



Ontario Drinking Water Advisory Council

Public Consultation on the Ontario Drinking Water Quality Standard for Tritium

March 26 and 27, 2008
Toronto, Ontario

Summary Report

Prepared for the
Ontario Drinking Water Advisory Council
By Lura Consulting

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This public consultation summary was prepared by Lura Consulting. It presents a summary of the public consultation meeting on March 26 and 27, 2008 and of received submissions. If you have any questions or comments regarding the report, please contact either:

Scott Barrett

Executive Assistant

Ontario Drinking Water Advisory Council **OR**

Phone: 416-212-7596

scott.barrett@ontario.ca

Jean-Louis Gaudet

Consultant

Lura Consulting

Phone: 416-410-3888 x5

jgaudet@lura.ca

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I Introduction

I.1 About the Public Consultation Meeting

On March 26 and 27, 2008, the Ontario Drinking Water Advisory Council (ODWAC) held a two-day public consultation meeting on Ontario's Drinking Water Quality Standard (ODWQS) for tritium. The purpose of the meeting was to obtain input from a broad spectrum of interested community groups and stakeholders. Consultation participants were asked for their feedback on the following three questions:

- Is the current Ontario Drinking Water Quality Standard for tritium acceptable?
- If not, what is the basis for finding the current Standard unacceptable?
- If you propose a different Standard, what is your rationale?

Participants were also invited to contribute any other feedback they had on the ODWQS for tritium. This feedback will be incorporated with other input received to date from other stakeholders and will inform ODWAC's advice to the Ontario Minister of the Environment on this topic.

The Minister's request for advice on this Standard was formally made to ODWAC on February 21, 2007. The request was in response to a letter from Dr. David McKeown, Medical Officer of Health, City of Toronto, which outlined concerns about the current Standard for tritium. The Minister's request asked ODWAC to consider the 1994 recommendations made by the former Ontario Advisory Committee on Environmental Standards as well as the Greenpeace report entitled "Tritium Hazard Report: Pollution and Radiation Risk from Canadian Nuclear Facilities."

The public consultation was advertised in the Toronto Star, and invitations were distributed directly to stakeholder groups. Information on the consultation was also posted on ODWAC's website at (http://www.odwac.gov.on.ca/standards_review/tritium/tritium.htm). The public was invited to make a presentation to ODWAC at the meeting, to submit comments in writing, or both. At the meeting, participants were provided with 10 minutes to make their presentation, and an additional 5 minutes for questions from ODWAC panel members.

I.2 Overview of this Report

This report provides a summary of the feedback received through the public consultation, including presentations made during the March 26-27, 2008 meeting as well as written submissions received at or following the consultation meeting.

The summary of public comments is provided in section 2 of this report and is organized based on the three questions posed by ODWAC. The agenda for the meeting is provide in Appendix A, and a summary of the questions asked by the ODWAC panel members and the answers given by the presenters is provided in Appendix B. Copies of the presentations and written submissions are provided in Appendix C and D.

2 Summary of Public Comments

This section provides a summary of the comments made by the presenters during the two-day public consultation meeting and from the written submissions received during the consultative process. A total of 65 individuals and organizations participated in the consultation, either by making a presentation to ODWAC, submitting written comments, or both. Participants included:

- 19 individuals;
- 11 community-based groups;
- 8 health organizations (6 health non-governmental organizations and 2 professional health associations)
- 6 environmental non-governmental organizations;
- 5 industry/consulting organizations;
- 4 municipalities;
- 3 non-governmental organizations;
- 2 universities;
- 1 federal government representative; and
- 1 labour organization.

In addition, ODWAC received 532 e-mails from individual members of the public that closely followed a model submission provided on the Greenpeace website.

The paragraphs below summarize the feedback provided by the various stakeholder groups. The comments are organized according to the three key questions posed by ODWAC for this public consultation, followed by a summary of any other tritium-related concerns or issues raised. No attempt has been made to assess the scientific accuracy or basis of the feedback received.

2.1 Is the current Ontario Drinking Water Quality Standard for Tritium acceptable?

In general, most of the stakeholder groups that commented during the Council's consultation on the ODWQS for tritium believe that the current Standard is not acceptable. These groups included concerned citizens, community groups, health organizations, health non-governmental organizations and professional health associations, environmental non-governmental organizations, municipalities, non-governmental organizations, universities, and labour.

Five submissions indicated that the current standard is acceptable or that there is insufficient evidence to warrant lowering it (Health Canada, the Canadian Nuclear Association, two radiation researchers/scientists, and a health physicist).

2.2 What is the basis for finding the current standard acceptable or unacceptable?

2.2.1 Rationale for the standard being "unacceptable"

There were a number of issues raised to support the view that the current ODWQS for tritium is unacceptable. These issues are summarized below.

Impact of Tritium on Human Health

The rationale provided by those who felt that the Standard is unacceptable was consistent across many of the participants. A key area of concern was the potential impact of tritium on human health. Key comments presented included:

- There is no safe dose or level to exposure of radiation, and even the smallest doses (e.g., background) can cause cancer and other health effects. Tritium can also promote and accelerate cancer.
- Women are more vulnerable to tritium and are affected differently than men, particularly with respect to their reproductive systems.
- Rapidly growing cells such as fetal tissue and young girls' developing breasts, genetic materials and blood forming organs are especially sensitive to tritium.
- Tritium can damage DNA, causing a mutagenic effect resulting in cancers, miscarriages, birth defects, sterility, and hypothyroidism, among others. The effects from exposure to tritium can harm offspring and last for generations.
- Female human infants are at risk from elevated tritium levels due to genetic damage to ova exposed to tritiated hydrogen.
- Certain groups are especially vulnerable to environmental carcinogens, such as women (especially when pregnant), the unborn, and the elderly, those with compromised immune systems, children, teenagers and Aboriginal people.

Risk and Dose Measurement Methodologies

Concerns about how risk and doses are measured and used to help set the Standard were raised by community groups, citizens, NGOs and health organizations. These concerns included:

- How risk and dose measurements are calculated, particularly in that the current models use the “standard man”, which may not reflect dosages experienced by women and children. Research by Dr. Richard B. Richardson was cited as finding that the dosage of tritium to women is estimated to be 45% higher than the dose to the “standard man.” Dr. Richardson’s research was referenced as illustrating that the dose co-efficient for women is under-calculated.
- Additionally, exposure studies based on animal testing are not accurate because of the lower body fat levels found in **animals**.
- Many of the non-lethal cancer effects of tritium are not currently considered in the model upon which the current Standard is based on. These effects include non-fatal cancers, miscarriages, still births, birth defects, sterility, hypothyroidism, genetic mutation, respiratory failure, kidney failure, nervous system disorders, cardiovascular disease, among others.
- The current Standard does not consider organically-bound tritium, thus under-estimating the true dose.
- Cumulative exposure and combined effects are not being considered.
- The current Standard considers 340 excess fatal cancers per million as an “acceptable risk”, which is equivalent to 1 in 3,000.

With respect to using either radiological or chemical assessment approaches in developing an ODWQS for tritium, the Public Health sector advocated using the chemical-based approach. Their reasons included:

- The Standard is being set for drinking water for the whole population.
- Tritium exposure should be considered primarily an anthropogenic contaminant emitted to the environment.
- Anthropogenic emissions of tritium directly impact the drinking water supplies of approximately one-quarter of the Canadian population, thereby resulting in a large population exposure.
- Exposure to tritium in drinking water is involuntary.

Tritium in Ontario's Environment

Concern over the amount of tritium currently found in Ontario's environment was cited as a reason for the current ODWQS for tritium being unacceptable. For example, a few NGOs and community groups noted that:

- Levels of tritium are 2 to 5 times higher in Lake Ontario than in other water bodies in the Great Lakes and across Canada. For example, concentration of tritium in Lake Ontario was reported to be 7.1 Bq/L, compared to 2 Bq/L in Lake Superior. Lake Ontario is a major source of drinking water for Ontarians.
- Between 1979 and 1997, there were 11 known leaks of tritium from Canadian nuclear reactors.

Elevated concentrations of tritium were also reported to have been found in food and well water samples. For example, water samples taken from a pond at a home in/near Millbrook in 2005 were reported to show an average concentration of 1770 Bq/L, with a maximum of 2494 Bq/L. The home was reported to be 220 metres away from an emissions stack at a tritium light manufacturing facility. Produce grown by residents in Pembroke was reported to contain tritium levels as high as 12,000 Bq/L.

Proximity of Nuclear Reactors in Southern Ontario

A number of citizens, community groups, NGOs and health organizations, as well as the City of Pickering, noted that Ontario has a high number of nuclear reactors that use heavy water as a coolant, and therefore the risk of exposure to tritium is higher due to the facilities proximity and their use of deuterium.

How the Ontario Standard Compares to Other Standards Internationally

Community groups, concerned citizens, NGOs, health groups and university representatives believe that Canada's current Guideline for tritium in drinking water (which is the same as Ontario's Standard) is unacceptable because it is high compared to other jurisdictions. For example, while the ODWQS for tritium is 7000 Bq/L, it was reported that the drinking water standard for tritium in the United States is 740 Bq/L and the European Union has an action level of 100 Bq/L.

The Precautionary Approach

The precautionary approach was raised by many of the stakeholders who believe the current Standard is unacceptable, including community groups, citizens, health organizations, and NGOs. It was felt that the precautionary approach was not being applied with respect to tritium in drinking water and that because there is still uncertainty over the impacts of tritium (such as synergistic effects with other substances), then the precautionary principle should be applied and the Standard should be lowered.

2.2.2 Rationale for the standard being “acceptable”

While many of the consultation participants felt that the current Standard was unacceptable, there was some support not changing it. Reasons for not changing the current standard include:

- There is no new information that warrants a change to the current Standard.
- The methodology for assessing risk and dose for tritium and other radionuclides is internationally accepted, sufficient and prudent;
- The risk of fatal and non-fatal cancers from exposure to radionuclides in drinking water of 0.1 mSv/year is negligible (6×10^{-4} over a lifetime).
- Making the Standard more stringent would depart from international guidance and advice from organizations such as the International Commission on Radiation Protection (ICRP) and the World Health Organization (WHO).
- Changing the Standard would create the false impression with the public that there is now a higher risk from tritium in drinking water.

Also, regarding the question on whether to assess the risk from tritium as either ionizing radiation or as a genotoxic chemical, it was suggested that the appropriate assessment is as an ionizing radiation because it is the location of where the radiation is delivered and the nature of the radiation that is important, rather than the chemical nature of the radionuclides. It was also suggested that, for the purposes of setting standards, all radionuclides should be treated equally.

It was also noted by one submitter that while there was currently no compelling reason to reconsider the Standard at this time, it may be reasonable to adjust the radiation weighting factor from 1 to 2 and accommodate parameters more appropriate for infants, which would result in a revised Standard of 3,000 Bq/L. The submitter noted that adopting this value would be of little practical significance because tritium levels currently observed are already far below this value.

2.3 If you propose a different Standard, what is your rationale?

The majority of those who believe that the current ODWQS for tritium is unacceptable suggest that the levels proposed in the 1994 ACES report should be adopted, that the current Standard be reduced immediately to 100 Bq/L and then to 20 Bq/L within 5 years. The main reasons stated for adopting this process include:

- The ACES recommendation is more conservative than the current Standard;
- Ontario Power Generation has stated that levels below 100 Bq/L at drinking water plant intakes are currently achievable;

- It employs the precautionary approach, and encourages erring on the side of caution;
- It is based on the chemical genotoxic paradigm, rather than the radionuclide paradigm;
- It lowers the level of risk of cancer to 1 in a million, and reduces the number of premature deaths from 340 per million to 5 per million.

For similar reasons, some concerned citizens and NGOs recommended lower limits, ranging from 0 Bq/L to a range between 10 and 20 Bq/L.

2.4 Other Tritium-Related Comments

In addition to comments regarding the ODWQS for tritium, the consultation participants also provided additional comments with respect to tritium. The most common of these was the suggestion that the allowable level of tritium in discharge from nuclear reactors be zero. This comment was made by health, NGO, municipal public health representatives, concerned citizens and community groups. Other comments are summarized below.

Tritium and Human Health

- More research is needed to identify the impacts of tritium on human health.
- A study is currently underway by the CNSC regarding tritium and its health impacts.
- A committee should be established to investigate health issues related to tritium.

Tritium Monitoring

- Monitoring for tritium in drinking water should be mandatory.
- Should drinking water monitoring show levels of tritium higher than the maximum allowable, then alternate drinking water supplies should be provided.
- Daily monitoring of drinking water should be required for areas near Ontario Power Generation (OPG) plants.

Public Notification and Disclosure

- The public should be immediately notified when tritium levels in drinking water exceed 5 Bq/L.
- The public and municipalities should be notified in instances of accidental releases of tritium from nuclear facilities.
- The nuclear industry should be compelled by stricter disclosure obligations.

Nuclear Power

- Government funds and subsidies should be diverted from nuclear power to renewable energy;
- More research is needed on how to reduce emissions of radioactive material from nuclear energy production facilities.

3 Next Steps

After the public consultation meeting, participants were given until April 4, 2008 to submit additional comments for the consultation. Mr Jim Merritt, ODWAC Chair, noted that information received after that date would still be considered in their advice to the Minister of the Environment. ODWAC plans to transmit its recommendations on the ODWQS for tritium some time in the summer of 2008.