



ODWAC

Ontario Drinking Water Advisory Council

ANNUAL REPORT 2011-2012





“Advising Ontario on Drinking Water Quality”

www.odwac.gov.on.ca

The Ontario Drinking Water Advisory Council, known formally as the Advisory Council on Drinking Water Quality and Testing Standards, is an Agency of the Government of Ontario

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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 present this 8th annual report outlining our activities and achievements from May, 2011 to May, 2012.

The Council's overall mandate is to provide the Minister of the Environment with advice on a variety of matters related to drinking water in Ontario. The Council consists of a group of drinking water professionals appointed by the Minister of the Environment. They have a genuine interest in protecting and improving the safety and quality of Ontario's drinking water, and bring their collective knowledge and experience to the table to formulate advice, and provide workable solutions.

The Council continued its work to develop a report on alternative approaches to providing microbiologically safe drinking water to consumers. The goal of this work is to develop recommendations for considering a process to allow for new approaches to providing microbiologically safe drinking water to consumers, possibly without the use of chlorine as a secondary disinfectant.

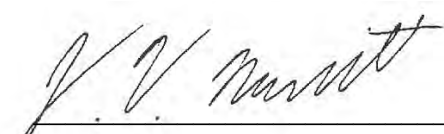
The Council also addressed a number of drinking water issues; both proactive and as a result of previous requests from the Minister of the Environment. The Council evaluated several Canadian Drinking Water Quality Guidelines for inclusion or update as Standards in Ontario, including formal advice on carbon tetrachloride, dichloromethane, fluoride, and radiological parameters and monitoring.

The Council continued to monitor Ontario's Drinking Water Safety Net and has kept abreast of new developments in other jurisdictions, in order to provide the Minister of the Environment with the most current advice possible.

As well, as requested directly by the Minister of the Environment, the Council continued its work on tracking the USEPA's new initiatives to regulate: contaminants as groups (starting with carcinogenic volatile compounds); perchlorate; and hexavalent chromium, with a view of reporting back on what Ontario could or should do to remain in the forefront of drinking water protection.

It is with sadness that I note the Council lost two very valuable members in this past year. Derrick Kamanga passed away on October 19, 2011, and Dr. Lesbia Smith passed away on December 21, 2011. *(See the end of Appendix I for their biographies)*

I would like to thank the Council members for their unwavering support and contribution to the mandate of the Council. I would also like to thank the staff of the Ministry of the Environment and the Ministry of Health and Long-Term Care for their continued cooperation and assistance in support of the Council's many core activities.



Jim Merritt

2.0 Council Background and Mandate

On May 23, 2002, Justice O'Connor, in the Part Two Report of the Walkerton Inquiry, made several recommendations regarding an "Advisory Council on Standards":

- 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."*
- 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."*
- Recommendation 27 states that *"The Advisory Council on Standards should consider whether to replace the total coliform test with an E. coli test."*
- 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."*
- 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."*

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

- It is reasonable to seek expertise from an Advisory Council on standards comprised of members of the broader general public; as such expertise 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.

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

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 E for the relevant sections of the *Safe Drinking Water Act, 2002*)

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, risk assessment, 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’s deliberations. (See Appendix I for the Council Members’ Biographies)

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 deemed appropriate. The role of the Council includes, but is not necessarily limited to, the following core activities:

- **Requests 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)
- **Standards Review:**
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. (See Section 5.0)
- **Council Initiatives:**
Providing recommendations on drinking water matters that the Council has become aware of and has identified as being of interest, and which may merit the attention of the Minister of the Environment.
(See Section 6.0)
- **Stakeholder / General Public Consultations:**
Publishing information on the Environmental Registry and undertaking additional consultations on standards, regulations, or other drinking water matters, to solicit views from stakeholders or the general public, in order to provide advice and recommendations to the Minister of the Environment.

3.0 Summary of Activities and Accomplishments

Following is a summary of the Council's activities and accomplishments from May, 2011 to May, 2012, as well as progress on items reported in previous annual reports:

Requests from the Minister of the Environment: *(See Section 4.0)*

Progress on Requests from Previous Years:

- Small Drinking Water Systems Program
- Wells Regulation (Ontario Regulation 903) Disinfection Requirements
- Tritium Standard
- Corrosion Control / Lead Reduction
- USEPA's Initiatives to Regulate Contaminants as Groups, Perchlorate, and Hexavalent Chromium

Standards Review: *(See Section 5.0)*

Standards Reviews Completed:

- Carbon Tetrachloride
- Dichloromethane
- Fluoride
- Radiological Parameters

Standards Currently Under Review:

- Ammonia
- *E. coli*
- Enteric Protozoa
- Enteric Viruses
- Nitrate / Nitrite
- N-Nitrosodimethylamine (NDMA)
- Turbidity

Standards Prioritization *(See Section 5.3)*

Council Initiatives: *(See Section 6.0)*

Progress on Initiatives from Previous Years:

- Clean Water Act: Source Protection Plans
- Drinking Water Quality Management Standard

- Ontario Regulation 248 (Drinking-Water Testing Services)

Initiatives Currently Under Review:

- Alternative Approaches to Providing Microbiologically Safe Drinking Water to Consumers
- Council Standards Development Process
- Disinfection Procedure Review

Areas of Ongoing Interest:

- Accreditation of Drinking Water Systems
- Backflow and Cross Connections
- Bill S-8 *Safe Drinking Water for First Nations Act* (Federal)
- Blood Lead Level reports (Health Canada)
- Blue-Green Algae Blooms
- Cryptosporidium, *Giardia* Monitoring
- Drinking Water Advisories and Reporting Systems
- Drinking Water Quality Management System
- *E. coli* Field Test Kits
- Endocrine Disruptors / Pharmaceuticals and Personal Care Products
- Financial Plans for Drinking Water Systems (Ministry of the Environment)
- *Great Lakes Protection Act*
- GUDI Terms of Reference Working Group (Ministry of the Environment)
- Hydraulic Fracturing
- Hydrogen Peroxide as a Disinfectant
- Lead in Drinking Water
- Microcystin Field Test Kits
- Municipal Licencing Program (Ministry of the Environment)
- NSF Certification
- Public Health Ontario (PHO) Role
- Source Characterization and Treatment Requirements
- Source Protection Planning
- Southern Ontario Water Consortium (SOWC)
- Statutory Standard of Care
- *Water Opportunities Act* (infrastructure sustainability)
- WaterTAP

Administrative: (See Section 6.4)

- Memorandum of Understanding
- Learning and Development Map

4.0 Requests from the Minister of the Environment

The Minister of the Environment can formally request the Council to provide direct advice and make recommendations on drinking water policies, practices, procedures, standards, testing methods, and related research.

The following requests were referred to the Council by the Minister in a previous annual report year, but there was additional activity and progress made during this reporting period:

4.1 Progress on Requests from Previous Years

Small Drinking Water Systems Program

Over this annual report period, the Council continued to monitor progress on the implementation of the Small Drinking Water Systems Program. Oversight responsibility for Ontario's small systems was transferred to the Ministry of Health and Long-Term Care (MOHLTC) from the Ministry of the Environment on December 1, 2008. As such, all small drinking water systems across the province are now legislated under Ontario Regulation 318/08 or 319/08.

In collaboration with local boards of health, the MOHLTC has undertaken a comprehensive and collaborative approach to implementing the Program, using a risk-based approach to identify adverse conditions and to ensure that issues are addressed quickly by operators, who work closely with local boards of health.

Significant improvements have been made to Small Drinking Water Systems through compliance with individual directives, while ongoing monitoring ensures the continued provision of safe drinking water.

As of December 2011, 10,106 systems were identified as falling under the Small Drinking Water Systems Program. Their risk characterization assessment status is as follows:

- 6,990 *finalized*:
 - 1,048 categorized as high risk (15%)
 - 1,398 categorized as moderate risk (20%)
 - 4,544 categorized as low risk (65%)
- 2,831 *in progress*
- 285 *to be carried out*

Wells Regulation (Ontario Regulation 903) Disinfection Requirements

On July 25, 2007, the Wells Regulation was updated and the amendments came into effect on December 31, 2007.

The amended Wells Regulation adopted the Council's recommendations for disinfection with chlorine with regards to dosage, contact time, flushing, and verification of free chlorine residuals, and applies to drinking water wells following initial construction, alterations and pump installation.

The Ministry of the Environment released a manual entitled "*Water Supply Wells – Requirements and Best Management Practices*", which provides a concise discussion of the amended Wells Regulation, as well as best management practices and recommended techniques for well construction. The manual can be viewed at:

http://www.ene.gov.on.ca/environment/en/resources/STD01_078655.html

Corrosion Control / Lead Reduction

Over this annual report period, the Council continued to monitor Ontario's Lead Action Plan in terms of any future regulatory amendments or guidance documentation development.

Regulatory amendments, including reduced flushing at schools and day nurseries, continued to be implemented during this annual report period, and guidance was prepared by the Ministry of the Environment.

Of the 20 large municipal residential drinking water systems required to prepare corrosion control plans based on their community lead testing results, 13 systems have prepared plans and received acceptance from the Ministry of the Environment by May, 2012. Four systems are pursuing lead service line replacement and the remaining plans are still under evaluation.

Tritium Standard

On February 21, 2007, the Minister of the Environment formally requested that the Council review and provide advice on the current Ontario Drinking Water Quality Standard (ODWQS) for tritium, taking into consideration recommendations made in the 1994 report entitled: "A Standard for Tritium" transmitted to the Minister of Environment and Energy by the Ontario Advisory Committee on Environmental Standards (ACES).

The Council held a public consultation on March 26 and 27, 2008 and the results were incorporated with the input received from individuals and other stakeholders to inform the Council's advice to the Minister of the Environment on the Ontario Drinking Water Quality Standard for tritium.

The Council took considerable effort to review all of the health and risk aspects of tritium exposure to the public from drinking water, and on May 21, 2009, delivered its “Report and Advice on the Ontario Drinking Water Quality Standard for Tritium” to the Minister of the Environment.

The full report can be found at:

http://www.odwac.gov.on.ca/reports/052109_ODWAC_Tritium_Report.pdf

Throughout this annual report year, the Council continued to monitor the Tritium Drinking Water Quality Standard issue, and provided support to the Minister’s Office, while the Council’s report continued to serve as a source of information.

In August, 2011, a Joint Review Panel report for the Darlington New Nuclear Power Plant Project was released (see: www.ceaa.gc.ca/052/details-eng.cfm?pid=29525 for more information). The Panel recognized the Council’s report and made a recommendation that *“during construction and operation, the Canadian Nuclear Safety Commission require OPG to implement measures to manage releases from the Project to avoid tritium in drinking water levels exceeding a running annual average of 20 Becquerels per litre at drinking water supply plants in the regional study area.”*

USEPA’s Initiatives to Regulate Contaminants as Groups, Perchlorate, and Hexavalent Chromium

On March 7, 2011, The Minister of the Environment formally requested the Council to track the United States Environmental Protection Agency’s (USEPA) development of new drinking water limits and / or monitoring requirements for perchlorate and hexavalent chromium.

As well the Council was asked to track the USEPA’s (*as well as other jurisdiction’s*) new approaches to drinking water regulation, which involve the grouping of similar contaminants. The Council was requested to report back to the Minister on whether this approach could / should be used in Ontario, so that the province remains a leader in drinking water protection and keeps abreast of developments in other jurisdictions.

The Council formed a working group and is currently carrying out an action plan involving:

- tracking the USEPA’s initiative on regulating contaminants as groups;
- tracking the USEPA’s initiative on regulating perchlorate;
- tracking the USEPA’s initiative on monitoring for hexavalent chromium;
- tracking Health Canada’s initiative on the grouping of some Volatile Organic Compounds;
- investigating other important jurisdictions’ possible work on these 3 initiatives;
- seeking direct contact with the USEPA to discuss progress and possible directions first-hand;
- seeking to participate in forums where these 3 initiatives are part of the agenda;
- developing and information database on VOCs; and
- investigating treatment options.

The Council continued to monitor the USEPA's initiative to regulate contaminants as groups. The first group selected for regulation is carcinogenic volatile compounds (cVOCs).

As well, the Council continued to monitor the USEPA's initiatives to monitor for and regulate both perchlorate and hexavalent chromium.

5.0 Standards Review

Part of the Council's mandate is to provide advice to the Minister of the Environment on proposed drinking water standards, objectives, and guidelines 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 order to provide comprehensive advice, the Council assesses Health Canada's Guideline Technical Documents, comments from the national and Ontario 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 the province.

Based on this assessment, the Council may recommend the endorsement of a Canadian Drinking Water Quality Guideline (CDWQG) as an Ontario Drinking Water Quality Standard (ODWQS) in Ontario Regulation 169/03, or as an Objective, or Guideline, or it may make an alternative recommendation. When appropriate, the Council may also conduct independent consultations with stakeholders and technical experts as deemed necessary to formulate its advice.

It should be noted that the Council's protocol is to recommend that all Ontario Standards, Objectives, and Guidelines be at least as stringent, if not more stringent, than the corresponding CDWQGs. (*See Appendix F for the Council's Standards Review Protocol*)

Following is an update of the status of the Council's review of standards, from May, 2011 to May, 2012, as well as progress on standards reported on in previous annual report years:

5.1 Standards Reviews Completed

Carbon Tetrachloride

Health Canada, through the Federal-Provincial-Territorial process, completed its review of the health risks associated with carbon tetrachloride in drinking water, and chose a more stringent maximum acceptable concentration (MAC) of 0.002 mg/L for this Canadian Drinking Water Quality Guideline (CDWQG). The previous CDWQG and Ontario's current Ontario Drinking Water Quality Standard (ODWQS) are both 0.005 mg/L.

The Council concurred with Health Canada's rationale and transmitted its advice to the Minister of the Environment on July 26, 2011, recommending that the Ministry of the Environment revise the Ontario Drinking Water Quality Standard for carbon tetrachloride in drinking water to 0.002 mg/L (*See Appendix A*)

Dichloromethane

Health Canada, through the Federal-Provincial-Territorial process, completed its review of the health risks associated with dichloromethane (DCM) in drinking water, and chose to reaffirm its previous (1987) CDWQG at a maximum acceptable concentration of 0.05 mg/L, which is identical to Ontario's current ODWQS.

The Council concurred with Health Canada's rationale and transmitted its advice to the Minister of the Environment on December 12, 2011, recommending that the Ministry of the Environment maintain the current ODWQS of 0.05 mg/L for dichloromethane in drinking water. *(See Appendix B)*

Fluoride

Health Canada, through the Federal-Provincial-Territorial process, completed its review of the health risks associated with fluoride in drinking water. Their review assessed all identified human health risks, taking into account a new total diet study, collaborating with Health Canada's Chief Dental Officer, and facilitating an expert panel review. They reaffirmed the maximum acceptable concentration (MAC) of 1.5 mg/L for this CDWQG, which is also the current ODWQS.

The Council concurred with Health Canada's rationale and transmitted its advice to the Minister of the Environment on December 12, 2011, recommending that the Ministry of the Environment maintain the current ODWQS of 1.5 mg/L for fluoride in drinking water. *(See Appendix C)*

Radiological Parameters and Monitoring

Consistent with the World Health Organization (WHO), Health Canada, through the Federal-Provincial-Territorial process revised the Canadian Drinking Water Quality Guidelines for Radiological Parameters, based on updated (1996) scientific information published by the International Commission on Radiological Protection (ICRP).

The revised Health Canada Guidelines consist of specific maximum acceptable concentrations (MACs) for several radiological parameters most likely to be detected in Canadian source waters. In addition, calculated concentrations were derived for 78 other radiological parameters, but Health Canada did not recommend monitoring for these, since they are not normally expected to be found in drinking water sources.

The analytical methodology for measuring the levels of individual radiological parameters in drinking water is sophisticated and expensive. A more practical approach for regulatory purposes is to test for total radioactivity using Gross Alpha / Gross Beta determinations, which measure the radioactive decay of the radionuclides present. This approach is already used by many jurisdictions, including Ontario, as it is both cost-effective and can identify potential health risks due to radionuclides in drinking water, since it is the radiation from radioactive decay that causes the health effect of concern; namely cancer.

The Council transmitted its advice on radiological parameters and monitoring to the Minister of the Environment on March 6, 2012, recommending that the Ministry of the Environment formalize and implement a gross alpha / gross beta compliance protocol, with set limits of 0.1 Becquerels per litre for Gross Alpha and 0.2 Becquerels per litre for Gross Beta determinations. (*See Appendix D*)

5.2 Standards Currently Under Review

The following standards are still under review by the Council. Presentations were received and discussions took place on Health Canada's Documents for Public Comment and / or Guideline Technical Documents. 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, if warranted. The standards include:

- Ammonia
- *E. coli*
- Enteric Protozoa
- Enteric Viruses
- Nitrate / Nitrite
- N-Nitrosodimethylamine (NDMA)
- Turbidity

Ammonia, *E. coli*, Enteric Protozoa, Enteric Viruses, and Turbidity were all reviewed in terms of their application and implications for Ontario. Even though the Council deemed that an Ontario Drinking Water Quality Standards may not be required for some of these contaminants, it is intended that these be reviewed and commented on via the Ministry of the Environment's upcoming revisions to the "Procedure for Disinfection of Drinking Water in Ontario", which the Council is engaged in. (*See Section 6.2*)

Other drinking water contaminants, which the Council had discussions on, but did not formally review, included:

- Adenovirus
- Manganese
- Microcystins

5.3 Standards Prioritization

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

Specifically, in establishing its own process, the Council has chosen to review, on a yearly basis, 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 of substances for Ontario to put forward, that may not be on the current National Priority List, and / or to recommend the bumping-up of existing substances as deemed important for the province. For the May, 2011 to May, 2012 Council year, a review was completed and the Council concurred with the National Priority List.

6.0 Council Initiatives

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 engage in drinking water matters, which it has identified as being of interest, and which, in its opinion, may merit the attention of the Minister of the Environment, and the Ministry of the Environment.

The process by which the Council engages in its initiatives is as follows:

- Initiatives are identified through the Council's priority-setting process.
- The Council decides whether or not to form a working group to facilitate tasks, based on the complexity of the initiative.
- The Council or working group then decides how to best approach each initiative using any or all of the following means, including:
 - inviting a Ministry of the Environment expert make a presentation to the Council
 - inviting an external expert make a presentation to the Council
 - carrying out a literature search
 - holding a stakeholder and / or experts workshop and / or symposium
 - facilitating a research project
- The conclusions and suggested recommendations are deliberated by the full Council, and advice is developed and transmitted to the Minister of the Environment, in cases where it is deemed to merit some attention and / or action.

Even though advice may have already been transmitted in some cases, many of these initiatives are of an on-going nature. As such, the Council remains engaged from the perspective of reviewing the development of legislative, regulatory and policy amendments, in order to provide on-going advice to the Minister of the Environment. Following is a brief outline of the initiatives that the Council was engaged in from May, 2011 to May, 2012:

6.1 Progress on Initiatives from Previous Years

The Council transmitted advice on the following initiatives to the Minister of the Environment in previous annual report years. Progress, however, was made during this annual reporting period, and is summarized below:

Clean Water Act: Source Protection Plans

Over this annual report period, the Council continued to monitor the Source Protection planning process.

Assessment reports, which identify risks to drinking water sources on a watershed basis, and strategies for mitigation or elimination of these risks, were submitted to the Ministry of the Environment for review and approval. By May, 2012, 37 of the 38 assessment reports were approved.

Source Protection Committees began drafting policies to address the risks identified in the reports. By May, 2012, all 19 Committees had begun consulting with local stakeholders on the draft policies.

The Ministry of the Environment continues to develop guidance documents to assist stakeholders, including Source Protection Committees, municipalities, and the Crown, in the preparation of their Source Protection Plans. These include technical bulletins and Frequently Asked Questions (FAQs) written specifically for the Committees, guidance documents which target municipalities, and web-enabled training sessions for all partners responsible for implementing the plans.

Drinking Water Quality Management Standard

Over this annual report period, the Council continued to monitor the progress of the implementation of the Drinking Water Quality Monitoring Standard (DWQMS).

The Ministry of the Environment continued to work with owners and operating authorities throughout the implementation of the Municipal Drinking Water Licensing Program, and, as of September, 2011, all municipal drinking water system owners had been issued their first Licence and Drinking Water Works Permit. On reaching this milestone, the Ministry of the Environment launched a review of the DWQMS, the Municipal Drinking Water Licensing Program (Licensing Program) and Accreditation Program for Operating Authorities.

The program review began in October, 2011 with the distribution of stakeholder surveys, and the Ministry of the Environment continues to collect stakeholder feedback. Information collected during the review will be used to inform decisions about the future delivery of the Licensing Program and may result in revisions to the DWQMS, and / or the development of revised guidance material.

In May 2012, the Ministry of the Environment also designated two new organizations as accreditation bodies under the *Safe Drinking Water Act, 2002*, effective July 1, 2012.

Ontario Regulation 248 (Drinking-Water Testing Services)

Over this annual report period, the Council met with Ministry of the Environment staff and continued to monitor the progress of its previous advice on Ontario Regulation 248/03, in terms of any future regulatory amendments or guidance documentation development.

To improve follow-up on drinking water testing and regulatory issues, regular discussions of the Drinking Water Working Group, including the Ministry of the Environment and the Canadian Council of Independent Laboratories, were held throughout this annual report period.

The Ministry of the Environment completed its collaboration with Health Canada to evaluate the effectiveness of rapid tests for the presence of microcystins when blue-green algae blooms occur, and a final report was prepared by Health Canada in May 2011. Work was also initiated to examine field use of commercial test kits to help monitor water quality at various municipal water treatment plant process functions.

The assessment of these test kits is being undertaken at the Council's urging, as these tests could provide an additional tool for drinking water system operators to identify and assess any potential threats and can be performed in the field.

6.2 Initiatives Currently Under Review

The Council continues to be actively engaged in the following initiatives with a view towards potentially providing advice to the Minister of the Environment in the future:

Alternative Approaches to Providing Microbiologically Safe Drinking Water to Consumers

The Council had become aware that some jurisdictions other than Ontario have quite different approaches to both primary and secondary disinfection (the practice of maintaining a *chlorine* residual in the distribution system). In some other jurisdictions, much less reliance is placed on chemical disinfection, and particularly in the use of chlorine, than is the case in Ontario.

Given its role of providing advice to the Minister of the Environment, it was considered desirable for the Council to become better informed on this matter. To this end, the Council held a symposium on September 22, 2008, to hear from experts in many other jurisdictions.

An ensuing expert panel session was held on September 23, 2008, comprised of the experts and several Council members, with the goal of developing possible recommendations for the province so that it may be in a position to consider a process to allow for alternative approaches to disinfection, particularly for distributed water.

The Council continued its research on alternative approaches to drinking water disinfection and will report on its findings, conclusions, and possible recommendations in the future.

Council Standards Development Process

The Council continued its work on a drinking water standards development process and approach in order to satisfy and facilitate the following two statements:

1. In accordance with Section 4 of the *Safe Drinking Water Act, 2002*, the Council's role is to *"consider issues relating to standards for drinking water quality and testing standards and to make recommendation to the Minister."*
2. In accordance with Recommendation 18 of the *Part Two Report of the Walkerton Inquiry*, Justice O'Connor stated that *"In setting drinking water quality standards, the objective should be such that, if the standards are met, a reasonable and informed person would feel safe drinking the water."*

The benefits of such a process and approach will include:

- consistent, systematic treatment for standards review and development;
- science-based justification for recommendations made to the Minister; and
- increased transparency of process for the public

Disinfection Procedure Revision

The Council was made aware that the Ministry of the Environment is revising the *"Procedure for Disinfection of Drinking Water in Ontario"* (Procedure).

The original Procedure was dated April 16, 2003, and the Council provided advice to the Minister on September 20, 2005, ahead of the current revision, which is dated June 4, 2006.

The Council has great interest in this next revision to the Procedure due to the importance of its operational-level application, and the convergence of many treatment-based standards and other pertinent guidance, which the Council is currently reviewing, or has previously provided advice on to the Minister.

To this end, the Council is formally reviewing all available Health Canada guidance documentation, in order to determine its applicability and appropriateness for use here in Ontario, through the Procedure. Contaminants included in the review included: ammonia, *E. coli*, enteric protozoa, enteric viruses, and turbidity.

6.3 Areas of Ongoing Interest

The Council formally engaged in the following additional areas of interest by requesting presentations on these topics with a view towards providing advice to the Minister of the Environment, if deemed appropriate, in the future:

- Drinking Water Research in Ontario: June 17, 2011 – Amy Cook, Ministry of Research and Innovation (MRI)
- Non-Municipal Year-Round Residential Drinking Water System Inspections and Compliance: June 17, 2011 – Paul Nieweglowski, Ministry of the Environment (MOE)
- Quantitative Microbiological Risk Assessment (QMRA): September 16, 2011 – Ian Douglas, City of Ottawa
- Operator Training and Certification / Walkerton Clean Water Centre (WCWC) update: December 16, 2011 – Larry Moore (WCWC)
- Water Quality Health Index: December 16, 2011 – Ian Douglas, City of Ottawa
- First Nations Drinking Water Quality Pilot Project: January 20, 2012 – Paul Froese, Indra Prashad, Ministry of the Environment (MOE)
- Water Safety in Buildings (World Health Organization Report): February 24, 2012 – Albert Simhon, Ministry of the Environment (MOE)
- Small Drinking Water Systems Program: March 23, 2012 – Tony Amalfa, Henry Garcia, Ministry of Health and Long-Term Care (MOHLTC)

A well, the following topics, which were brought before the Council by its own Members as a result of their awareness of issues in the drinking water world, were informally discussed:

- Accreditation of Drinking Water Systems
 - Backflow and Cross Connections
 - Bill S-8 *Safe Drinking Water for First Nations Act* (Federal)
 - Blood Lead Level reports (Health Canada)
 - Blue-Green Algae Blooms
 - Cryptosporidium, *Giardia* Monitoring
 - Drinking Water Advisories and Reporting Systems
 - Drinking Water Quality Management System
 - *E. coli* Field Test Kits
 - Endocrine Disruptors / Pharmaceuticals and Personal Care Products
 - Financial Plans for Drinking Water Systems (Ministry of the Environment)
 - *Great Lakes Protection Act*
 - GUDI Terms of Reference Working Group (Ministry of the Environment)
 - Hydraulic Fracturing
 - Hydrogen Peroxide as a Secondary Disinfectant
 - Lead in Drinking Water
 - Microcystin Field Test Kits
 - Municipal Licencing Program (Ministry of the Environment)
-

- NSF Certification
- Public Health Ontario (PHO) Role
- Source Characterization and Treatment Requirements
- Source Protection Planning
- Southern Ontario Water Consortium (SOWC)
- Statutory Standard of Care
- *Water Opportunities Act* (infrastructure sustainability)
- WaterTAP

6.4 Administrative

Memorandum of Understanding

On July 7, 2010, the Chair of the Council and the Minister of the Environment both signed a Memorandum of Understanding (MOU), replacing the Terms of Reference from November 5, 2004. This MOU was re-affirmed on May 31, 2012.

The MOU clearly outlines the roles and responsibilities of both the Council and the Ministry of the Environment, and reaffirms the importance of working together to ensure Ontario remains a leader in drinking water protection, through an up-to-date and transparent standards-setting process, involving increased public input. (See Appendix G)

Learning and Development Map

The use of Learning and Development Maps is promoted government-wide for Agencies, Boards, and Commissions. To this end, on March 19, 2012, the Council completed an update to its Learning and Development Map, although it continues to be a living document.

The purpose of the Learning and Development Map is to:

- promote a learning culture and continuous improvement;
- identify key learning and development needs and opportunities for members and staff
(*Identification of the key learning and development needs are via the Council's "all things drinking water" mandate and core activities such as: Requests from the Minister of the Environment (See Section 4.0); Standards Review (See Section 5.0); and Council Initiatives (See Section 6.0);*);
- identify individual members' excellence in certain areas and promote the sharing of skills;
- coordinate learning and development in an efficient and structured fashion;
- promote and protect the Council's reputation and credibility leading to public confidence; and
- promote the Council's presence and profile leading to industry awareness and acceptance.

The Learning and Development Map has been and will continue to be carried out via:

- listing key conferences / courses / presentations to Council and cross-referencing with member / staff learning and development needs;
- seeking financial support for those members where a key learning / development need has been identified, an opportunity exists, and the member has no financial support from their employer or industry association;
- seeking financial support for staff where a key learning / development need has been identified and an opportunity exists;
- having at least 1 attendee at each conference / training course of importance;
- considering allocation of limited resources; and
- providing written reports back to the Council.

Appendix A - Advice on Carbon Tetrachloride

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July 26, 2011

The Honourable John Wilkinson
Minister of the Environment
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, Ontario M7A 2T5

Dear Minister Wilkinson:

Re: Advice on a Revised Ontario Drinking Water Quality Standard for Carbon Tetrachloride

Part of the Ontario Drinking Water Advisory Council's mandate is to provide you with advice on proposed drinking water standards, objectives, or guidelines and their applicability in Ontario.

In order to provide comprehensive advice, the Council assesses Health Canada's Guideline Technical Documents and Guidance Documents, comments from the national public consultation process, and information on the occurrence and impact that a particular substance is likely to have on the delivery of safe drinking water in Ontario.

Based on this assessment, the Council may recommend the endorsement of a Canadian Drinking Water Quality Guideline (CDWQG) as an Ontario Drinking Water Quality Standard (ODWQS) in Ontario Regulation 169/03, or as an Objective, or Guideline, or it may make an alternative recommendation. The Council may also conduct independent consultations with stakeholders and technical experts as deemed necessary to formulate its advice. The Council has now completed its review of carbon tetrachloride.

Health Canada, through the Federal-Provincial-Territorial process, recently completed its review of the health risks associated with carbon tetrachloride in drinking water, and has chosen a more stringent maximum acceptable concentration (MAC) of 0.002 mg/L for this CDWQG. The previous CDWQG and Ontario's current ODWQS are both 0.005 mg/L.

Although there are deficiencies in the available cancer studies database, carbon tetrachloride has been classified by Health Canada as possibly carcinogenic to humans. Data from animal studies indicate that the carcinogenicity of carbon tetrachloride is secondary to its hepatotoxic (liver) effects, indicating a possible threshold.

Thus, the more stringent MAC of 0.002 mg/L was established based on liver toxicity, as well as incorporating a multi-route exposure approach, due to carbon tetrachloride's high volatility, which could result in inhalation and dermal absorption during bathing and showering.

The Council concurs with the rationale used by Health Canada to arrive at a new MAC of 0.002 mg/L in their Guideline Technical Document for carbon tetrachloride. For reference, limits in other jurisdictions are as follows: Australia: 0.003 mg/L; World Health Organization: 0.004 mg/L; and the USEPA: 0.005 mg/L.

Ontarians could still be exposed to carbon tetrachloride via drinking water, as a result of historically contaminated sites. However, in consultation with Ministry of the Environment staff, the Council was advised that adoption of a more stringent ODWQS for carbon tetrachloride of 0.002 mg/L would have minimal impact on the Groundwater Standards or the Soil and Sediment Standards under O. Reg. 153/04 Record of Site Condition filings.

To date, a review of data from the Drinking Water Surveillance Program (DWSP) and the Drinking Water Information System (DWIS) for O. Reg. 170/03 systems, found no carbon tetrachloride results above the proposed new lower MAC. As well, the proposed MAC is achievable by available treatment technology at both municipal and residential scales, and routinely measurable by currently available analytical methods.

As such, revising the ODWQS for carbon tetrachloride to 0.002 mg/L should not result in a significant increase in regulatory burden.

The Council, therefore, recommends that the Ministry of the Environment revise the Ontario Drinking Water Quality Standard for carbon tetrachloride to 0.002 mg/L

The Council feels that its recommendation on a more stringent ODWQS for carbon tetrachloride will enable continuous improvement in the quality of drinking water for Ontarians.

Sincerely,

ORIGINAL SIGNED BY:

Jim Merritt, Chair
Ontario Drinking Water Advisory Council

Appendix B - Advice on Dichloromethane

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December 12, 2011

The Honourable Jim Bradley
Minister of the Environment
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, Ontario M7A 2T5

Dear Minister Bradley:

Re: Advice on the Ontario Drinking Water Quality Standard for Dichloromethane

Part of the Ontario Drinking Water Advisory Council's mandate is to provide you with advice on proposed drinking water standards, objectives, or guidelines and their applicability in Ontario.

In order to provide comprehensive advice, the Council assesses Health Canada's Guideline Technical Documents and Guidance Documents, comments from the national public consultation process, and information on the occurrence and impact that a particular substance is likely to have on the delivery of safe drinking water in Ontario.

Based on this assessment, the Council may recommend the endorsement of a Canadian Drinking Water Quality Guideline (CDWQG) as an Ontario Drinking Water Quality Standard (ODWQS) in Ontario Regulation 169/03, or as an Objective, or a Guideline, or it may make an alternative recommendation. The Council may also conduct independent consultations with stakeholders and technical experts as deemed necessary to formulate its advice. The Council has now completed its review of dichloromethane in drinking water.

Health Canada, through the Federal-Provincial-Territorial process, recently completed its review of the health risks associated with dichloromethane (DCM) in drinking water, and has chosen to reaffirm its previous (1987) CDWQG at a maximum acceptable concentration (MAC) of 0.05 mg/L, which is identical to Ontario's current ODWQS.

Health Canada identified all health risks associated with dichloromethane in drinking water, and incorporated all relevant routes of exposure from drinking water, new studies and approaches, and the availability of appropriate treatment technology.

They found that the most sensitive endpoint for dichloromethane was for cell structure changes in the livers of rats, which is a non-cancer end-point, resulting in a health-based value of 0.05 mg/L, derived from these observed effects. They also concluded that a health-based value of 0.169 mg/L, based on a lifetime excess cancer risk of 10^{-6} , could also be derived.

Application of the precautionary approach then led Health Canada to opt for the more stringent of the two calculated health-based proposed MACs of 0.05 mg/L versus 0.169 mg/L, in order to be protective for both cancer and non-cancer endpoints.

The USEPA's Maximum Contaminant Level (MCL) for dichloromethane in drinking water was set at 0.005 mg/L in 1994. As indicated by Health Canada's review, recent science has shown the cancer risk to be much less than the value used to calculate USEPA's MCL. However, amendments to the Safe Drinking Water Act in 1996, regarding the review of standards, state that "*each revision shall maintain, or provide for greater, protection of the health of persons*". As such, under this regulatory framework, it is difficult for the USEPA to establish a less stringent MCL, even when new science leads to this conclusion.

For reference, limits in other jurisdictions are as follows: World Health Organization (WHO): 0.02 mg/L; Australia: 0.004 mg/L; and the California Environmental Protection Agency: 0.004 mg/L.

Results from the Ministry of the Environment's Drinking Water Surveillance Program (DWSP) show that Ontario has no municipal groundwater drinking water sources contaminated with dichloromethane. The average concentration was below 0.0005 mg/l (0.5 µg/L), and the highest concentration, found in 2005, was 0.0035 mg/L (3.5 µg/L). All of these results are below the limits for the above-noted international jurisdictions.

It should be noted that dichloromethane is one of the contaminants identified as part of the USEPA's group of volatile organic compounds (VOCs). These VOCs are the first to be slated by the USEPA for regulation as a group. In a March 7, 2011 letter addressed to me, the Minister of the Environment requested that this USEPA initiative be tracked by the Council, with consideration towards its applicability to Ontario's drinking water protection framework. To this end, the Council will continue to keep abreast of this initiative, and will report back to you in a timely fashion, including any possible new advice on dichloromethane.

The Council, therefore, recommends that the Ministry of the Environment maintain the current Ontario Drinking Water Quality Standard for dichloromethane of 0.05 mg/L

Since Health Canada's reaffirmed CDWQG for dichloromethane is identical to the ODWQS of 0.05 mg/L, maintaining this Standard will not result in any increased regulatory burden, and will facilitate the continued safety of the quality of drinking water for Ontarians.

Sincerely,

ORIGINAL SIGNED BY:

Jim Merritt, Chair
Ontario Drinking Water Advisory Council

Appendix C - Advice on Fluoride

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December 12, 2011

The Honourable Jim Bradley
Minister of the Environment
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, Ontario M7A 2T5

Dear Minister Bradley:

Re: Advice on the Ontario Drinking Water Quality Standard for Fluoride

Part of the Ontario Drinking Water Advisory Council's mandate is to provide you with advice on proposed drinking water standards, objectives, or guidelines and their applicability in Ontario.

In order to provide comprehensive advice, the Council assesses Health Canada's Guideline Technical Documents and Guidance Documents, comments from the national public consultation process, and information on the occurrence and impact that a particular substance is likely to have on the delivery of safe drinking water in Ontario.

Based on this assessment, the Council may recommend the endorsement of a Canadian Drinking Water Quality Guideline (CDWQG) as an Ontario Drinking Water Quality Standard (ODWQS) in Ontario Regulation 169/03, or as an Objective, or Guideline, or it may make an alternative recommendation. The Council may also conduct independent consultations with stakeholders and technical experts as deemed necessary to formulate its advice. The Council has now completed its review of fluoride in drinking water.

Health Canada, through the Federal-Provincial-Territorial process, recently completed its review of the health risks associated with fluoride in drinking water. Their review assessed all identified human health risks, taking into account a new total diet study (using a multi-route exposure approach), collaborating with Health Canada's Chief Dental Officer, and facilitating an expert panel review. They reaffirmed the maximum acceptable concentration (MAC) of 1.5 mg/L for this CDWQG, which is also the current ODWQS. *Of note is the fact that their review did not discuss or assess fluoridation of drinking water supplies.*

Other international jurisdictions have similar limits: World Health Organization: 1.5 mg/L (2004); Australia: 1.5 mg/L (2004); USEPA: 4.0 mg/L, with a 2.0 mg/L secondary standard based on cosmetic effects (1992, *but currently under review*); California EPA: a range of 1.4 to 2.4 mg/L, depending on temperature (2005); and the European Union: 1.5 mg/L for naturally occurring fluoride and 1.0 mg/L for fluoridated supplies (1998).

Health Canada's Guideline on fluoride actually derived a "Health-Based Value" of 0.9 mg/L. The Council notes that Health Canada's use of the term "Health Based-Value" does **not** refer to a toxicological end-point as is usually the case for drinking water guidelines; rather it refers to a cosmetic or aesthetic end point. In this case, moderate dental fluorosis was chosen as the end point of concern for fluoride in drinking water.

According to Health Canada, if the MAC were to change from 1.5 mg/L to 0.9 mg/L, it is possible that the optimal dental health benefits of fluoride in drinking water, determined by Health Canada's Chief Dental Officer to be 0.7 mg/L, may be compromised because the operational variability involved in the dosing of fluoride in municipal drinking water systems may trigger unwarranted corrective actions.

Health Canada has chosen a risk management approach for the reaffirmed MAC of 1.5 mg/L for the protection of dental health, recognizing that this level is unlikely to cause moderate dental fluorosis, and will be protective against all adverse toxicological health effects including cancer, bone fracture, immunotoxicity, reproductive / developmental toxicity, genotoxicity, and / or neurotoxicity.

The Council's review of fluoride in drinking water focused solely on the protection of human health from a toxicological perspective. The issue of fluoride levels in drinking water (i.e. fluoridation) in relation to dental health falls under the jurisdiction of the Ministry of Health and Long-Term Care. As well, fluoridation of water supplies is a municipal decision via the provisions of the *Fluoridation Act*, R.S.O. 1990. As such, the Council will not be making any recommendations on this issue.

It should also be noted that there have been some concerns about the presence of heavy metal contaminants such as arsenic, lead and chromium in fluoridating agents used at drinking water systems in Ontario. To this end, the Council reviewed the heavy metal analyses of various NSF Standard-60 certified fluoridation agents used at municipal drinking water systems. The results of heavy metal content, carried out at the Ministry of the Environment's laboratory, indicated that the contaminants were present at such low levels that any health risk would be very unlikely.

As Ontario's current ODWQS for fluoride is already at 1.5 mg/L, maintaining this level will not result in any increased regulatory burden.

The Council, therefore, recommends that the Ministry of the Environment maintain the current Ontario Drinking Water Quality Standard for fluoride of 1.5 mg/L

The Council feels that its recommendation on the ODWQS for fluoride will facilitate the continued safety of the quality of drinking water for Ontarians.

Sincerely,

ORIGINAL SIGNED BY:

Jim Merritt, Chair
Ontario Drinking Water Advisory Council

Appendix D - Advice on Radiological Parameters and Monitoring

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March 6, 2012

The Honourable Jim Bradley
Minister of the Environment
77 Wellesley Street West
11th Floor, Ferguson Block
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Dear Minister Bradley:

Re: Advice on Radiological Monitoring and Standards for Ontario

Part of the Ontario Drinking Water Advisory Council's mandate is to provide you with advice on proposed drinking water standards, objectives, or guidelines and their applicability in Ontario.

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

Based on this assessment, the Council may recommend the endorsement of Canadian Drinking Water Quality Guidelines as Ontario Drinking Water Quality Standards (ODWQS) in Ontario Regulation 169/03, or as Objectives, or Guidelines, or it may make an alternative recommendation. The Council may also conduct independent consultations with stakeholders and technical experts as deemed necessary to formulate its advice. The Council has now completed its review of radiological monitoring and standards for Ontario.

Health Canada Guidelines:

Consistent with the World Health Organization (WHO), Health Canada, through the Federal-Provincial-Territorial process has revised the Canadian Drinking Water Quality Guidelines for Radiological Parameters, based on updated (1996) scientific information published by the International Commission on Radiological Protection (ICRP).

The revised Health Canada Guidelines consist of specific maximum acceptable concentrations (MACs) for several radiological parameters most likely to be detected in Canadian source waters. In addition, calculated concentrations have been derived for 78 other radiological parameters, but Health Canada does not recommend monitoring for these, since they are not normally expected to be found in water sources.

The analytical methodology for measuring the levels of individual radiological parameters in drinking water is sophisticated and expensive. A more practical approach for regulatory purposes is to test for total radioactivity using Gross Alpha / Gross Beta determinations, which measure the radioactive decay of the radionuclides present. This is the approach used by many jurisdictions, including Ontario, as it is both cost-effective and can identify potential health risks due to radionuclides in drinking water, since it is the radiation from radioactive decay that causes cancer.

In Health Canada's Guidelines, it is noted that Gross Alpha / Gross Beta monitoring is *"suitable either as a preliminary screening procedure to determine if further radioisotope-specific analysis is necessary or, if radionuclide analyses have been carried out previously, for detecting changes in the radiological characteristics of the drinking water source."* and further note that *"EQ CHAPTER \h \r 1}compliance with the guidelines may be inferred if the measurements are less than 0.5 Bq/L"* (becquerels per litre) *"for gross alpha activity and less than 1 Bq/L for gross beta activity."*

Gross Alpha / Gross Beta monitoring is also useful in determining if further, more detailed, tests are needed to identify the specific radiological parameters depending on the radioactivity level found. The "Application of the Guideline" section of Health Canada's Guidelines provides general guidance on the interpretation of the results of Gross Alpha / Gross Beta testing and actions which should be followed should there be an exceedance of either of the above-noted levels.

International Guidelines:

Internationally, drinking water quality guidelines for radionuclides are based on a recommended Reference Dose Level of 0.1 mSv from 1 year's consumption of drinking water, which comprises 10% of the intervention level that is recommended by ICRP for prolonged exposure situations, such as long-term consumption of drinking water by the public. This Reference Dose Level has been used by Health Canada, as well as the WHO and most of its Member States, the European Commission, and the Food and Agriculture Organization of the United Nations for their risk assessments.

The 0.1 mSv annual dose level was the basis for the original screening recommendations of 0.1 Bq/L for Gross Alpha and 1 Bq/L for Gross Beta published by WHO in the 2nd Edition of their drinking water quality guidelines (1996). However, subsequent experience led to the conclusion that the 0.1 mSv annual dose would not usually be exceeded as long as the drinking water levels are less than or equal to 0.5 Bq/L Gross Alpha. Therefore, both WHO and Health Canada have adopted 0.5 Bq/L Gross Alpha and 1.0 Bq/L Gross Beta as their recommended screening levels.

The USEPA not only uses Gross Alpha / Gross Beta measurements as a screening tool, but as actual enforceable Standards for drinking water. Although the units used are different from most other jurisdictions, they are approximately equivalent to 0.55 Bq/L for Gross Alpha and 1.85 Bq/L for Gross Beta.

The European Union (EU) sets individual levels for maximum doses of radiological parameters in drinking water. For practical purposes however, EU member states use screening methods for Gross Alpha / Gross Beta to monitor compliance for a maximum Total Indicative Dose (TID), which, like WHO and Health Canada, is set at 0.1 mSv per year.

Radiological Monitoring in Ontario:

In 2000, as part of the requirement for an engineer's report under Ontario Regulation 459/00 (Drinking Water Protection Regulation – Larger Water Works), all drinking water systems were required to sample and monitor their source water for radioactivity. Currently, all new drinking water systems are required to conduct the same source water characterization as was performed in 2000, using Gross Alpha / Gross Beta testing. This approach for monitoring radiological parameters is similar to Health Canada's approach.

In 2003, Ontario Drinking Water Standards from Ontario Regulation 459/00 became Ontario Drinking Water Quality Standards in Ontario Regulation 169/03 (Ontario Drinking Water Quality Standards). Schedule 3 of this Regulation lists the Radiological Standards, but the general sampling and testing requirements, outlined in Ontario Regulation 170/03 (Drinking Water Systems), do not include Schedule 3. In other words, the 78 Standards found in Schedule 3 were not, and are still not, being monitored for in a traditional sense.

As part of its Drinking Water Surveillance Program, the Ministry of the Environment has been monitoring source water and treated water for radioactivity at all its participating drinking water systems in the province, using Gross Alpha / Gross Beta testing. The results provide valuable information which can be used for assessing trends in the levels of radiation in drinking water as well as in source water. Municipal drinking water systems in the vicinity of nuclear power plants or other sources of radiation are monitored by the Ministry of Labour and the nuclear power generation authorities.

Ontario Regulation 170/03 does not require routine monitoring of radiological parameters at municipal drinking water systems. However, site-specific requirements to monitor for radiological parameters at specific systems can be included via approvals, municipal drinking water licences, or orders.

Municipalities wishing to voluntarily monitor for radiological parameters should contact the Ministry of the Environment and the Ministry of Labour's Radiation Protection Laboratory to discuss possible options.

All mandatory municipal samples are analyzed for Gross Alpha / Gross Beta levels at the Ministry of Labour's Radiation Protection Laboratory. Gross Alpha compliance is assessed against a 0.1 Bq/L limit, once adjusted for the possible contribution from uranium. Gross Beta compliance is assessed against a 0.5 Bq/L limit, once adjusted for the possible contribution from potassium.

If either of the Gross Alpha or Gross Beta results equal or exceed their limits, then a more detailed investigation is undertaken, which includes analysis for the specific radionuclides which may have caused the exceedance, and application of a "*Hazard Index Approach*" (Summation Rule), followed by appropriate corrective actions, if required. However, Ontario's current practice, as outlined above, is not formally established in any regulation, policy, or procedure.

Conclusions and Recommendations on Radiological Monitoring and Standards in Ontario:

Gross Alpha / Gross Beta monitoring is the most cost-effective and practical approach for ensuring that drinking water is acceptable for human consumption from a radiological perspective.

Even though Ontario has not formally documented, approved or adopted Gross Alpha / Gross Beta monitoring for compliance, it has been in wide-spread use for over a decade. Other regulatory jurisdictions and agencies such as the United States Environmental Protection Agency, the European Community, the World Health Organization, as well as other provinces and territories, all endorse and use similar approaches.

The Council recommends that the Ministry of the Environment formalize a Gross Alpha / Gross Beta compliance protocol for radiological monitoring in Ontario, detailing the evaluation process including corrective actions to be taken when Gross Alpha / Gross Beta limits are exceeded

The Council recommends that the Ministry of the Environment use a Gross Alpha / Gross Beta compliance protocol at drinking water treatment plants, and for the Drinking Water Surveillance Program, approvals, municipal drinking water licences, or orders, as consistent with current practice

The Council reviewed the appropriate Gross Alpha / Gross Beta compliance limits for application in Ontario. Several options were considered and the Council concluded that the limits should be set at the most stringent of all of the natural, artificial, and observed individual radiological parameters.

Based on Health Canada's new Guidelines, the most stringent Alpha emitter is Polonium-210, which has a calculated concentration limit of 0.1 Bq/L, and the most stringent Beta emitter is Radium-228, which has a calculated concentration limit of 0.2 Bq/L.

The Council recommends that the Ministry of the Environment set the Gross Alpha / Gross Beta compliance limits at 0.1 Bq/L for Gross Alpha and 0.2 Bq/L for Gross Beta

The Council recommends that the Ministry of the Environment replace Schedule 3 of Ontario Regulation 169/03 (Ontario Drinking Water Quality Standards) with the Gross Alpha / Gross Beta compliance limits of 0.1 Bq/L and 0.2 Bq/L respectively

The Council recommends that a Gross Alpha / Gross Beta compliance protocol for radiological monitoring in Ontario be added to the “Technical Support Document for Ontario Drinking Water Quality Standards, Objectives and Guidelines”, and be referenced via Schedule 3 of Ontario Regulation 169/03 (Ontario Drinking Water Quality Standards)

The Council further recommends that the most up-to-date list of all of Health Canada’s radionuclide Maximum Acceptable Concentrations and Calculated Concentrations replace Table 3 of the “Technical Support Document for Ontario Drinking Water Quality Standards, Objectives and Guidelines”. Table 3 should then be referenced via Schedule 3 of Ontario Regulation 169/03 (Ontario Drinking Water Quality Standards)

It should be noted that tritium is not detected by Gross Alpha / Gross Beta monitoring due to its low-energy beta particle emissions. Therefore, a unique Standard for tritium is both required and warranted in Ontario. The Council completed its review of the Ontario Drinking Water Quality Standard for tritium, and submitted a separate report, which included a proposed new Standard, to the Minister of the Environment, on May 21, 2009.

The Council feels that its recommendations on radiological monitoring and Standards for Ontario represent a precautionary approach, enabling continuous improvement in the quality and safety of drinking water for Ontarians, with no increased regulatory burden. As well, the approach recommended by Council harmonizes with federal guidelines and reflects the latest direction taken by the USEPA to monitor contaminants as groups.

Sincerely,

ORIGINAL SIGNED BY:

Jim Merritt, Chair,
Ontario Drinking Water Advisory Council

Appendix E - Relevant Legislation

- ***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.

Appendix F - 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 standards.

Summary Table

Federal Stage	MOE Stage	Council Stage				
				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 (<i>formal</i>)
			b. Review Final National Priority List	Substances of Interest NOT included on the list to be addressed by MOE	Final National Priority List	Conveyance of Substances of Interest NOT included on the list to Minister of the Environment (<i>formal</i>)
Scientific / Technical Review			<i>No Council Involvement</i>			
Guideline Technical Document	Review & Comment	2	a. Assess Guideline Technical Document	Concerns with document addressed	Draft Guideline Technical Document, decision sought, references, presentation	Information for formulation of advice on Ontario's position
National Public Consultation			b. Propose Interim Ontario Standard (<i>if warranted</i>) i. Undertake Independent Consultation (<i>if warranted</i>)			

Federal Stage	MOE Stage	Council Stage				
				Issue	Input	Output
Assess comments from National Public Consultation	Assess comments from National Public Consultation	3	Assess Comments from National Public Consultation	Concerns with national public comments addressed	Public comments from National consultation	Information for formulation of advice on Ontario's position
Draft Final Guideline Technical Document	Review & Comment	4	a. Assess Draft Final Guideline Technical Document b. Undertake Independent Consultation (if warranted) c. Determine and convey Position to MOE (informal)	Concerns with document addressed	Draft Final Guideline Technical Document; Presentation by MOE / HC expert	Conveyance of Council's advice to Ministry of the Environment and Minister's Office staff (informal)
	Convey Ontario's Position to CDW, CHE		No Council Involvement			
CDW, CHE Approval of Guideline Technical Document and Canadian Drinking Water Quality Guideline		5	Transmit Advice Letter to Minister (Proposed Ontario Standard, Objective, or Guideline, and operational advice, if necessary)	Ontario Concerns with final document addressed	Final Guideline Technical Document	Conveyance of Council's advice to Minister of the Environment (formal)
	Ontario public consultation via EBR Proposal		No Council Involvement			
	Assess EBR comments		No Council Involvement			
	Post EBR Decision		No Council Involvement			
	Revise Reg. 169, and / or other guidance documents as necessary		No Council Involvement			

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 proposed National Priority List?

Priorities 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 re-ranking of parameters
- 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 2:

a. Assess Guideline Technical Comment

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

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

The Council's role in this stage is to assess the Guideline Technical Document 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 of the Environment Liaison staff member to clarify Council's request
- Consult with SDB. If deemed simple, requested information be supplied to Council through Ministry of the Environment Liaison staff member
- Consult with SDB. If deemed complex, Ministry of the Environment 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: Guideline Technical Document, 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 standard while the National Process is undertaken?

The Council will assess the Draft Guideline Technical Document to consider whether or not to advise Ontario to adopt an interim standard.

Input: Council to receive Draft Guideline Technical Document, 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 Guideline Technical Document

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 3:

Assess Comments from National Public Consultation

The question before the Council at this stage is:

Does the Council have any concerns that arise from the comments received from the national public consultation?

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

Input: Council to receive public comments from the national consultation.

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 4.

Council Engagement Stage 4:

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 Canadian Drinking Water Quality Guideline 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 public consultation process in Stage 3.

Input: Draft Final Guideline Technical Document; Presentation by Ministry of the Environment and / or Health Canada expert.

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 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 Canadian Drinking Water Quality Guideline?*
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 Canadian Drinking Water Quality Guideline.

Input: Draft Final Guideline Technical Document, comments received from the National 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 5:

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, or an alternative recommendation.

This transmittal can occur anytime after approval has been granted for the Canadian Drinking Water Quality Guideline by both the Committee on Drinking Water (CDW) and the Committee on Health and the Environment (CHE).

The advice may 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 will only propose an Ontario Drinking Water Quality Standard, Objective, or Guideline that is equivalent to or more stringent than a Canadian Drinking Water Quality Guideline, or existing Ontario Drinking Water Quality Standard.

- Input:** Ministry of the Environment Liaison staff member notify the Council when both CDW and CHE have approved the final Canadian Drinking Water Quality Guideline, and supply the final Guideline Technical Document to the Council.
- 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, or make an alternative recommendation, if warranted.

Appendix G - Memorandum of Understanding

The following Memorandum of Understanding was agreed upon by the Council and finalized by the Council's Chair and the Minister of the Environment, on July 7, 2010, replacing the Terms of Reference of November 5, 2004. It was also re-affirmed on May 31, 2012.

MEMORANDUM OF UNDERSTANDING

Between:

Minister of the Environment

and

**Advisory Council on
Drinking Water Quality and Testing Standards**

Memorandum of Understanding

ADVISORY COUNCIL ON DRINKING WATER QUALITY AND TESTING STANDARDS

THIS MEMORANDUM OF UNDERSTANDING (“MOU”) is made in triplicate and is effective as of the date set out in Section 13.

1. Definitions

When used in the MOU, the following words or expressions have the following meanings:

- a) “**Chair**” means the Chair of the Advisory Council on Drinking Water Quality and Testing Standards;
- b) “**Council**” means the Advisory Council on Drinking Water Quality and Testing Standards;
- c) “**Deputy Minister**” means the Deputy Minister of the Environment
- d) “**Fiscal Year**” means the period commencing on May 12 and ending on the following May 11;
- e) “**Government**” means the Ontario Government;
- f) “**MBC**” means Management Board of Cabinet;
- g) “**Minister**” means the Ontario Minister of the Environment, or his or her delegate;
- h) “**MOE**” means the Ontario Ministry of the Environment;
- i) “**MOHLTC**” means the Ontario Ministry of Health and Long-Term Care;
- j) “**PSOA**” means the *Public Service of Ontario Act, 2006*, S.O. 2006, c. 35, Sched. A, as amended;
- k) “**Registry**” means the environmental registry established under section 5 of the *Environmental Bill of Rights, 1993*, as amended from time to time; and,
- l) “**SDWA**” means the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32, as amended from time to time.

2. Background

The Government is responsible for regulating drinking water in Ontario under the SDWA, the *Clean Water Act, 2006*, as amended, and their regulations.

The Council is an advisory agency as classified by MBC in accordance with the Ontario Government’s ‘Agency Establishment and Accountability Directive’. The Council is prescribed as a public body and a commission public body for the purposes of the PSOA, pursuant to Ontario Regulation 374/07 “Public Bodies and Commission Public Bodies – Definitions”.

Upon signing, this MOU will replace the existing terms of reference for the Council that was effective November 5, 2004.

3. Legislative Authority

The legislative authority for the Council is set out in Section 4 of the SDWA.

4. Mandate

As set out in Section 4 of the SDWA the Council:

- (a) will consider issues relating to standards for drinking water quality and testing and make recommendations to the Minister; and
- (b) may publish information in the Registry.

In particular, the Council will:

- a) advise the Minister on issues and initiatives related to standards, methods and procedures for drinking water quality and testing brought forward to the Council by the Minister or raised by members of the Council;
- b) make recommendations to the Minister and report annually upon the activities of the Council; and
- c) ensure its advice reflects the principles that drinking water standards should be based on a precautionary approach and that if the standards are met, a reasonable and informed person would feel safe drinking the water.

5. Expected Outcomes and Timelines

For the purposes of developing its advice to the Minister, the Council may:

- a) review research and scientific and technical documentation related to drinking water quality and testing standards;
- b) recommend the development or adoption of drinking water quality and testing standards, including those not currently on the Federal Government's or Ontario Government's respective agendas;
- c) publish information in the Registry, and undertake additional consultation with, and solicit views from, the general public as necessary; and
- d) when directed by the Minister, provide advice on:
 - i. policies, practices and procedures to be used in the development of drinking water quality and testing standards; or
 - ii. priorities for the development of drinking water quality and testing standards, testing methods and related research.

The Council, through the Chair, will report to and provide written advice to the Minister or his or her delegate as directed. From time to time the Chair will also keep the Minister or his or her delegate informed of drinking water-related issues or events that may concern the Minister in the exercise of his or her responsibilities.

6. Roles and Responsibilities

i) The Minister:

- a) is accountable to the Legislative Assembly for the performance of the Council in the fulfillment of its objects and mandate and compliance with applicable TB/MBC guidelines, directives and policies;
- b) is responsible for reporting and responding to the Legislative Assembly on the affairs of the Council;
- c) is responsible for representing the Council in the Cabinet and its committees, the Legislative Assembly and before committees of the Legislature;
- d) will inform the Chair of the Government's priorities and broad policy directions for the Council, and when appropriate or necessary, will take action or direct that corrective action be taken in respect of the fulfillment of the Council's mandate;
- e) will consult, as appropriate, with the Chair (and others) on significant new directions for the Council and/or when the Government is considering regulatory or legislative changes for the Council;
- f) shall make Council member appointments and reappointments pursuant to the process established by legislation or by Management Board of Cabinet, after consultation with the Chair; and,
- g) may meet with the Chair as required.

ii) The Deputy Minister:

- a) is accountable to the Minister for the performance of the Ministry in providing administrative and organizational support to the Council and for carrying out the roles and responsibilities assigned to the Deputy Minister by the Minister, applicable TB/MBC directives and this MOU;
- b) will fulfill any responsibilities of the Minister, with respect to the Council, which may be delegated to the Deputy Minister by the Minister;

- c) ensures that the Ministry is providing to the Council the administrative and organizational support, financial and other services as set out in this MOU, including:
 - providing the Council with a single point of contact within the Ministry for ongoing monitoring, reporting and liaison between the Ministry and the Council;
 - interpreting Government directives, guidelines, the SDWA and applicable legislation, and
 - undertaking the preparation of all Cabinet, TB/MBC and any other submissions (with supporting documentation) required to obtain any Government approvals necessary for the Council;
- d) undertakes, on the Minister's behalf, to inform and to discuss the policies of the Ministry that apply to the Council;
- e) will meet 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; and,
- f) may, where appropriate, delegate to any of the Ministry's staff any of the responsibilities assigned to the Deputy Minister in this MOU.

iii) The **Chair**:

- a) is accountable to the Minister for the operation of the Council in accordance with the SDWA, this MOU, the approved annual report, applicable TB/MBC and Ministry of Finance directives, policies and guidelines, any other agreement /protocol with the Ministry and directions from the Minister;
 - b) provides strategic leadership for the Council through overall direction on existing priorities and opportunities to enhance the Council's delivery of its mandate as set out in the SDWA;
 - c) undertakes that public funds are used with integrity and honesty and ensures that the Council operates within the approved funding in the fulfillment of its mandate;
 - d) on behalf of the Council, may recommend appropriate amendments to the SDWA or this MOU;
 - e) provides leadership and direction to the Council particularly with respect to the translation of Government policy into mandate of the Council;
-

- f) keeps the Minister informed of issues or events that may concern the Ministry or the government and keeps the Deputy Minister informed as appropriate;
- g) is responsible under the PSOA to act as the ethics executive for Council for all that falls under the ethical framework (oaths of office, disclosure of wrongdoing, conflict of interest and political activity). In this role, the Chair is required to inform the Minister when a disclosure of wrongdoing is received, of the outcome of the disclosure (i.e., no wrongdoing found, referral to another forum, corrective action taken) and to provide any other information as requested by the Minister;
- h) is responsible for reviewing the Council's annual report and bringing it forward to the Minister and the Deputy Minister by August 31 of each year;
- i) is responsible for 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;
- j) keeps ongoing liaison with the Ministry's Assistant Deputy Minister of Environmental Science and Standards Division and the Chief Drinking Water Inspector, Assistant Deputy Minister of Drinking Water Management Division to exchange information, identify issues and concerns.

7. Composition

Council members are appointed by the Minister pursuant to Section 4 of the SDWA and are subject to member selection and appointment as stipulated by the Ontario Government's Public Appointments Processing Guide or any successor document. A maximum of fifteen (15) members, one of whom shall be appointed Chair and one of whom may be appointed Vice-Chair, will be chosen from those individuals with expertise in the areas of microbiology, toxicology, risk assessment, engineering, utility operations, public health, and drinking water-related issues.

8. Communications

The Council may publish information on the Registry.

The Council's advice is to be provided to the Minister. Under this MOU, public release of all advice or materials must be approved by the Minister.

The Council's advice is for the Minister. Any publicly released advice or materials under this MOU will be the sole property of Her Majesty the Queen in Right of Ontario and will include the copyright notice "© Queen's Printer for Ontario, [Insert Date Here]".

9. MBC Directives

The Council is subject to and shall comply with the Treasury Board/MBC and Ministry of Finance Directives specified in Schedule 1 to this MOU and any other directives, guidelines and policies that may be applicable to the Council pursuant to its classification as an Advisory Agency and a Commission public body under the PSOA unless the Council is explicitly exempted by MBC and the exemption is communicated in writing to the Chair by the Ministry.

10. Financial Staffing and Administrative Support

The MOE will provide the full range of financial, executive and administrative support services of the same quality and standards as provided to the MOE's own line divisions and branches, either directly or through shared service agreements.

The MOE shall designate one (1) staff liaison member, to act as a Council resource and a link to the MOE.

The MOHLTC may designate one (1) staff liaison member, to act as a Council resource and a link to the MOHLTC.

11. Conflict of Interest and Confidentiality

All Council members appointed by the Minister shall abide by the conflict of interest rules set out in Ontario Regulation 381/07 "Conflict of Interest Rules for Public Servants (Ministry) and Former Public Servants (Ministry)" made under the *Public Service of Ontario Act, 2006*, Schedule A, as amended. For ease of reference, Ontario Regulation 381/07 is reproduced at Schedule 2. [Note, for the purpose of interpretation with respect to this MOU, the term 'public servant' as referred to in O. Reg. 381/07 can be substituted with the term 'Council member'].

Council members will execute a Conflict of Interest and Confidentiality Undertaking provided by the MOE prior to assuming the responsibilities described in this MOU.

12. Administrative Considerations

The Chair will establish meeting schedules. Meetings will be monthly or as deemed necessary.

Council members and Council staff who are Ontario Government employees will not receive additional remuneration for time served on the Council but may receive reimbursement for reasonable expenses in accordance with Management Board of Cabinet directives and guidelines.

Council members and Council staff who are not Ontario Government employees will receive remuneration as determined by the Lieutenant Governor in Council for Ontario for meeting days and time required for official Council business, and will receive reimbursement for reasonable expenses in accordance with Management Board of Cabinet directives and guidelines.

13. Duration of MOU

The MOU will become effective on the date the Minister signs the MOU and will remain in effect for five (5) years from the date of the Minister's signature.

Notwithstanding the sentence above, the MOU shall remain in effect for no more than six (6) additional months until a newly signed MOU is provided to the Secretary, MBC.

14. Process for Review and Amendment

This MOU shall be reviewed upon appointment of a new Minister or a new Chair. The purpose of the review is to ensure that the Minister or the Chair, as the case may be, is aware of this MOU and to give the Minister or the Chair the opportunity to amend this MOU. Where the Minister and the Chair agree to continue this MOU with or without requiring any amendment, both parties must affirm the continuance and set out the amendments to the MOU, if any, in writing.

This MOU may be amended in writing at any time with the agreement of the Minister and the Council. Either the Minister or the Council through the Chair may propose amendments to this MOU.

FOR HER MAJESTY THE QUEEN IN RIGHT OF ONTARIO AS REPRESENTED BY THE MINISTER OF THE ENVIRONMENT

Per: Original Signed by:
The Honourable John Gerretsen
Minister

Date: July 7, 2010

FOR THE ADVISORY COUNCIL ON DRINKING WATER QUALITY AND TESTING STANDARDS

Per: Original Signed by:
Jim Merritt
Chair

Date: July 7, 2010

SCHEDULE 1

MBG DIRECTIVES APPLICABLE TO ADVISORY COUNCIL ON DRINKING WATER QUALITY AND TESTING STANDARDS

The Council is required to comply with all government directives which are applicable to an Advisory Agency. Amended, revised or successive directives continue to apply to the Council. Where a directive applies, all associated policies, procedures and guidelines also apply.

In addition to the above, any newly established government directive that applies to an Advisory Agency applies to the Council, unless explicitly exempted in accordance with government practices.

All Treasury Board/MBG and Ministry of Finance directives and policies apply to the Council.
Without limiting the generality of the foregoing, the directives include the following:

- Accountability Directive
- Advertising Content Directive
- Agency Establishment and Accountability Directive
- Delegation of Authority Key Directive
- Government Appointees Directive
- Procurement Directive
- Travel, Meal & Hospitality Expenses Directive

SCHEDULE 2

Public Service of Ontario Act, 2006

ONTARIO REGULATION 381/07

CONFLICT OF INTEREST RULES FOR PUBLIC SERVANTS (MINISTRY) AND FORMER PUBLIC SERVANTS (MINISTRY)

Consolidation Period: From August 20, 2007 to the e-Laws currency date.

No amendments.

PART I RULES FOR PUBLIC SERVANTS WHO WORK IN A MINISTRY

INTERPRETATION

Definitions

1. In this Part,

“confidential information” means information that is not available to the public and that, if disclosed, could result in harm to the Crown or could give the person to whom it is disclosed an advantage;

“gift” includes a benefit of any kind;

“spouse” means,

(a) a spouse as defined in section 1 of the *Family Law Act*, or

(b) either of two persons who live together in a conjugal relationship outside marriage.
O. Reg. 381/07, s. 1.

Application

2. This Part applies to every public servant who works in a ministry. O. Reg. 381/07, s. 2.

PROHIBITED CONDUCT

Benefiting self, spouse or children

3. (1) A public servant shall not use or attempt to use his or her employment by the Crown to directly or indirectly benefit himself or herself or his or her spouse or children. O. Reg. 381/07, s. 3 (1).

(2) A public servant shall not allow the prospect of his or her future employment by a person or entity to detrimentally affect the performance of his or her duties to the Crown.
O. Reg. 381/07, s. 3 (2).

Accepting gifts

4. (1) A public servant shall not accept a gift from any of the following persons or entities if a reasonable person might conclude that the gift could influence the public servant when performing his or her duties to the Crown:

1. A person, group or entity that has dealings with the Crown.
2. A person, group or entity to whom the public servant provides services in the course of his or her duties to the Crown.
3. A person, group or entity that seeks to do business with the Crown. O. Reg. 381/07, s. 4 (1).

(2) Subsection (1) shall not operate to prevent a public servant from accepting a gift of nominal value given as an expression of courtesy or hospitality if doing so is reasonable in the circumstances. O. Reg. 381/07, s. 4 (2).

(3) A public servant who receives a gift in the circumstances described in subsection (1) shall notify his or her ethics executive. O. Reg. 381/07, s. 4 (3).

Disclosing confidential information

5. (1) A public servant shall not disclose confidential information obtained during the course of his or her employment by the Crown to a person or entity unless the public servant is authorized to do so by law or by the Crown. O. Reg. 381/07, s. 5 (1).

(2) A public servant shall not use confidential information in a business or undertaking outside his or her work for the Crown. O. Reg. 381/07, s. 5 (2).

(3) A public servant shall not accept a gift directly or indirectly in exchange for disclosing confidential information. O. Reg. 381/07, s. 5 (3).

Giving preferential treatment

6. (1) When performing his or her duties to the Crown, a public servant shall not give preferential treatment to any person or entity, including a person or entity in which the public servant or a member of his or her family or a friend has an interest. O. Reg. 381/07, s. 6 (1).

(2) When performing his or her duties to the Crown, a public servant shall endeavour to avoid creating the appearance that preferential treatment is being given to a person or entity that could benefit from it. O. Reg. 381/07, s. 6 (2).

(3) A public servant shall not offer assistance to a person or entity in dealing with the Crown other than assistance given in the ordinary course of the public servant's employment. O. Reg. 381/07, s. 6 (3).

Hiring family members

7. (1) A public servant shall not, on behalf of the Crown, hire his or her spouse, child, parent or sibling. O. Reg. 381/07, s. 7 (1).

(2) A public servant shall not, on behalf of the Crown, enter into a contract with his or her spouse, child, parent or sibling or with a person or entity in which any of them has a substantial interest. O. Reg. 381/07, s. 7 (2).

(3) A public servant who hires a person on behalf of the Crown shall ensure that the person does not report to, or supervise the work of, the person's spouse, child, parent or sibling. O. Reg. 381/07, s. 7 (3).

(4) A public servant who reports to, or supervises the work of, his or her spouse, child, parent or sibling shall notify his or her ethics executive. O. Reg. 381/07, s. 7 (4).

Engaging in business, etc.

8. A public servant shall not become employed by or engage in a business or undertaking outside his or her employment by the Crown in any of the following circumstances:

1. If the public servant's private interests in connection with the employment or undertaking could conflict with his or her duties to the Crown.
2. If the employment or undertaking would interfere with the public servant's ability to perform his or her duties to the Crown.
3. If the employment is in a professional capacity and is likely to influence or detrimentally affect the public servant's ability to perform his or her duties to the Crown.
4. If the employment would constitute full-time employment for another person. However, this paragraph does not apply with respect to a public servant who is employed part-time by the Crown. This paragraph also does not apply with respect to a public servant who is on an authorized leave of absence from his or her position, but only if the employment is not contrary to or inconsistent with the terms of the leave of absence.
5. If, in connection with the employment or undertaking, any person would derive an advantage from the public servant's employment as a public servant.
6. If government premises, equipment or supplies are used in the employment or undertaking. O. Reg. 381/07, s. 8.

Participating in decision-making

9. (1) A public servant shall not participate in decision-making by the Crown with respect to a matter that the public servant is able to influence in the course of his or her duties if the public servant could benefit from the decision. O. Reg. 381/07, s. 9 (1).

(2) Subsection (1) does not apply if the public servant obtains the prior approval of his or her ethics executive to participate in decision-making by the Crown with respect to the matter. O. Reg. 381/07, s. 9 (2).

(3) A public servant who, in the course of his or her employment in a ministry, is a member of a body or group shall not participate in, or attempt to influence, decision-making by the body or group with respect to a matter if the public servant could benefit from the decision or if, as a result of the decision, the interests of the body or group could conflict with the interests of the Crown. O. Reg. 381/07, s. 9 (3).

(4) A public servant described in subsection (3) shall inform the body or group if the circumstances described in that subsection exist. O. Reg. 381/07, s. 9 (4).

MATTERS THAT MIGHT INVOLVE THE PRIVATE SECTOR

Interpretation

10. (1) Sections 11 and 12 apply to every public servant who works in a ministry, who routinely works on one or more matters that might involve the private sector and who has access to confidential information about the matter obtained during the course of his or her employment by the Crown. O. Reg. 381/07, s. 10 (1).

(2) In this section and in sections 11 and 12,

“matter that might involve the private sector” means a matter,

- (a) that relates to services currently provided under a program of the Crown or by a public body, an agency of the Crown or a corporation controlled by the Crown with respect to which it is possible that a private sector entity will provide all or part of the financing for the services or will provide some or all of the services, and
- (b) that has been referred to a ministry, a public body or an agency of the Crown by the Executive Council or a member of the Executive Council for review or implementation. O. Reg. 381/07, s. 10 (2).

Duty to declare certain financial interests

11. (1) When a public servant described in subsection 10 (1) begins work on a matter that might involve the private sector, he or she shall make a declaration to the Conflict of Interest Commissioner in which the public servant discloses the following matters respecting his or her financial interests:

- 1. A legal or beneficial interest of the public servant in securities or derivatives of corporations or governments, other than the Government of Ontario.
- 2. A legal or beneficial interest of the public servant in a business entity or a commercial operation or in the assets of such an entity or operation.
- 3. A legal or beneficial interest of the public servant in real property.
- 4. A legal or beneficial interest of the public servant in a mutual fund that is operated as an investment club where,
 - i. its shares or units are held by not more than 50 persons and its indebtedness has never been offered to the public,
 - ii. it does not pay or give any remuneration for investment advice or in respect of trades in securities, except normal brokerage fees, and
 - iii. all of its members are required to make contributions in proportion to the shares or units each holds for the purpose of financing its operations. O. Reg. 381/07, s. 11 (1).

(2) Despite subsection (1), the public servant is not required to disclose his or her legal or beneficial interest in any of the following:

- 1. A mutual fund within the meaning of subsection 1 (1) of the *Securities Act* other than a mutual fund described in paragraph 4 of subsection (1) of this Regulation.
- 2. Fixed-value securities issued or guaranteed by a government or a government agency.

3. A guaranteed investment certificate or similar financial instrument issued by a financial institution entitled by law to issue such instruments.
4. A registered pension plan, an employee benefit plan, an annuity or life insurance policy or a deferred profit sharing plan.
5. Real property that the public servant, or a member of his or her family, uses primarily as a residence or for recreational purposes. O. Reg. 381/07, s. 11 (2).

(3) The public servant shall disclose the information required by subsection (1), with necessary modifications, in respect of his or her spouse and dependent children, but only to the extent that the legal or beneficial interests of the spouse or a child could create a conflict of interest. O. Reg. 381/07, s. 11 (3).

(4) For the purpose of subsection (3), the public servant shall make reasonable efforts to obtain information about the financial interests described in subsection (1) of his or her spouse and dependent children. O. Reg. 381/07, s. 11 (4).

(5) The public servant shall give the Conflict of Interest Commissioner a revised declaration whenever there is a change in any of the information required to be disclosed. O. Reg. 381/07, s. 11 (5).

Prohibition on certain purchases

12. (1) A public servant described in subsection 10 (1) shall not purchase, or cause another person to purchase on his or her behalf, a legal or beneficial interest in an entity that is carrying on, or proposes to carry on, an activity relating to a matter that might involve the private sector. O. Reg. 381/07, s. 12 (1).

(2) Despite subsection (1), a public servant may purchase an interest in a mutual fund (within the meaning of subsection 1 (1) of the *Securities Act*) that includes securities of a person or entity described in subsection (1) but not an interest in a mutual fund described in paragraph 4 of subsection 11 (1) of this Regulation that includes such securities. O. Reg. 381/07, s. 12 (2).

(3) The prohibition described in subsection (1) ceases to have effect with respect to the matter,

- (a) six months after the date on which the action in respect of the matter is completed; or
- (b) six months after the date the Crown ceases to work on the matter. O. Reg. 381/07, s. 12 (3).

List of positions

13. (1) The Public Service Commission shall maintain a current list of positions in which public servants work in a ministry and routinely work on one or more matters that might involve the private sector. O. Reg. 381/07, s. 13 (1).

(2) The Commission shall ensure that public servants employed by the Crown in the positions described in subsection (1) are advised of the duties and restrictions imposed upon them under sections 11 and 12. O. Reg. 381/07, s. 13 (2).

(3) Every ethics executive shall notify the Commission of changes to be made to the list with respect to those persons for whom he or she is the ethics executive. O. Reg. 381/07, s. 13 (3).

PART II
RULES FOR FORMER PUBLIC SERVANTS WHO WORKED IN A MINISTRY

INTERPRETATION

Definition

14. In this Part,

“designated senior position” means any of the following positions:

1. The Secretary of the Cabinet.
2. Deputy minister, associate deputy minister or assistant deputy minister.
3. A position that is classified under subsection 33 (1) of the Act as SMG 2, XOFA 1, XOFA 2, ITX 2, ITX 3 or ITX 4. O. Reg. 381/07, s. 14.

Application

15. (1) This Part applies with respect to every former public servant who, immediately before he or she ceased to be a public servant, worked in a ministry. O. Reg. 381/07, s. 15 (1).

(2) Despite subsection (1), this Part does not apply to a person who ceases to be a public servant before the day on which section 57 of the Act comes into force. O. Reg. 381/07, s. 15 (2).

PROHIBITED CONDUCT

Seeking preferential treatment, etc.

16. A former public servant shall not seek preferential treatment by, or privileged access to, public servants who work in a minister’s office, a ministry or a public body. O. Reg. 381/07, s. 16.

Disclosing confidential information

17. (1) A former public servant shall not disclose confidential information obtained during the course of his or her employment by the Crown to a person or entity unless the former public servant is authorized to do so by law or by the Crown. O. Reg. 381/07, s. 17 (1).

(2) A former public servant shall not use confidential information in a business or undertaking. O. Reg. 381/07, s. 17 (2).

Restriction on lobbying

18. (1) This section applies to a former public servant who, immediately before ceasing to be a public servant, was employed in a designated senior position. O. Reg. 381/07, s. 18 (1).

(2) For 12 months after ceasing to be a public servant, the former public servant shall not lobby any of the following persons on behalf of a public body or another person or entity:

1. A public servant who works in a ministry or public body in which the former public servant worked at any time during the 12 months before he or she ceased to be a public servant.
2. The minister of any ministry in which the former public servant worked at any time during the 12 months before he or she ceased to be a public servant.

3. A public servant who works in the office of a minister described in paragraph 2.
O. Reg. 381/07, s. 18 (2).

Restriction on employment, etc.

19. (1) This section applies to a former public servant who, immediately before ceasing to be a public servant, was employed in a designated senior position and who, at any time during the 12 months before he or she ceased to be employed as a public servant, in the course of his or her employment as a public servant,

- (a) had substantial involvement with a public body or another person or entity; and
 - (b) had access to confidential information that, if it were to be disclosed to the public body, person or entity, could result in harm to the Crown or could give the public body, person or entity an unfair advantage in relation to one or more third parties.
- O. Reg. 381/07, s. 19 (1).

(2) For 12 months after ceasing to be a public servant, the former public servant shall not accept employment with the public body, person or entity or serve as a member of the board of directors or other governing body of the public body, person or entity. O. Reg. 381/07, s. 19 (2).

Restriction re certain transactions

20. (1) This section applies to a former public servant who, when he or she was a public servant working in a ministry, advised the Crown about a particular proceeding, negotiation or other transaction. O. Reg. 381/07, s. 20 (1).

(2) The former public servant shall not advise or otherwise assist any public body or any other person or entity in connection with the particular proceeding, negotiation or other transaction until the Crown ceases to be involved in it. O. Reg. 381/07, s. 20 (2).

(3) Despite subsection (2), the former public servant may continue to advise or otherwise assist the Crown in connection with the particular proceeding, negotiation or other transaction. O. Reg. 381/07, s. 20 (3).

21. Omitted (provides for coming into force of provisions of this Regulation). O. Reg. 381/07, s. 21.

Appendix H - Website

The Council's website, www.odwac.gov.on.ca, continued to be an important source of information for the general public, drinking water stakeholders, Ministry of the Environment, and Ministry of Health and Long-Term Care staff.

The Council's website was re-developed and updated to provide information on:

- History and establishment of the Council
- Mandate
- Requests from the Minister of the Environment
- Standards Review
- Proactive Initiatives
- Stakeholder Consultations
- Public Minutes from Council Meetings
- Reports to the Minister of the Environment
- Annual Reports
- Drinking Water-related Announcements
- Links to other Drinking Water-related Websites
- Members' Biographies
- Contact Information

Appendix I - Council Members' Biographies

Dr. Susan Andrews is an Associate Professor of Civil Engineering at the University of Toronto and was previously an Associate Professor of Civil Engineering at the University of Waterloo. She earned both her B.Sc. and her M.Sc. in Chemistry at the University of Alberta, and her PhD in Civil Engineering also at the University of Alberta. Dr. Andrews is an Associate Program Leader (Infrastructure) for the Canadian Water Network, former director of the Walkerton Clean Water Centre and former Chair of the Ontario Water Works Association. She is a member of the Association of Environmental Engineering and Science Professors, the American Water Works Association, the Water Environment Federation, the Chemical Institute of Canada, the American Chemical Society, the Canadian Association on Water Quality, the International Water Association, the Ontario Water Works Association and the Society for Teaching and Learning in Higher Education.

Dr. Mary Jane Conboy is a licensed geoscientist. As a Hydrogeologist for the Ontario Federation of Agriculture (OFA), Dr. Conboy has co-authored a technical paper for the Walkerton Inquiry, worked with farmers experiencing water problems, represented OFA on provincial committees, led an audit of well projects in Ontario, and sat on an expert panel for Water Well Sustainability in Ontario. Dr. Conboy also chairs the OFEC Water Quality Technical group, the APGO Nutrient Management committee and the APGO working group for the Water Wells regulation. Dr. Conboy is the technical consultant for the Well Aware program. She recently co-authored a consumer's guide for private wells and a children's book on wells and the water cycle. Dr. Conboy's current position is Director of Science Content and Design, leading a team of scientists and designers in designing exhibits to rejuvenate the Ontario Science Centre.

Ian Douglas has twenty years of experience in design, research and plant operations. He spent five years working in the petrochemical industry in Sarnia, Ontario before moving into the environmental sector, dealing with drinking water quality and treatment. Mr. Douglas has degrees in chemistry and chemical engineering from the University of Western Ontario. As Water Quality Engineer and Plant Manager for the City of Ottawa, he has worked on more than fifty research and optimization projects with partner organizations such as the Water Research Foundation, NSERC, Health Canada, CIDA and several Canadian universities. In 2006/7, Mr. Douglas spent a one-year work term working on microbial risk assessment and treatment guidelines with Health Canada in the Water, Air & Climate Change Bureau.

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. Ms. Giddings 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 also developed a number of drinking water guidelines for Health Canada and the World Health Organization.

Rod Holme is the former Vice-President of the water and wastewater division of a major international consulting company and is currently an independent consultant on drinking water. Mr. Holme is past President of the American Water Works Association and most recently chaired their International Council. Mr. Holme also served as Chair of the Joint Committee on Water Regulations for the Ontario Water Works Association and the Ontario Municipal Water Association for many years, and has extensive experience in technical and project management of municipal water supplies.

Dr. Peter Huck is a Professor in the Department of Civil and Environmental Engineering, a National Science and Engineering Research Council (NSERC) Chair in Water Treatment and University Research Chair at the University of Waterloo. Dr. Huck has undertaken extensive research in water quality and treatment in areas such as the robustness of water treatment systems, membrane and ultra-violet treatment, the removal pharmaceuticals and endocrine disrupting substances, and the determination of 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.

Dr. Robert Lannigan is a Professor of Medicine, Microbiology and Immunology at the Schulich School of Medicine and Dentistry, University of Western Ontario, and is also a member of the Ecosystem Health Team at the same facility. Dr. Lannigan's primary activity is as the medical leader of the Clinical Microbiology Laboratory of the London Laboratory Services Group, which is a city-wide diagnostic microbiology service for the London hospitals. Dr. Lannigan is a member of the American Society of Microbiology, the Canadian Hospital Infection Control Association and the Association of Medical Microbiology and Infectious Diseases, Canada, and is also a member of the Ontario Medical Association.

Jim Merritt is a senior consultant focused on environmental consulting, municipal infrastructure and water management. Mr. Merritt has assisted clients with managing regulatory issues, operational and organizational planning and strategic assessments of environmental situations. Mr. Merritt was the Assistant Deputy Minister of Operations Division with the Ontario Ministry of the Environment, responsible for environmental protection and regulatory services, including approvals and environmental assessments. Mr. Merritt also led the establishment of the Ontario Clean Water Agency and was the vice-president responsible for water and wastewater plant operations, engineering services, computer systems and information management. While with the Ministry of the Environment, Mr. Merritt served in various Directorship positions, including Central Region, Policy and Planning Branch, and the Administrative Services Branch, and is currently the Chair of the Advisory Council on Drinking Water Quality and Testing Standards.

Dr. Ken Roberts has over 40 years experience in the field of water resources engineering and management. Dr. Roberts' experience is gained through a number of water-quality-related positions in the Ontario Ministry of the Environment (formerly the Ontario Water Resources Commission) and with XCG Consultants Ltd. Dr. Roberts is currently an independent consultant, with experience in water and wastewater engineering, treatment and research, with a focus on drinking water. Dr. Roberts is also an Honorary Member of the American Water Works association.

John Rudnickas was the Manager of Water Quality for the City of Toronto. A chemist by training, Mr. Rudnickas has extensive experience in all aspects of quality assurance / quality control in large drinking water systems, and was responsible for the management of the City of Toronto's accredited and licensed laboratory for drinking water testing. Mr. Rudnickas is currently involved with the Walkerton Clean Water Centre in the training of drinking water operators, and is a member of the Ontario Water Works Association and is on the Water Quality Committee of the Canadian Water and Wastewater Association. Mr. Rudnickas is also a member of the American Water Works Association.

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, represents the Ontario Municipal Water Association, and is a Professional Engineer.

In Memory of...

Derrick Kamanga was a professional engineer with over 25 years of experience in the design, water treatability studies, membrane pilot studies, utility operation, community planning, and project management of water and wastewater treatment systems. Mr. Kamanga's academic qualifications included a Master of Engineering degree and several papers including "Transportation of Pollutants by storm runoff from Agricultural Lands", and his experience included the preparation of Engineering Reports for several municipalities in Ontario. Mr. Kamanga was a technical advisor to the First Nations for over 10 years, throughout Canada, and was in charge of Peer Review Engineers and prepared the first Terms of Reference for Engineering Reports covering First Nations Wastewater systems. Mr. Kamanga worked with the Ontario First Nations Technical Service Cooperation as the Senior Engineer, Water & Wastewater, supervising peer review engineers, and managed the Aboriginal Water and Wastewater Association of Ontario (AWWAO) and consultants working for First Nations, providing training for the certification of plant operators.

Dr. Lesbia Smith was an Assistant Professor at the University of Toronto and Clinical Research Associate of the McMaster University Institute of Environment and Health. Dr. Smith held a Medical degree, and was the former head of the Environmental Health and Toxicology Unit of the Public Health Branch of the Ontario Ministry of Health and Long-Term Care. Dr. Smith researched drinking water quality and chronic diseases such as non-bladder cancer (by-products of chlorination) and Alzheimer's disease (aluminum) and participated in the development of several Ontario Drinking Water Quality Standards. Dr. Smith also worked as environmental health consultant, playing a key role in many important national health projects.

Appendix J - Contact Information

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