of the Council's review of standards, as of May 11, 2006:

6.1 Standards Reviews Completed

1,4-dioxane

The Council became aware of and decided to review a Drinking Water Guidance Value (DWGV) developed by Health Canada for the chemical 1,4-dioxane. The request for the development of a DWGV was made to Health Canada by the Ministry of the Environment in response to a request from an Ontario municipality to assess the feasibility of upgrading a water treatment system to treat a groundwater supply contaminated with 1,4-dioxane.

DWGVs are not subject to a review as detailed as Health Canada's Guidelines for Canadian Drinking Water Quality, which undergo internal peer review and public consultation before approval by the Federal-Provincial-Territorial Committee on Drinking Water and the Federal-Provincial-Territorial Committee on Health and the Environment.

The Council deemed that the DWGV, derived for 1,4-dioxane, used a precautionary approach, and provided adequate protection to human health, until a more detailed evaluation could be conducted. To this end, Health Canada supported Ontario's request and the Council's opinion, that 1,4-dioxane be put on the priority list for the development of a Guideline for Canadian Drinking Water Quality.

Arsenic

The Council completed its review of Health Canada's "Arsenic in Drinking Water" Document for Public Comment, which underwent public consultation in Ontario from November 30, 2004 to May 17, 2005.

On April 28, 2006, the Council transmitted its final advice letter on Arsenic to the Minister of the Environment, recommending that the Ministry of the Environment endorse the revised Guideline and adopt it as an Ontario Drinking Water Quality Standard. Confirmation was received that both the Committee on Drinking Water and the Committee on Health and the Environment had approved the revised Guideline, with no significant changes.

On May 30, 2006, a final revised Guideline for Canadian Drinking Water Quality for arsenic was posted on Health Canada's website. The Ministry of the Environment intends to update the Ontario Drinking Water Quality Standard for Arsenic to reflect the revised Guideline in a future amendment to Ontario Regulation 169 (Ontario Drinking-Water Quality Standards).

Microbiological Quality of Drinking Water

The Council reviewed Health Canada's *Documents for Public Review* with regards to *Microbiological Quality of Drinking Water*, which underwent national public consultation ending January 13, 2005.

The 4 documents reviewed were:

- Bacterial Waterborne Pathogens - Current and Emerging Organisms of Concern;
- Heterotrophic Plate Count;
- Total Coliforms; and
- *Escherichia coli*

In evaluating the available information, it was the Council's opinion that the fundamental weighting of indicators of microbiological safety as expressed in the Guideline Supporting Documents was based on sound scientific interpretation and judgment. The Council endorsed the use of these documents, prepared by the Federal-Provincial-Territorial Committee on Drinking Water (CDW), as information to support its recommendations.

The review of these documents aided in the formulation of the Council's formal advice to the Minister of the Environment on Recommendation #27 of the Part Two Report of the Walkerton Inquiry, which states that "*The Advisory Council on Standards should consider whether to replace the coliform test with an E. coli test.*"

See Appendix A1 for the Council's final advice letter on microbial indicators of adverse water quality, which was transmitted to the Minister of the Environment on April 5, 2005.

Trichloroethylene

The Council conducted an initial review of Trichloroethylene (TCE) and endorsed Health Canada's proposed revised Guideline on October 15, 2004, but requested more time to review the impacts on Ontario systems and the implications for implementation prior to providing formal advice to the Minister of the Environment.

The Council completed its review of Health Canada's "Trichloroethylene in Drinking Water" (TCE) Document for Public Comment, which underwent public consultation in Ontario from December 19, 2003 to April 5, 2004.

In May, 2005 Health Canada posted its Final "Guidelines for Canadian Drinking Water Quality: Supporting Documentation – Trichloroethylene" document, and the Council recommended that the Ministry of the Environment endorse the revised Guideline and adopt it as an Ontario Drinking Water Quality Standard.

See Appendix A2 for the Council's final advice letter on Trichloroethylene, which was transmitted to the Minister of the Environment on June 21, 2005.

On June 7, 2006, the Ministry of the Environment posted a Notice of Decision for Regulation on the Environmental Bill of Rights Registry, to proceed with amendments to Ontario Regulation 170, in order to add clarity and flexibility to the testing and operational regimes. As well, subsequent amendments were made to Ontario Regulation 169, including a more stringent Ontario Drinking Water Quality Standard for Trichloroethylene (TCE).

Total Trihalomethanes and Bromodichloromethane

The Council completed its review of the "Trihalomethanes in Drinking Water" (THMs) Document for Public Comment, which underwent public consultation in Ontario from October 1, 2004 to January 07, 2005.

Health Canada, through the Federal-Provincial-Territorial reviewed the maximum acceptable concentration for Total Trihalomethanes in drinking water; in addition a new, separate Guideline for Canadian Drinking Water Quality for Bromodichloromethane in drinking water was developed.

The new maximum acceptable concentration for Bromodichloromethane in drinking water was established at 0.016 mg/L (16 µg/L), as approved by both the Committee on Drinking Water (CDW) and the Committee on Health and the Environment (CHE), and the Council recommended that the Ministry of the Environment endorse it and adopt it as an Ontario Drinking Water Quality Standard.

The Guideline for Canadian Drinking Water Quality for Total Trihalomethanes in drinking water was reaffirmed, and approved by both the CDW and the CHE, at a risk-managed level of 0.1 mg/L (100 µg/L), due to the results of a cost-benefit analysis. This analysis determined that, while no significant expected increase in risk to health existed between 80 µg/L and 100 µg/L, significant costs would be incurred in many areas of Canada in order to comply with the lower value.

The Council endorsed Health Canada's new scientific / technical review and rationale in that it provided for increased human health protection, by incorporating additional exposure routes from drinking water, such as inhalation and dermal absorption, resulting in a higher overall estimated exposure than was previously recognized. Health Canada's rationale resulted in a risk assessment value of 80 µg/L.

The Council, therefore, recommended that the Ministry of the Environment set a more stringent Ontario Drinking Water Quality Standard of 0.08 mg/L (80 µg/L) for Total Trihalomethanes in drinking water.

See Appendix A5 for the Council's final advice letter on Trihalomethanes and Bromodichloromethane, which was transmitted to the Minister of the Environment on November 30, 2005.

As a direct result of the Council's advice above, the Ministry of the Environment posted a Notice of Proposal for Regulation on the Environmental Registry, from April 7 to May 7, 2006, for public comment, in order to seek feedback on the adoption of a more stringent Ontario Drinking Water Quality Standard of 0.080 mg/L (80 µg/L) for total Trihalomethanes, with a phase-in period.

Upon the decision to adopt this more stringent Ontario Drinking Water Quality Standard, the Ministry of the Environment would then seek to amend Ontario Regulation 169 (Ontario Drinking-Water Quality Standards).

Turbidity

The Council conducted an initial review of Turbidity and endorsed Health Canada's proposed revised Guideline on October 15, 2004, but requested more time to review the impacts on Ontario systems and the implications for implementation prior to providing formal advice to the Minister of the Environment.

In order to also address Recommendation #29 from the Part Two Report of the Walkerton Inquiry, the Council then chose to address "*the desirability of a turbidity limit that is lower than the limit specified in the federal-provincial guidelines*" through its review of the *Procedure for Disinfection of Drinking Water in Ontario*. Also included was a review of Health Canada's "Guidelines for Canadian Drinking Water Quality: Supporting Documentation – Turbidity", which underwent public consultation in Ontario from April 5 to June 14, 2005.

As a result, the Council concluded that its original endorsement of Health Canada's Guideline was appropriate for application in Ontario.

See Appendix A4 for further advice on Turbidity, as included the Council's final advice letter on the "Procedure for Disinfection of Drinking Water in Ontario", which was transmitted to the Minister of the Environment on September 20, 2005.

6.2 Standards Currently Under Review

The following standards are still under review by the Council. The Council will continue to assess these contaminants and will provide formal advice to the Minister of the Environment in an appropriate and timely fashion. The standards include:

- 2-Methyl-4-chlorophenoxyacetic Acid (MCPA)
- Chloral Hydrate
- Chlorite/Chlorate
- Corrosion Control
- Haloacetic Acids
- Methyl tertiary-butyl ether (MTBE)
- Potassium
- Radiological Characteristics

6.3 Standards Prioritization

Part of the mandate of the Council is to provide advice and make recommendations on matters relating to the prioritization of the review and development of standards for drinking water quality and testing for Ontario.

In addition, the *Part Two Report of the Walkerton Inquiry* noted in Recommendation 26, that “*The Advisory Council on Standards should have the authority to recommend that the provincial government adopt standards for contaminants that are not on the current federal-provincial agenda.*”

Specifically, the Council, in establishing its own process and protocols, has chosen to review the list of priority substances as developed by the Federal-Provincial-Territorial (FPT) Committee on Drinking Water (CDW).

The purpose of this review is to recommend the addition, deletion, bumping-up, or bumping-down of substances for Ontario to put forward, that may or may not be on the current National Priority List.

Yearly, the Council discusses priorities for drinking water standards and emerging issues.

See Appendix A3 for the Council’s final advice letter on the National Priority List Review, which was transmitted to the Minister of the Environment on July 15, 2005.

7.0 Matters Under Consideration

While the Minister of the Environment can request that the Council provide advice on specific matters related to drinking water, the Council can also choose to pursue matters related to drinking water proactively, which it has identified as being a priority, and which merit the attention of the Minister of the Environment.

Following is a brief outline of matters that the Council chose to proactively pursue during its second fiscal year. Some matters resulted in formal advice being transmitted to the Minister of the Environment, while others are still under consideration. The Council remains engaged in all of these matters from the perspective of the development and implementation of legislative, regulatory and policy amendments, in order to provide on-going advice.

7.1 Drinking Water Source Protection

The Council undertook a review of drinking water source protection, as part of its ongoing role to advise the Minister of the Environment on matters relating to drinking water quality. For this review the Council considered the document entitled "*Watershed-Based Source Protection Planning -- A Threats Assessment Framework*" prepared by the Technical Experts Committee in November, 2004, and recognized the important work of this Committee and its contribution to improving drinking water quality in Ontario. The report entitled *Watershed Based Source Protection: Implementation Committee Report to the Minister of the Environment* was also considered.

The Council transmitted its final advice letter on Drinking Water Source Protection to the Minister of the Environment on November 15, 2005, and continues to remain engaged in this issue, in order to provide on-going advice. This advice was considered by the Minister of the Environment in developing the draft *Clean Water Act* (Bill 43).

7.2 Clean Water Act (Bill 43)

The Council was actively engaged in reviewing and commenting on the Ministry of the Environment's efforts on a Drinking Water Source Protection program, including the ensuing draft *Clean Water Act* (Bill 43) that was posted on the Environmental Registry in December, 2005. The Council also reviewed other related documents such as the proposed regulations guidance modules.

In the Council's opinion, the content of Bill 43 represents a significant improvement over the early draft version that was released for comment in June, 2004, and is generally consistent with the advice previously provided by the Council in November, 2005.

The Council transmitted its final advice letter on the *Clean Water Act* (Bill 43) to the Minister of the Environment on March 31, 2006, and continues to remain engaged to monitor the ongoing developments related to the progress of Bill 43, in order to provide on-going advice.

7.3 Regulation 248

Ontario Regulation 248/03 (*Drinking-Water Testing Services*) sets out the requirements for drinking water testing, pertaining to the licensing of drinking water testing laboratories. Specific requirements are provided regarding conditions of license, sampling and sample handling, test protocols, and reports and records. The Regulation also prescribes tests which may be performed without license at a drinking water system by persons with prescribed qualifications as well as certain other exemptions.

The matter of testing and laboratories received significant attention in the *Part Two Report of the Walkerton Inquiry*. This Report discussed specific issues of quality, availability and cost, and several recommendations specific to testing and laboratories were put forward.

During its investigations and deliberations concerning various issues with which the Council has become engaged, the importance of testing has been a recurrent theme. Testing-related issues such as availability and cost have emerged as concerns in some circumstances.

The Council transmitted its final advice letter on Regulation 248/03 to the Minister of the Environment on January 3, 2006, and continues to remain engaged in this issue, in order to provide on-going advice.

7.4 Drinking Water Quality Management Standard

As part of its broader mandate to review issues related to drinking water, the Council undertook a review of the draft Drinking Water Quality Management Standard (DWQMS) that was posted on the Environmental Registry in November, 2005.

In formulating its observations and recommendations on the draft DWQMS, the Council reviewed:

- Environmental Bill of Rights documentation,
- Pertinent sections of the *Safe Drinking Water Act, 2002*,
- Chapter 11 of the *Part Two Report of the Walkerton Inquiry*,
- The Report of the Water Strategy Expert Panel (Watertight),
- ISO standards,
- Comments from water associations in Ontario, and
- Presentations by Ministry of the Environment staff

The Council transmitted its final advice letter on the Drinking Water Quality Management Standard to the Minister of the Environment on March 31, 2006, and continues to remain engaged in its development, in order to provide on-going advice.

7.5 Treatment of Surface Water Used for Private Drinking Water Supplies

Since its inception, the Council has worked on several issues relating to the need to treat drinking water derived from surface water sources. In fact, the Council, in Recommendation #13 of its *“Report and Advice on Ontario Regulation 170/03 Smaller Private Systems Review and Recommendations”* recommended that *“...all surface water source drinking water systems should require some form of treatment...”*. This recommendation related specifically to systems covered under Ontario Regulation 170.

The issue of treating surface water also arose during the Council’s deliberation on Regulation 903 (Wells), which currently requires that all wells, including Groundwater Under the Direct Influence of surface water (GUDI) wells, be able to produce potable water, when they are to be used as a source of water for human consumption.

In this light, it came to the Council’s attention that private and other unregulated systems that use surface water as their source for drinking water are the *only* category of system to have *no* regulatory requirements for installation and / or use of treatment equipment, or the provision of potable water.

The Council transmitted its final advice letter on the Treatment of Surface Water Used for Private Drinking Water Supplies to the Minister of the Environment on April 10, 2006, and continues to remain engaged in this issue, in order to provide on-going advice.

7.6 Definitions and Use of Terminology for Chlorine

Subsequent to the Council’s advice on the *Procedure for Disinfection of Drinking Water in Ontario* (See Section 5.2), the Council became aware that the definitions and terminology used for chlorine, chlorination, free chlorine residual, combined chlorine residual, and total chlorine residual, as found in the *Procedure for Disinfection of Drinking Water in Ontario*, Ontario Regulation 903, and Ontario Regulation 170, have not been applied consistently.

The Council also reviewed definitions and use of terminology for chlorine residuals from the American Water Works Association (AWWA) and the Canadian Environmental Law Association (CELA), in order to gain a better overall perspective of the issue.

The Council transmitted its final advice letter on the Definitions and Use of Terminology for Chlorine to the Minister of the Environment on April 10, 2006, and continues to remain engaged in this issue, in order to provide on-going advice.

7.7 Total Coliform Standard and Corrective Actions

After the Council's review of Ontario Regulation 170 (Drinking-Water Systems Regulation) in 2004, the Council continued to hear from stakeholders concerned that the Total Coliform Standard was too stringent.

The Council concluded that there was some confusion concerning the numerical Standard versus the level for which Corrective Actions are taken, and by whom.

The Standard for Total Coliforms in Ontario is "Not Detectable", as prescribed, since 2003, in the Ontario Drinking-Water Quality Standards Regulation (Ontario Regulation 169). Previously, Ontario Regulation 459 identified any detection of coliform bacteria in drinking water as an indicator of adverse water quality. Prior to that, there was a Drinking Water Quality Objective for Total Coliforms, which was also "Not detectable".

Corrective Actions are either prescribed by regulation under the *Safe Drinking Water Act*, or administered by Public Health Inspectors, under the *Health Protection and Promotion Act*.

Under the *Safe Drinking Water Act*, both the Ontario Regulation 170 and the Non-Residential and Non-Municipal Seasonal Residential Systems That Do Not Serve The Public Regulation (Ontario Regulation 252) prescribe Corrective Actions to be taken when *any* positive Total Coliform results are discovered.

It is understood by the Council that a new Regulation, replacing Ontario Regulation 252, is being developed for promulgation under the *Health Protection and Promotion Act*. At that time, Total Coliform Corrective Actions will be determined by Public Health Inspectors, using a mandatory Risk-Based Site-Specific Assessment for all subject facilities.

Private systems and systems that do not serve the public are currently unregulated. However, Total Coliform Corrective Actions (*and their trigger level*) may be recommended by Public Health Inspectors, and could also be subject to a Risk-Based Site-Specific process in the future.

The Council has noted, however, that both Ontario's Public Health Units and Health Canada have historically offered *direct* advice on Total Coliform Corrective Actions at trigger levels that exceed Ontario's Standard.

Total Coliforms include a large number of non-disease-causing bacteria arising from soil and vegetation. Their presence, as long as no *E. coli* is detected, indicates system vulnerability and a potential pathway for pathogens, but does not necessarily require immediate implementation of Corrective Actions such as Boil Water Advisories or the use of alternative drinking water sources. However, the Council believes that investigation into the cause(s) of the presence of Total Coliforms should be undertaken by Public Health Inspectors, as part of a Risk-Based Site-Specific Assessment process.

The Council continues to formulate and finalize its advice to the Minister of the Environment on the Total Coliform Standard and Corrective Actions for positive results, and will remain engaged in this matter in order to provide on-going advice.

Appendix A - Advice Letters

- A1 Microbial Indicators of Adverse Water Quality
- A2 Trichloroethylene
- A3 National Priority List Review
- A4 *Procedure for Disinfection of Drinking Water in Ontario*
- A5 Total Trihalomethanes and Bromodichloromethane

A1 Microbial Indicators of Adverse Water Quality

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April 5, 2005

The Honourable Leona Dombrowsky
Minister of the Environment
135 St. Clair Avenue West, 12th Floor
Toronto, Ontario M4V 1P5

Dear Ms. Dombrowsky:

Re: Assessment of Microbial Indicators of Adverse Water Quality by the Advisory Council on Drinking Water Quality and Testing Standards

In his Part Two Report of the Walkerton Inquiry, Justice Dennis O'Connor referred to microbial risks as acute risks. Microbial contamination was a primary factor leading to the outbreak of waterborne disease in Walkerton Ontario in the spring of 2000. In fact, the Inquiry report states that "Globally, the contamination of water by pathogenic organisms poses the most significant threat to the health of humans."

It is in this context, and with an understanding that it is the testing for *indicators* of fecal contamination of water, rather than the testing for the pathogens themselves, that currently provides drinking water purveyors with a means of assessing the safety of drinking water that recommendation 27 of the Inquiry Report was developed. This recommendation states that:

"The Advisory Council on Standards should consider whether to replace the coliform test with an *E. coli* test."

The Council has interpreted this recommendation in a broader fashion and has reviewed the appropriateness of *several* microbial indicators of adverse water quality, as defined in the Ontario Drinking Water Quality Standards and Drinking Water Systems Regulations.

In reviewing these indicators, the Council has drawn upon various technical documents including those prepared by Ministry of Environment (MOE) staff and those recently posted for public comment in support of the Guidelines for Canadian Drinking Water Quality.

The Council wishes to acknowledge and commend MOE staff as well as members of the Federal-Provincial-Territorial Committee on Drinking Water for the comprehensive nature of these documents. The Council has also drawn upon the extensive knowledge and experience of its own members in developing its recommendations.

In evaluating the available information, it is the Council's opinion that the fundamental weighting of indicators of microbial safety as expressed in the Guideline supporting documents is based on sound scientific interpretation and judgment. The Council therefore endorses the use of these documents¹, prepared by the Federal-Provincial-Territorial Committee on Drinking Water, as information to support its recommendations.

The recommendations provided focus on principle rather than detail. It is the Council's expectation that MOE staff will use the recommendations to develop specific regulatory revisions in order to facilitate the implementation of these principles. In order to ensure that the Council's intent in providing the recommendations is clearly understood, the Council suggests that the resulting draft regulatory revisions first be brought to the Council for review, prior to posting on the Environmental Registry.

Following are the Council's recommendations pertaining to each indicator which has been reviewed as well as a brief rationale for the recommendation:

1. *E. coli* vs. Fecal Coliforms

Recommendation:

It is the Council's recommendation that the use of fecal coliforms as an indicator of public health risk be discontinued and that *E. coli* be used as the sole indicator of recent fecal contamination.

This recommendation is based on the fact that *E. coli* is generally considered to be a definitive indicator of the presence of fecal matter. Also, methods are readily available for the enumeration of *E. coli* in drinking water. Fecal coliforms indicate the presence of thermo-tolerant coliform bacteria and are, therefore, somewhat ambiguous in their indication of fecal contamination. Removal of the fecal coliform test in favour of the *E. coli* test will not result in an increase in health risk and would place little or no additional burden on regulated systems.

1 (1) Microbiological Quality of Drinking Water: Bacterial Waterborne Pathogens Current and Emerging Organisms of Concern; (2) Microbiological Quality of Drinking Water: Escherichia coli; (3) Microbiological Quality of Drinking Water: Total Coliforms; (4) Microbiological Quality of Drinking Water: Heterotrophic Plate Count

2. Total Coliforms

Recommendation

It is the Council's recommendation that the Ontario Drinking Water Quality Standard be retained for total coliform bacteria. However, it is the Council's opinion that the current prescriptive requirements arising from detection of coliform bacteria may, in some cases, be unduly severe. Specifically, the Council recommends that the decision to provide advice to customers that an alternate source of water be used, or that the water be boiled prior to consumption, should be subject to the discretion of the local Medical Officer of Health in consultation with the MOE.

Coliform bacteria have had a longstanding history of use as indicators of drinking water safety. However, their utility in this respect has been subject to review subsequent to the development of methodologies facilitating testing specifically for *E. coli*.

While coliform bacteria may indicate the presence of fecal matter, they suffer from significant ambiguity in this regard. This arises from the fact that coliform bacteria presence may be attributed to growth and persistence in an environment not subject to fecal contamination. As coliform bacteria may grow and persist within an otherwise well managed drinking water system, their presence may well be indicative of a need for intervention but is not a definitive indicator of unsafe water.

At the same time, there is an enduring understanding that coliform bacteria are readily inactivated by standard disinfection practices and an expectation that they should not be present in drinking water following treatment. Therefore, their presence, immediately following disinfection, can indicate an operational deficiency that may result in risk to health, should pathogens be present in the source water.

The Council, in considering this apparent dichotomy of thought, has concluded that the standard for coliform bacteria should remain in place as well as the testing requirement. The Council does, however, suggest that the presence of coliform bacteria be considered as part of a more comprehensive assessment of system operation and analytical findings, when health-based decision making is at stake. This approach is particularly applicable in situations where coliform presence is detected within a distribution system but not at the treatment facility. Adverse result notification and re-sampling requirements should remain in place but subsequent actions should be dependant on further assessment and subject to the discretion of the local Medical Officer of Health.

3. Background Colony Counts on the Total Coliform Membrane Filter

Recommendation:

It is the Council's recommendation that all references to background colony counts on the total coliform membrane filter be removed from the Ontario Drinking Water Quality Standards and Drinking Water Systems Regulations.

As background counts are not specifically tested for, their determination is incidental to performing coliform tests. Background counts are a poor and inconsistent indicator of the general bacterial population as enumeration is subject to influences dependant on the specific coliform test method employed. As well, the use of this indicator is virtually unheard of in other jurisdictions. The presence of elevated background colony counts on a membrane filter may interfere with the enumeration of coliform bacteria. As a result, coliform test results may be invalidated and re-sampling may be required.

The Drinking Water Testing Services Regulation provides an instrument for ensuring proper testing procedures, and thus pre-empting the reporting of invalid coliform test results due to high background levels. In and of itself, this parameter does not provide any indication of the true safety of water.

4. Colony Counts on a Heterotrophic Plate Count

Recommendation:

It is the Council's recommendation that heterotrophic plate count be removed from the Ontario Drinking Water Quality Standards Regulation and as an indicator of adverse water quality in the Drinking Water System Regulation. Since the Council believes that heterotrophic plate count could be of value in indicating an operational deficiency or potential deterioration in water quality, it is recommended that heterotrophic plate count be designated as an operational parameter. However, a numerical value should not be assigned and deterioration of quality should be assessed on the basis of an increase in counts above the normal baseline of a given system.

Heterotrophic plate count has long been used as an indicator of general bacterial population. However, only a limited number of bacteria actually present are enumerated and the variety of methods available for determining this parameter do not produce consistent results. Furthermore, there is general consensus in the scientific community that the heterotrophic plate count should not be used in isolation for public health decision making. Heterotrophic bacteria may grow and persist within distribution systems but such presence, in itself, does not signify risk to health.

As a sudden or unexpected increase in heterotrophic plate count may be an early signal of water quality deterioration and / or an increase in the vulnerability of a system, the Council considers it to be an effective tool, when used judiciously. The Council does not recommend that monitoring for this parameter be mandatory but does encourage its use as a best practise. The MOE may choose to evoke a testing requirement through its various instruments, such as Certificates of Approval, when concerns have arisen regarding the quality of water and operational effectiveness of a system.

It is felt that the foregoing recommendations are based on a sound understanding of current scientific knowledge concerning microbial indicators of water safety. It is anticipated that the implementation of these recommendations would result in effective risk management and at the same time support the effective and efficient use of resources.

Sincerely,



Jim Merritt, Chair
Advisory Council on Drinking Water
Quality and Testing Standards

A2 Trichloroethylene

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June 21, 2005

The Honourable Leona Dombrowsky
Minister of the Environment
135 St. Clair Avenue West, 12th Floor
Toronto, Ontario M4V 1P5

Dear Ms. Dombrowsky:

**Re: Endorsement of the Canadian Drinking Water Guideline for Trichloroethylene
And Adoption as an Ontario Drinking Water Quality Standard**

Part of the Advisory Council on Drinking Water Quality and Testing Standards' mandate is to consider issues relating to standards for drinking water quality, and to provide you with advice on recommending the adoption of standards.

In order to provide you with quality advice, the Council reviews Health Canada's draft guideline, supporting documentation, comments from the public consultation process, and information on the occurrence and impact that a particular substance will have on drinking water in Ontario.

As a result of this review, the Council may recommend endorsement of the Canadian Drinking Water Guideline as an Ontario Drinking Water Quality Standard, or consider a more stringent Standard for Ontario, where appropriate. As well, the Council may conduct independent consultations with stakeholders and technical experts as deemed necessary to recommend a more stringent Standard.

Health Canada, through the Federal-Provincial-Territorial process, has revised the maximum acceptable concentration for Trichloroethylene in drinking water from the existing Canadian Drinking Water Guideline of 0.05 mg/L (50 µg/L) to 0.005 mg/L (5 µg/L), based on new evidence of probable human carcinogenicity and evidence of potential developmental effects with acute exposures to high concentrations. The Guideline has also been approved by the Committee on Drinking Water (CDW) and the Committee on Health and the Environment (CHE).

In following the above-outlined review process, the Council recommends that the Ministry of the Environment endorse the revised Canadian Drinking Water Guideline for Trichloroethylene, as approved by both the CDW and the CHE, and adopt it as an Ontario Drinking Water Quality Standard; conditional upon Health Canada's posting of the Final Guideline.

Sincerely,



Jim Merritt, Chair
Advisory Council on Drinking Water
Quality and Testing Standards

A3 National Priority List Review

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July 15, 2005

The Honourable Laurel Broten
Minister of the Environment
135 St. Clair Avenue West, 12th Floor
Toronto, Ontario M4V 1P5

Dear Ms. Broten:

**Re: Recommendation for Ontario to Put Forward N-Nitrosodimethylamine (NDMA)
For Inclusion on the National Priority List**

Part of the mandate of the Advisory Council on Drinking Water Quality and Testing Standards is to provide you with advice and make recommendations on matters related to the *prioritization* of the review and development of standards for drinking water quality and testing in Ontario.

Specifically, the Council, in establishing its own process and protocols, has chosen to review the list of priority substances as suggested by the Federal-Provincial-Territorial (FPT) Committee on Drinking Water (CDW), and recommend additional standards for Ontario to put forward, that are not on the current National Priority List.

The Council chose the June meeting of each year to discuss priorities for drinking water standards and emerging issues. The following substances of interest were discussed at the June, 2005 meeting:

- Endocrine Disruptors, Pharmaceuticals, and Personal Care Products
- Disinfection By-Products (DBPs)
- N-Nitrosodimethylamine (NDMA)
- Fluoride

As a result of this discussion, the following conclusions were made:

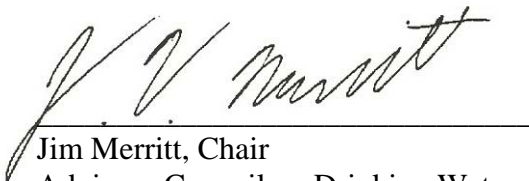
It was noted that while Endocrine Disruptors, Pharmaceuticals, and Personal Care Products may well be the most important emerging issue in drinking water, they are currently being studied in Ontario, and there is not enough data at present, to determine the threats to human health via drinking water. The Council will, however, continue to follow developments on these classes of compounds.

Regarding Disinfection By-Products, the Council concluded that its process for providing overall advice on DBPs, on an on-going basis, can be superseded by the review of individual DBP standards, based on the review of the relatively limited number of associated treatment technologies. As such, DBPs need not be put forward by Ontario for the National Priority List.

Regarding Fluoride, the Council learned that it is already on the Federal agenda to update the Canadian Drinking Water Guideline. Although Health Canada's review has begun, they are awaiting the outcome of the United States National Academies of Science report, which is due to be released in 2006.

Finally, the Council decided, by consensus, that NDMA should be re-visited and recommends its addition to the National Priority List. NDMA was an interim standard that became an Ontario Drinking Water Quality Standard via O. Reg. 169, in 2003. Since NDMA is also a DBP, it is of interest to the Council in relation to Walkerton Recommendation #31, which calls for the Council's "*review of Ontario's standards for disinfection by-products.*"

Sincerely,



Jim Merritt, Chair
Advisory Council on Drinking Water
Quality and Testing Standards

cc: Carl Griffith, ADM, ESSD
Dale Henry, Director, SDB

A4 Procedure for Disinfection of Drinking Water in Ontario

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September 20, 2005

The Honourable Laurel Broten
Minister of the Environment
135 St. Clair Avenue West, 12th Floor
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Dear Ms. Broten:

Re: Advisory Council on Drinking Water Quality and Testing Standards' Advice and Recommendations on the "Procedure for Disinfection of Drinking Water in Ontario"

Part of the mandate of the Advisory Council on Drinking Water Quality and Testing Standards is to provide you with advice and make recommendations on matters related the review and development of standards, guidelines, and procedures for drinking water quality and testing in Ontario.

Specifically, the Council, in establishing its own process, has chosen to review the "Procedure for Disinfection of Drinking Water in Ontario" (Disinfection Procedure) with a view towards providing broad advice on improvements that could be made to enhance and clarify its content and intention.

As well, the Disinfection Procedure, by design, also encompasses three Walkerton Recommendations:

- Recommendation #28: Protozoa Treatment Standard;
- Recommendation #29: Recommending a Lower Turbidity Limit; and
- Recommendation #31: Disinfection By-Products Review.

In recommending the creation of this Council, Justice O'Connor also envisioned that the Council be responsible for providing advice on these three issues. As such, it was decided that a holistic review of the Disinfection Procedure would serve our mandate well.

In fact, all three of the Walkerton recommendations are inter-related and should be considered in the Disinfection Procedure.

First, determination of a protozoa treatment standard should, wherever possible, be based on a quantitative site-specific review of source water quality. Once determined, an assessment of existing treatment and disinfection will lead to optimal methods to provide protozoa control.

Concurrently, the potential to meet existing or proposed disinfection by-product levels or standards must be evaluated. Should formation of disinfection by-products be found to be a limiting factor, then the treatment should be reviewed again such that it satisfies protozoa and disinfection by-product criteria as well as turbidity levels.

The revised Disinfection Procedure has clarified measures that are consistent with good disinfection practices and the Council acknowledges that it is an important and positive measure in protecting the health of Ontarians. Disinfection, however, remains complex, and criteria may easily be misinterpreted unless sufficient guidance is provided to both the designers and operators of drinking water systems.

The United States Environmental Protection Agency (U.S. EPA) has produced an excellent series of guidance manuals that provide a source of information concerning disinfection design and evaluation. It is suggested that the Ministry recognize the best engineering practices outlined in these guidance manuals and make it clear that such practices should be actively encouraged in Ontario.

The following specific examples illustrate how the integration of U.S. EPA guidelines may serve to enhance and clarify the Disinfection Procedure:

- **Pathogen Removal/Disinfection Requirements (Section 2).** The Disinfection Procedure indicates that surface water and Ground Water Under the Direct Influence of Surface Water (GUDI) drinking water systems must provide a minimum 2-log *Cryptosporidium*, 3-log *Giardia* and 4-log virus control. These values were originally derived by the U.S. EPA based on a risk assessment of the level of control needed for “pristine” waters given a survey of ambient pathogen concentrations. Therefore, the U.S. EPA recommends that when source waters are not “pristine”, the level of treatment must be increased to provide the same finished water quality to consumers.

Although mention is made in Section 2.2 of the Disinfection Procedure that determination of additional log treatment credits required may be based on pathogen monitoring, there is no reference specifically noted for this purpose. Failing to outline such an approach may result in drinking water systems treating only to the minimum objectives which could cause populations to be exposed to a greater than acceptable risk.

The U.S. EPA has established a practical method for determining the required level of treatment by surveying *E. coli* concentrations in the source water. *E. coli* data for the source water are compiled over a sufficient length of time, preferably at least a year, and the 95th percentile highest value is compared to a chart found in the U.S. EPA's guidelines. This chart then indicates the level of *Giardia* and virus reduction required for a particular source water to meet an acceptable level of risk.

It should be noted that implementation of source water characterization may, in fact, be potentially linked to the Ministry's current Drinking Water Source Protection initiatives.

Recommendation:

- **The Disinfection Procedure should provide specific reference as to how to determine the required level of treatment required for each individual drinking water system, based on source water quality.**
- **Chloramination (Section 3.1)** The application of ammonia must be downstream of the application of free chlorine (not "usually", as stated in the Disinfection Procedure) in order for the CT requirements to apply. There is a safety factor inherent in the chloramine CT values that require this sequence of application whereby free chlorine is present for a short period of time. If ammonia is present before free chlorine, the CT values shown in Tables 12 and 13 should not apply. This is explained in the original U.S. EPA CT Guidance Manual published in 1989.

Recommendation:

- **The Disinfection Procedure should state that, when drinking water systems employ Chloramination, the addition of ammonia must occur downstream of the application of chlorine.**
- **CT Disinfection Concept – Calculations (Section 3.1.1)** The description of how to calculate CT values is the basic, conservative approach whereby C is defined as the effluent concentration leaving a unit process, and T represents contact time. In most cases this "conservative" approach will lead to overdosing with disinfectant, with an associated increase in disinfection by-product (DBP) formation.

The Disinfection Procedure should explicitly allow drinking water systems to use best practices when calculating CT values in the interests of maximizing pathogen control while minimizing DBP formation.

Best practices for disinfection involve applying the Integrated Disinfection Design Framework (IDDF), a method of accounting for disinfectant decay and true process hydraulics when determining the CT. The IDDF has been widely accepted by the drinking water industry in North America and has already been implemented internally by several drinking water systems in Ontario. The Disinfection Procedure should make it clear that while not required, the Ministry would encourage IDDF approaches to calculating CT values in the interests of promoting best practices.

Recommendation:

- **The Disinfection Procedure should explicitly allow drinking water systems to use best practices, like application of the Integrated Disinfection Design Framework, when calculating CT values, in the interests of maximizing pathogen control while minimizing Disinfection By-Product formation.**
- **CT Disinfection Concept - DBPs (Sections 3.1.1, 7).** The need for source waters to be properly characterized in terms of the potential for contamination has been addressed earlier in this document, and how this may lead to greater than 3-log *Giardia* and 4-log virus reduction requirements for some drinking water systems. In turn, this may require increased disinfectant doses which may promote DBP formation. It is important that the issue of pathogen control and DBP minimization be addressed concurrently.

In the United States, there are rules that drinking water systems at risk of exceeding DBP limits must achieve prescribed levels of Total Organic Carbon (TOC) reduction prior to being able to claim CT credits when chlorinating (for example, through enhanced coagulation). These rules discourage the use of pre-chlorination and help to ensure lower DBP concentrations.

The Disinfection Procedure does not clearly address DBP precursor removal despite indirectly defining minimum disinfection doses. The Ministry should consider requiring precursor removal prior to being able to claim CT credits, unless site-specific justifications can be argued otherwise. Such a requirement would represent best practices as they are currently understood in the context of disinfection.

Recommendation:

- **The Disinfection Procedure should require drinking water systems to remove Disinfection By-Product precursors, prior to a being able to claim CT credits, unless site-specific justifications can be argued otherwise.**

- **CT Disinfection Concept - (Section 3.1.1)** For the sentence “Where data supporting four season stable operating conditions are available which indicate a reliable algorithm can be established for chlorine concentration though the process with acceptable error ranges, omission of continuous upstream monitoring requirements may be considered.”, there should be a definition or reference to the requirements for consideration.

Recommendation:

- **The Disinfection Procedure should define or reference the requirements for consideration of omission of upstream monitoring, in regards to determining CT values.**
- **Monitoring - Primary Disinfection (Section 6.1)** It is suggested that the explanation regarding monitoring of “relevant parameters” be expanded to clarify that it is the level of inactivation (as calculated using the CT concept) that is of prime importance. As such, “continuous disinfection monitoring and recording devices with alarms” should clearly relate to the continuous calculation of microbial inactivation.

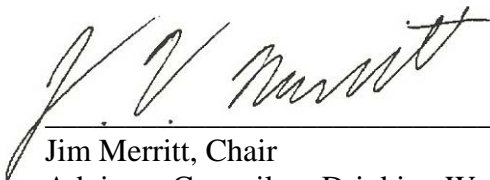
Recommendation:

- **The Disinfection Procedure should state that, regarding monitoring of primary disinfection, continuous disinfection monitoring and recording devices with alarms should clearly relate to the continuous calculation of microbial inactivation.**

The Council feels that consideration and implementation of our advice will provide the necessary clarification and enhancements to the Disinfection Procedure in order to ensure that it is easier to understand, and clearer in its intention.

If you would like to discuss the advice offered here, Council representatives would be pleased to meet with you, your staff, or Ministry staff, to further explain the rationale and approach used in formulating our recommendations.

Sincerely,



Jim Merritt, Chair
Advisory Council on Drinking Water
Quality and Testing Standards

cc: Catherine Brown, ADM, IEPD
Jim Smith, ADM, DWMD
Carl Griffith, ADM, ESSD

Select References:

USEPA. (1999). *Alternative Disinfectants and Oxidants Guidance Manual*. EPA 815-R-99-014.

USEPA. (2003). *Draft Long Term 2 Enhanced Surface Water Treatment Rule Guidance Manual*. EPA 816-D-03-001.

USEPA. (2003). *Draft Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) Implementation Guidance*. EPA 816-D-03-002.

USEPA. (1999). *Microbial and Disinfection Byproduct Rules Simultaneous Compliance Guidance Manual*. EPA 815-R-99-015.

A5 Total Trihalomethanes and Bromodichloromethane

Advisory Council on Drinking Water Quality and Testing Standards

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November 30, 2005

The Honourable Laurel C. Broten
Minister of the Environment
135 St. Clair Avenue West, 12th Floor
Toronto, Ontario M4V 1P5

Dear Ms. Broten:

**Re: Canadian Drinking Water Quality Guidelines for
Bromodichloromethane and Total Trihalomethanes, and
Adoption as Ontario Drinking Water Quality Standards**

Part of the Advisory Council on Drinking Water Quality and Testing Standards' mandate is to provide you with advice on proposed drinking water standards and their applicability in Ontario.

In order to provide you comprehensive advice on these standards, the Council reviews Health Canada's Documents for Public Comment, Supporting Documentation, comments from the public consultation process, and information on the occurrence and impact that a particular substance will have on the delivery of safe drinking water in Ontario.

As a result of this review, the Council may recommend endorsement of a Canadian Drinking Water Quality Guideline as an Ontario Drinking Water Quality Standard, or consider a more stringent Standard for Ontario, where appropriate. As well, the Council may conduct independent consultations with stakeholders and technical experts as deemed necessary to recommend a more stringent Standard.

Health Canada, through the Federal-Provincial-Territorial has reviewed the maximum acceptable concentration for total trihalomethanes in drinking water. In addition, a separate guideline for bromodichloromethane in drinking water was developed.

Bromodichloromethane:

The new maximum acceptable concentration for bromodichloromethane in drinking water has been set at 0.016 mg/L (16 µg/L), as approved by the Committee on Drinking Water (CDW). Final approval will be sought from the Committee on Health and the Environment (CHE) in January, 2006.

The Council recommends that the Ministry of the Environment endorse the new Canadian Drinking Water Quality Guideline of 0.016 mg/L (16 µg/L) for bromodichloromethane in drinking water, as approved by the CDW, and adopt it as an Ontario Drinking Water Quality Standard

Total Trihalomethanes:

Considerable progress has been made since the establishment of the previous Canadian Drinking Water Quality Guideline for total trihalomethanes (1993). The Council endorses Health Canada's new scientific / technical review and rationale in that it provides for increased human health protection, by incorporating additional exposure routes from drinking water, such as inhalation and dermal absorption, resulting in a higher overall estimated exposure than was previously recognized. Their rationale results in a calculated value of 80 µg/L.

However, the national Guideline for total trihalomethanes, as approved by the CDW, will remain at a risk-managed level of 0.1 mg/L (100 µg/L), due to the results of a cost-benefit analysis which determined that, while no significant expected increase in risk to health exists between 80 µg/L and 100 µg/L, significant costs would be incurred in many areas of Canada in order to comply with the lower value. Final approval of this Guideline will be sought from the CHE in January, 2006.

As well, the new Guideline will now be based on a locational running annual average of quarterly samples taken at the point(s) in the distribution system with the highest potential trihalomethane levels.

Trihalomethanes, along with haloacetic acids, are the two major groups of indicators of the presence of disinfection by-products in treated drinking water, and it is expected that their control will reduce the levels of all disinfection by-products and the corresponding risks to human health.

The benefits of meeting the 80 µg/L total trihalomethane level also include promoting and encouraging the optimization of treatment processes, and best management practices, which the Council feels should be actively encouraged in Ontario. It should also be noted that regulations in Quebec specify a total trihalomethane requirement of 80 µg/L.

A recent review of treatment plant performance carried out by the Ministry of the Environment determined that the 80 µg/L level for total trihalomethanes can be, or has been, achieved by most of Ontario's treatment plants, and the Council understands that the province is already working with those plants that do not meet the new standard.

The Council, therefore, recommends that the Ministry of the Environment set a more stringent Ontario Drinking Water Quality Standard of 0.08 mg/L (80 µg/L) for total trihalomethanes in drinking water

In addition, the new total trihalomethanes standard should be phased in as follows:

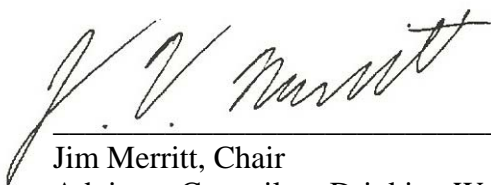
- Treatment plants undergoing significant expansions or significant upgrades should be designed to, at minimum, meet the new total trihalomethanes standard without compromising disinfection effectiveness.
- All other treatment plants should, at minimum, meet the new total trihalomethanes standard, without compromising disinfection effectiveness, within a period of 2 years from the date that the standard is promulgated.

The Council also recommends that, during the phase-in period, systems that do not meet the new recommended 80 µg/L level for total trihalomethanes, should not be required to report levels between 80 and 100 µg/L as adverse results

The Council also agrees with the inclusion of “locational running annual average of quarterly samples taken at the point(s) in the distribution system with the highest potential trihalomethane levels” for the sampling and reporting of total trihalomethanes.

The Council feels that its recommendations on bromodichloromethane and total trihalomethanes represent a precautionary approach to drinking water safety, enabling continuous improvement in the quality of drinking water for Ontarians.

Sincerely,



Jim Merritt, Chair
Advisory Council on Drinking Water
Quality and Testing Standards

Appendix B - Overview of Relevant Legislation & Regulations

- *Safe Drinking Water Act, 2002, Sections 4-5*

Advisory Council on Drinking-water Quality and Testing Standards

4. (1) The Minister shall establish an advisory body known in English as the “Advisory Council on Drinking-water Quality and Testing Standards” and in French as “Conseil consultatif sur les normes de qualité et d’analyse de l’eau potable” to consider issues relating to standards for drinking-water quality and testing and to make recommendations to the Minister. 2002, c. 32, s. 4 (1).

Appointment of members

(2) The members of the Advisory Council shall be appointed by the Minister. 2002, c. 32, s. 4 (2).

Notice

(3) The Advisory Council may publish information in the Registry. 2002, c. 32, s. 4 (3).

Consideration by Minister

5. The Minister shall ensure that all recommendations of the Advisory Council on Drinking-water Quality and Testing Standards are taken into consideration in establishing and revising standards under this Act for drinking-water quality and testing. 2002, c. 32, s. 5.

- *Ontario Drinking-Water Quality Standards (Ontario Regulation 169/03)*
- *Drinking-Water Systems (Ontario Regulation 170/03)*
- *Drinking-Water Testing Services (Ontario Regulation 248/03)*
- *Wells (R.R.O. 1990, Ontario Regulation 903)*
- *Non-Residential And Non-Municipal Seasonal Residential Systems That Do Not Serve Designated Facilities (Ontario Regulation 252/05)*

Appendix C - Terms of Reference

These following Terms of Reference were agreed upon by the Council and finalized by the Council's Chair and the Minister of the Environment, on November 5, 2004.

1. Definitions

In these Terms of Reference (TOR):

- a) "the Act" means the *Safe Drinking Water Act*;
- b) "the Council" means the Advisory Council on Drinking-water Quality and Testing Standards;
- c) "the Ministry" means the Ministry of the Environment;
- d) "the Chair" means the Chair of the Advisory Council on Drinking-water Quality and Testing Standards;
- e) "the Minister" means the Minister of the Environment;
- f) "the Deputy Minister" means the Deputy Minister of the Environment.

2. Preamble

The purpose of the TOR is to describe the operational, administrative and reporting relationships between the Minister and the Chair, the Chair and the Deputy Minister, and reflect the powers of the Council as an advisory agency as set out in Schedule C of the 'Agency Establishment and Accountability Directives'.

The TOR should be used in conjunction with the legislation governing the Council and its constituting instrument to determine how the Council should govern itself. This TOR does not affect, modify, limit or interfere with the responsibilities of any of its parties under law. In the event of any conflict between the TOR and any law, the law prevails.

3. Duration and Review of Terms of Reference

The TOR will become effective on the date of its signature by the parties and will remain in effect for five years or until a new TOR is agreed to by the parties.

The TOR must be reviewed at the expiry of the term or prior to that at the request of any of the parties involved.

4. Legislative Authority

The legislative authority of the Council is set out in Section 4 of the *Safe Drinking Water Act*.

5. Mandate

The mandate of the Council is to provide advice and make recommendations to the Minister of the Environment on matters related to standards for drinking-water quality and testing. Activities of the Council may include but not be limited to:

- a. Review research and scientific and technical documentation related to drinking-water quality and testing standards;
- b. Publish information in the Environmental Registry established under section 5 of the *Environmental Bill of Rights, 1993* and undertake additional consultation with and solicit views from the general public as necessary and provide feedback;
- c. Forward recommendations and their rationale to the Minister within a specified time frame;
- d. When directed by the Minister, provide advice on policies, practices and procedures to be used in the development of standards; and, priorities for the development of standards, testing methods and related research; and
- e. Make recommendations to the Minister on other matters it has identified as being priorities and which merit the attention of the Minister and/or the Ministry.

6. Guiding Principles

The parties agree that they will adhere to the following principles:

- a. The Minister recognizes that the Council is a statutory entity which exercises powers and performs duties in accordance with its mandate under the Act;
- b. The Minister recognizes that the Council operates at “arms length” from the Government;
- c. The Council acknowledges that it is accountable to the Government in exercising its mandate. Accountability is a fundamental principle to be observed in the management, administration and operations of the Council;
- d. As an agency of the Government, the Council conducts itself according to the management principles of the Government of Ontario;
- e. The Deputy Minister will ensure that the support or services provided to the Council are of the same quality and standard as provided to the Ministry’s own line divisions and branches.
- f. The Council and the Ministry must avoid duplication of services.

7. Reporting Relationships

The parties agree that:

- a. The Council is committed through the Chair to the reporting requirements as outlined in Schedule 2 (attached);

- b. The Chair will keep the Minister advised of issues or events that concerns or may concern the Minister in the exercise of his or her responsibilities;
- c. The Minister and the Chair will consult with each other on relevant public communications strategies and publications and will keep each other informed on the results of stakeholder and other public consultations and discussions;
- d. The Chair will provide reports containing the Council's advice on a specified subject and reports commissioned by the Council to the Minister. The public release of said advice or reports shall be at the discretion of the Minister; statements to the press with respect to such advice or reports are not appropriate until the report is publicly released by the Minister; and
- e. The Minister and the Chair will meet as required to discuss issues relating to the delivery of the Council's mandate.

8. Accountability

The accountability of the parties is as follows:

- a. The Minister is accountable to the Legislature for the Council's fulfillment of its mandate, its compliance with Government policies and for reporting to the Legislature on the Council's affairs;
- b. The Chair is accountable to the Minister for the performance of the Council in fulfilling its mandate and for carrying out the roles and responsibilities assigned to the Chair by Management Board of Cabinet Directives and Guidelines, the Council's constituting instrument and the TOR; and
- c. The Deputy Minister is accountable to the Minister for the performance of the Ministry in providing administrative support (including staffing and funding) to the Council and for carrying out the roles and responsibilities assigned to him or her by the Minister, by Management Board of Cabinet Directives and Guidelines, the Council's constituting instrument, and the TOR.

9. Roles and Responsibilities

The *Minister* is responsible for:

- a. Monitoring the activities of the Council to ensure that its mandate is being fulfilled and that it is in compliance with Government policies;
- b. Reviewing, approving and presenting the estimated/recommended annual allocation for the Council as part of the Ministry's Business Plan;
- c. Consulting with the Chair as appropriate when significant new directions for the Council are contemplated or when initiatives are taken to amend any legislation or regulations which may affect the mandate of the Council;

- d. Ensuring that proposed changes to the governing legislation/regulation are accompanied by a recommendation on the continued need for the Council's services and the appropriateness of its mandate;
- e. Recommend appointments and reappointments pursuant to the process for Council appointments established by legislation or by Management Board, after consultation with the Chair as appropriate; and
- f. Meeting with the Chair of the Council as required.

The *Chair* is responsible for:

- a. Directing the affairs of the Council within its mandate as defined by the Act, the Council's constituting instrument and the TOR;
- b. Ensuring that the Council carries out the responsibilities assigned to the Council or its Chair under the Act, the Council's constituting instrument and the TOR;
- c. Providing advice to the Government and seeking policy direction from the Government in specific instances;
- d. Keeping the Minister advised of issues or events that concern or can reasonably be expected to concern him or her in the exercise of ministerial responsibilities;
- e. Ensuring that matters relating to the Council which are of importance to the Ministry are brought to the attention of the Minister and the Deputy Minister in a timely fashion;
- f. Recommending all formal documents related to the fulfillment of the Council's mandate to the Government for approval;
- g. Reviewing the Council's annual budget and bringing it forward to the Minister and the Deputy Minister for approval;
- h. Reviewing the Council's annual report and bringing it forward to the Minister and the Deputy Minister by July 31 of each year;
- i. Ensuring that public funds are used in accordance with management Principles of the Government of Ontario - ensuring that the Council operates within the approved funding in the fulfillment of its mandate;
- j. Attending and/or making presentations before Cabinet or committees of Cabinet or the Legislature on matters concerning the affairs of the Council when requested to do so;
- k. Notifying the Minister of appointment vacancies and making recommendations to the Minister on appointments and reappointments of Council members pursuant to the process for Council appointments established by Management Board of Cabinet;
- l. Ensuring Council compliance with Management Board of Cabinet Directives and Guidelines, and the Ministry's Administrative Policy Manual;
- m. Ensuring that conflict of interest matters are handled in accordance with Management Board Directives; and

- n. Ongoing liaison with the Director of the Ministry's Standards Development Branch to exchange information and ideas related to the administration and operation of the Ministry of the Environment and the Council as they impact upon each other.

The *Deputy Minister* is responsible for:

- a. Advising and assisting the Minister in meeting assigned ministerial responsibility with respect to the Council and ensuring that the Minister is advised of the requirements of Management Board Directive of the administration of agencies;
- b. Undertaking on behalf of the Minister, assessments of whether or not the Council is fulfilling its legislative mandate in concert with approved Government policies; identifying any need for corrective action and recommending ways to resolve any issues that are identified;
- c. Providing a framework for assessing whether the Council is fulfilling its mandate;
- d. Ensuring the ministry is providing the administrative support, financial and other services as set out in the TOR and Schedule 1 (attached) to reflect the same quality and standard as provided to the Ministry's own line divisions and branches;
- e. Meeting with the Chair, as required, to discuss matters of mutual importance to the Council and the Ministry, such as services provided by the Ministry to the Council;
- f. Informing the Council of the policies of the Ministry and the Government that apply to the Council, including financial and administrative, human resources and corporate policies, including policies in respect of French language services, freedom of information, workplace harassment and equal opportunity; and
- g. The Deputy Minister may, in accordance with the *Public Service Act*, and applicable Government directives, delegate any of the powers and duties assigned to him or her by law, as they pertain to the Council.

10. Finances

- a. The Council is funded out of the Consolidated Revenue Fund pursuant to an appropriation authorized by the Legislature, unless otherwise provided.
- b. Recovered costs and other revenues, if any, are paid, as received, to the Consolidated Revenue Fund and may not be applied to as administrative expenditures for the Council unless otherwise provided by law.
- c. Financial arrangements are subject to amendment by such revenue policy directives as the Management Board of Cabinet may issue. Financial arrangements may also be changed by amendment to the Council's constituting instrument.

- d. The Council prepares estimates for inclusion in the Business Plan of the Ministry for presentation to the Legislature. The Council will deliver these estimates to the Minister and Deputy Minister in sufficient time to be analyzed and approved by the Minister and Deputy Minister. The estimates provided by the Council may, after appropriate consultation with the Chair, be altered as required.
- e. Financial procedures of the Council must be in accordance with Management Board of Cabinet Directives and Guidelines, the Ministry's Administrative Policy Manual and other directives of the Ministry and Government.
- f. Responsibility for the maintenance of documentation and information to support expenditures is assigned to the Chair as outlined in the Accounting Policy of the Ministry.

11. Audit Arrangements

- a. The affairs of the Council shall be subject to audit by both the Management Audit Branch of the Ministry and by the Provincial Auditor. The Ministry and the Council shall arrange mutually agreeable times for audit by the ministry at least once per annum.
- b. The results of any audit by Ministry staff will be shared with the Chair. The Chair will be accorded an opportunity to enter his or her comments into the audit record.
- c. The Chair shall direct to the Minister through the Ministry all correspondence of the Council with the provincial Auditor in response to the findings, conclusions and recommendations of the Provincial Auditor's report. The Chair shall consult with the Director of the Ministry's Management Audit Branch throughout the audit process.
- d. The Chair may request an external audit of the financial transactions or management controls of the Council at the Council's expense.

12. Administrative Arrangements and Support

- a. The Ministry is committed to providing the Council with the full range of financial and administrative support services either directly or through shared service agreements as outlined in Schedule 1 (attached) to this TOR. The services will be provided to the same quality and standard as provided to the Ministry's own line divisions and branches.
- b. The Council is an advisory agency as designated by the Management Board of Cabinet. The Chair will develop procedures and will operate the Council in accordance with all administrative policies established and specified in Management Board of Cabinet Directives and Guidelines and the Ministry's Administrative Policy Manual.

- c. The Council may engage persons to provide professional, technical or other assistance to or on behalf of the Council, and may provide payment or remuneration and expenses of such persons in accordance with the Government's and the Ministry's policy.
- d. If the Council requires consultant or other services, the following shall be adhered to:
 - i. the Council will use the administrative services of the Ministry in developing, tendering and administering contracts;
 - ii. all tendering will be consistent with the procedures contained within the Management Board of Cabinet Directives and Guidelines and the Ministry's Administrative Policy;
 - iii. the Council's signing authority and single/sole authority is in accordance with the Ministry Delegation of Authority Framework;
 - iv. in order to avoid the duplication of services already available from the Ministry, all requests from the Council for either internal or external creative services (i.e. Web page design, desktop publishing, advertising) will be forwarded to the Communications Branch for review and approval by the Director; and
 - v. to ensure documents are in accordance with government graphic design guidelines the Council should forward any changes in graphic designs or any new documents to Communications Branch for review and approval by the Director.
- e. Legal Services to the Council are to be provided by the Ministry of the Attorney General.
- f. The Council may request outside legal assistance when it requires expertise unavailable within the Ministry of the Attorney General or when the use of a law officer of the Crown would result in any conflict of interest.
- g. The Ministry of the Attorney General must approve retention of outside legal counsel by the Council. The Council will refer to and comply with the Management Board of Cabinet Directives and Guidelines on legal services and the retention of counsel when obtaining external legal counsel.

13. Staffing and Appointments

- a. The Council is staffed by persons appointed under the *Public Service Act* and eligible for all those rights and benefits accorded under the *Public Service Act*, and relevant collective agreements.
- b. All recommendations for new appointments and reappointments to the Council will be reviewed by the Minister's Office and the Public Appointments Secretariat.
- c. The Council in its dealings with staff appointed under the *Public Service Act* is subject to Management Board of Cabinet Directives and Guidelines.

- d. The Council is also governed by:
 - i. the policies of the Civil Service Commission;
 - ii. the human resources manual of the Ministry;
 - iii. the corporate financial and administrative policies and procedures manual;
 - iv. applicable collective agreement provisions; and
 - v. any other applicable legislation or regulations.

14. Conflict of Interest

- a. All members of the Council appointed by the Minister shall abide by the conflict of interest principle and mandatory requirements set out in the Management Board of Cabinet Directives.

SCHEDULE 1: ADMINISTRATIVE SUPPORT

The Deputy Minister will ensure that the support or services provided to the Council are of the same quality and standard as provided to the Ministry's own line divisions and branches either directly or through shared services agreements:

1. **Financial Administration:** pay and benefits administration, accounts payable and technical advice, purchasing, central mail and printing services, and records and form advisory services.
2. **Human Resources Services:** classification; advice and consultation regarding recruitment procedures and staff relations; job description writing; counselling regarding career planning and staff development; and advice and consultation regarding corporate initiatives such as Occupational Health and Safety, etc. Corporate educational opportunities and career planning services are available and open to Council staff and the Ministry must assist the Chair in ensuring that these are communicated effectively to Council staff.
3. **Information Technology and Telecommunications Services:** advice and consultation.
4. **Internal Audit:** financial compliance, management, human resources and information systems audits; operational reviews and special investigations as required.
5. **Accommodation Planning:** including lease renewals.
6. **Freedom of Information Program:** services as required.
7. **French Language Services:** translation and interpretation services.
8. **Communications:** communications planning, preparation of communications documents i.e. news releases, backgrounders, posting of documents on ministry websites, assistance in the preparation of public documents.

SCHEDULE 2: REPORTING REQUIREMENTS

The Chair ensures that the following reports, statements and documents are submitted to the Minister for review and approval:

1. Annual reports are required by July 31 of each year. The Annual report should describe the Council's accomplishments and a list of activities undertaken during the preceding year; and
2. Financial reports as required by Ministry's internal financial reporting requirements; and
3. Other reports that may be required by the Council's governing legislation or regulation(s) or reports as the Minister may require from time to time.

Appendix D - Council's Standards Review Protocol

The following summary table and detailed descriptions of the Council's standards review protocol were developed to address and implement Recommendation 25 of the Part Two Report of the Walkerton Inquiry, which states that "In setting drinking water quality standards for Ontario, the Minister of the Environment should be advised by an Advisory Council on Standards." The protocol focuses and guides the Council in providing timely advice to the Minister of the Environment on the endorsement of Guidelines for Canadian Drinking Water Quality, and their subsequent adoption as Ontario Drinking Water Quality Standards, including operational advice.

Summary Table

Federal Stages	MOE Stages	Council Stages	Issue	Input	Output	
National Priority Setting	MOE Input into Priorities	①	a. Convey Substances of Interest to MOE (yearly)	Substances of Interest addressed	Proposed National Priority List	Conveyance of Substances of Interest to Minister of the Environment (formal)
			b. Review Final National Priority List	Substances of Interest that did NOT make the list to be addressed by MOE	Final National Priority List	Conveyance of Substances of Interest that did NOT make the list to Minister of the Environment (formal)
Scientific / Technical Review (of Individual Substances)		②	<i>No Council Involvement at this Stage</i>			
Draft/Final Document for Public Comment	Review & Comment	③	a. Assess Draft/Final Document for Public Comment	Concerns with document addressed	Draft/Final Document for Public Comment, decision sought, references, presentation	Information for formulation of advice on Ontario's position
National Public Consultation	Ontario Public Consultation concurrent with National Public Consultation		b. Propose Interim Ontario Standard (if warranted) i. Undertake Independent Consultation (if warranted)			

Federal Stages	MOE Stages	Council Stages	Issue	Input	Output	
	Assess comments from Public Consultations	④	Assess Comments from Public Consultations	Concerns with comments addressed	Public comments from National and Ontario consultations	Information for formulation of advice on Ontario's position
Draft Final Guideline Technical Document	Review & Comment	⑤	a. Assess Draft Final Guideline Technical Document b. Undertake Independent Consultation (<i>if warranted</i>) c. Determine and convey Position to MOE (informal)	Concerns with document addressed	Draft Final Guideline Technical Document	Conveyance of Council's advice to Ministry of the Environment (informal)
	Convey Ontario's Position to CDW, CHE	⑥	<i>No Council Involvement at this Stage</i>			
CDW, CHE Approval		⑦	<i>No Council Involvement at this Stage</i>			
		⑧	Transmit Advice Letter to Minister (<i>Proposed Ontario Standard, Objective, or Guideline, and operational advice, if necessary</i>)	Advice conveyed to Minister	Notice that CDW, CHE have approved standard, <i>with no significant changes</i>	Conveyance of Council's advice to Minister of the Environment (formal)
Final Guideline for Canadian Drinking Water Quality	Revise Reg. 169, and / or other documents as necessary	⑨	<i>No Council Involvement at this Stage</i>			

Council Engagement Stage 1:

a. Convey Council's Substances of Interest to the MOE

The question before the Council at this sub-stage is:

Are there any substances of interest that are not already on the National Priority List?

Considerations:

- Does the substance have an adverse health effect?
- Is the substance known or likely to occur at levels of concern?
- Would regulating the substance provide a meaningful opportunity for risk reduction?
- Would research of this substance (which could include collecting occurrence data, treatment data, health effects data, and developing analytical methods) constitute a good use of resources and funding?

Notes:

- Must account for emerging and emergency parameters (like NDMA)
- Can suggest bump up (or bump down) of parameters
- Can also suggest dropping parameters from the list
- Minister may call on Council at any time for advice

Input: Ministry of the Environment Liaison staff member to supply the Council with the *proposed* National Priority List for review. Council members then identify substances of interest (that are not already on the list) and prepare for their discussion at the June meeting of every year.

Output: Council to submit a list of substances of interest to the Minister of the Environment to be considered for inclusion in Ontario's Standards Plan, and input into the Federal-Provincial-Territorial process.

b. Review Final National Priority List

The question before the Council at this sub-stage is:

Are there any substances that the Council recommended for inclusion on the National Priority List, that did not make the List, and, if so, what action should the Council take?

This sub-stage is directly linked to Recommendation #26 of the Part Two Report of the Walkerton Inquiry, which states that “*The Advisory Council on Standards should have the authority to recommend that the provincial government adopt standards for contaminants that are not on the current federal-provincial agenda.*”

Input: Ministry of the Environment Liaison staff member to supply the Council with the *final* National Priority List for review. Council members then review the National Priority List and identify the Council’s substances of interest that did not get included, if any. The Council will then prepare for discussion of these substances to decide what steps should be taken, including whether to advise the Ministry of the Environment to undertake their own standard review.

Output: Council to convey advice on next steps for the Substances of Interest (that did not get included in the Final National Priority List) to the Minister for the Ministry of the Environment to undertake its own scientific / technical review in consideration of the preparation of a document for public consultation.

Council Engagement Stage 3:

a. Assess Draft/Final Document for Public Comment

The question before the Council at this sub-stage is:

Does the Council have any concerns with the Draft/Final Document for Public Comment?

The Council's role in this stage is to assess the Draft/Final Document for Public Comment arising from the National Process, relying primarily on the knowledge and experience of its members, and possibly including such aspects as economic impacts, occurrence data, treatment data, and analytical methods, with consideration given to "Nice to Have" versus "Need to Have" information.

In the event that the above-mentioned aspects cannot easily be addressed, it may be determined that additional information or work is required. If so, the following process will be initiated, in consultation with the Ministry of the Environment's Standards Development Branch (SDB), to assist the review of the substance in question:

Process for Requesting Information from the Ministry:

- Consult with SDB Director and Ministry Liaison staff member to clarify Council's request
- Consult with SDB. If deemed simple, requested information be supplied to Council through Ministry Liaison staff member
- Consult with SDB. If deemed complex, Ministry Liaison staff member to provide ideas on next steps to the Council
- If under \$25,000, Council could initiate and project-manage the research in cooperation with SDB
- If over \$25,000, Council to formally advise Minister of study / research need

Input: Draft/Final Document for Public Comment, decision sought, scientific references, and a presentation by the Ministry (including information on the range of values and possible compromises made at the national level, and known and potential contentious issues), and *if required*, information per the above 5 step process for requesting information from the Minister or Ministry.

Output: Council to use information to develop advice for inclusion in the analysis and formulation of Ontario's position.

b. Propose Interim Ontario Standard (If warranted)

The question before the Council at this sub-stage is:

Does Ontario need an interim Number or Guideline while the National Process is undertaken?

The Council will assess the Draft/Final Document for Public Comment to consider whether or not to advise Ontario to adopt an interim number or guideline.

Input: Council to receive Draft/Final Document for Public Comment, and, when required, other documentation for review, decision sought, scientific references, and a presentation by the Ministry (including information on the range of values and possible compromises made at the national level, as well as known and potential contentious issues).

Output: Council to convey advice on possible interim standard to the Minister for implementation consideration by the Ministry of the Environment.

i. Undertake Independent Consultation (If warranted)

The question before the Council at this sub-stage is:

Does the Council feel that it needs to undertake its own consultation to gain a better understanding of stakeholder and public concerns?

The Council could use the following consultation methods to obtain more or different information about a standard: EBR Information Posting, peer review, stakeholder information sessions, or public meetings.

Input: Draft/Final Document for Public Comment.

Output: Council to use information gleaned from independent consultation process to provide advice to the Ministry of the Environment, for inclusion in Ontario's position.

Council Engagement Stage 4:

Assess Comments from Public Consultations

The question before the Council at this stage is:

Does the Council have any concerns with the comments received from the public consultations?

The Council's role in this stage is to take into account comments received from the National and Ontario public consultation process.

Input: Council to receive public comments from the National and Ontario consultations.

Output: Council to use comments received for inclusion in the analysis and formulation of Ontario's position, as well as to assess the Draft Final Guidance Technical Document in Stage 5.

Council Engagement Stage 5:

a. Assess Draft Final Guideline Technical Document

The question before the Council at this sub-stage is:

Does the Council have any concerns with the Draft Final Guideline Technical Document?

This stage is positioned after public consultation, but before the Guideline for Canadian Drinking Water Quality is approved, or any other document goes to the Federal-Provincial-Territorial Committee on Drinking Water (CDW) and the Federal-Provincial-Territorial Committee on Health and the Environment (CHE).

The Council's role in this stage is to assess the Draft Final Guideline Technical Document, taking into account the assessment of the comments received from the National and Ontario public consultation process in Stage 4.

Input: Draft Final Guideline Technical Document

Output: Assessment to be used in providing advice to the Ministry of the Environment on the acceptability of the Draft Final Guideline Technical Document, in relation to Ontario.

b. Undertake Independent Consultation (If warranted)

The question before the Council at this sub-stage is:

Does the Council feel that it needs to undertake its own consultation to gain a better understanding of stakeholder and public concerns?

The Council could use the following consultation methods to obtain more or different information about a standard: EBR Information Posting, peer review, stakeholder information sessions, or public meetings.

Input: Draft Final Guideline Technical Document and comments received from the National and Ontario public consultation process.

Output: Council to use information gleaned from independent consultation process to provide advice to the Ministry of the Environment, for inclusion in Ontario's position.

c. Determine and Convey Position to MOE (Informal)

There are 2 questions before the Council at this sub-stage:

1. *Should the Ontario Standard be set at a level different from the Guideline for Canadian Drinking Water Quality?*
2. *How should the Standard be applied in Ontario?*

The Council's role in this stage is to propose an Ontario Drinking Water Quality Standard, Objective or Guideline, including operational advice, if deemed necessary, in order to provide advice on how the standard is to be applied in Ontario, in regards to sampling, compliance, and regulation.

It should be noted that the Council will only propose an Ontario Drinking Water Quality Standard, Objective, or Guideline that is equivalent to or more stringent than a Guideline for Canadian Drinking Water Quality.

Input: Draft Final Guideline Technical Document, comments received from the National and Ontario public consultation process, and information gleaned from independent consultation process, if undertaken.

Output: Council to provide informal advice to the Ministry of the Environment on the proposed Ontario Drinking Water Quality Standard, Objective, or Guideline, and its application in Ontario, if deemed necessary.

Council Engagement Stage 8:

Transmit Advice Letter to Minister (*Formal*)

The Council's role in this stage is to formally transmit its advice to the Minister of the Environment, on a proposed Ontario Drinking Water Quality Standard, Objective, or Guideline, after approval has been granted for the Guideline for Canadian Drinking Water Quality by both the Committee on Drinking Water (CDW) and the Committee on Health and the Environment (CHE).

The advice will also outline how the standard is to be applied in Ontario, in regards to sampling, compliance, and regulation, if warranted.

It should be noted that the Council would only propose an Ontario Drinking Water Quality Standard, Objective, or Guideline that is equivalent to or more stringent than a Guideline for Canadian Drinking Water Quality.

Input: Council to receive notice from Ministry Liaison staff member that both CDW and CHE have approved the final Guideline for Canadian Drinking Water Quality.

Output: Council to provide formal advice to the Minister of the Environment on the proposed Ontario Drinking Water Quality Standard, Objective, or Guideline, and its application in Ontario, if warranted.

Appendix E - Council Members' Biographies

Dr. Robert Andrews is a Professor and Associate Chair of Research in the Department of Civil Engineering at the University of Toronto. He is a 2003 co-recipient of the National Science and Engineering Research Council (NSERC) Synergy Award for University-Industry Partnerships. He currently serves on the NSERC Civil Engineering Grant Selection Committee and the Council of Research Managers - Great Lakes International Joint Commission. Dr. Andrews also serves on the American Water Works Association (AWWA) Disinfection Committee, and on the Ontario Water Works Association's Distribution System Committee. He has extensive experience in Drinking Water Treatment and Disinfection.

Dr. Ronald Brecher is a founding partner of GlobalTox International Consultants - a Canadian corporation that assesses the impact of toxic chemical exposures on human health. Dr. Brecher is one of about 35 Canadians certified by the American Board of Toxicology. He is an Adjunct Professor, School of Planning, at the University of Waterloo and Associated Graduate Faculty, Department of Biomedical Sciences at the University of Guelph. From 1994-2002, he was a director of the Children's Groundwater Institute. He is a past recipient of the National Science and Engineering Research Council's Industrial Research Fellowship. He is a member of the Science and Policy Advisory Board of the American Council of Science and Health.

Michèle Giddings is the Manager of the Water Quality and Science Division in the Water Quality and Health Bureau, Healthy Environments & Consumer Safety Branch, Health Canada. She is on Health Canada's Secretariat for the Federal/Provincial/Territorial Committee on Drinking Water. She is currently co-coordinator of the Disinfectants and Disinfection By-products Working Group for the World Health Organization's Guidelines for Drinking Water Quality. Ms. Giddings has developed a number of drinking water guidelines for Health Canada and WHO.

Rod Holme is the former Vice President of the Water and Wastewater division of Earth Tech Canada and is currently an independent consultant on drinking water. He is Past President of American Water Works Association and currently chairs their International Council. He is also Chair of the Joint Committee on Water Regulations for the Ontario Water Works Association and the Ontario Municipal Water Association. He has extensive experience in technical and project management in municipal water supply.

Dr. Peter Huck is a Professor in the Department of Civil and Environmental Engineering, NSERC Chair in Water Treatment and University Research Chair at the University of Waterloo. He has undertaken extensive research in water quality and treatment in areas such as the robustness of water treatment systems, membrane and UV treatment, the removal of Cryptosporidium pathogen loadings in watersheds, among other topics.

Dr. Alexander Hukowich is the former Medical Officer of Health for the Haliburton, Kawartha, Pine Ridge Health Unit and coroner for Northumberland County, and was nominated for the Council by the Association of Local Public Health Agencies.

Marilyn Lee is a trustee of the Environmental Health Foundation of Canada and a member of the Joint Committee on Drinking Water Treatment Units (NSF). She is a professor in the School of Occupational and Public Health, Ryerson University, where she teaches courses on water quality, food pathogens, parasitology, and infection control. She is also a Certified Public Health Inspector and worked for 6 years in a general program of public health inspection with the Wellington-Dufferin-Guelph Health Unit. Her published work primarily deals with food pathogens, which include Giardia, the coccidial parasites, and E. coli O157:H7.

Jim Merritt is an independent consultant on environmental services, municipal infrastructure and water management. He is a former Assistant Deputy Minister of Operations at the Ontario Ministry of the Environment. Mr. Merritt led the establishment of the Ontario Clean Water Agency and served as Vice President of Operations and Vice President of Information and Technology. Mr. Merritt currently serves as the Chair of the Council.

Dr. Harold Richardson is the managing director of the Laboratory Proficiency Testing Program of the Ontario Medical Association. He also serves as the Vice-chair of the National Committee on Medical Laboratory Quality Systems of the Canadian Standards Association. He is a former chair of the Medical Microbiology and Infectious Diseases program, and past president of the Canadian Association of Medical Microbiologists. Dr. Richardson represents the Ontario Medical Association.

Dr. Ken Roberts has over 30 years' experience in the field of drinking water treatment engineering and groundwater management. He currently works for XCG Consultants Ltd. Prior to joining XCG, he served in a number of water-quality-related positions in the Ontario Ministry of the Environment and Energy. Mr. Roberts is a member of the American Water Works Association and the AWWA's Research Foundation.

John Rudnickas is the Manager of Water Quality for the City of Toronto. A chemist by training, he has extensive experience in all aspects of quality assurance/quality control in a large drinking water system. He is responsible for the management of the City of Toronto's accredited and licensed laboratory for drinking water testing. He is a member of the Ontario Water Works Association and is on the Water Quality Committee of the Canadian Water and Wastewater Association. He is also a member of the American Water Works Association.

Dr. Lesbia Smith is an Assistant Professor at the University of Toronto and Clinical Research Associate of the McMaster University Institute of Environment and Health. Dr. Smith holds a Medical degree, and is the former head of the Environmental health and Toxicology Unit of the Public Health Branch of the Ontario Ministry of Health. Dr. Smith has researched drinking water quality and chronic diseases such as non-bladder cancer (by-products of chlorination) and Alzheimer's disease (aluminum). She has participated in the development of several Ontario drinking water standards. Her current work relates to ecological and human impacts of industrial emissions through human and ecological risk assessments including studies of the impacts on health of surface waters affected by a variety of industrial contaminants.

Robert Walton is the Director of Public Works for the County of Oxford. He is the former Manager of Water and Wastewater Services. Prior to joining the County of Oxford, Mr. Walton worked as a consulting engineer. Mr. Walton is a member of the Ontario Municipal Water Association and has served on the Drinking Water Committee of the Association of Municipalities of Ontario. He represents the Ontario Municipal Water Association.

Appendix F - Contact Information

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