

April 4, 2008

Mr. Jim Merrit, ODWAC Chair,
ODWAC,
40 St. Clair Avenue West, 3rd Floor
Toronto, Ontario, Canada
M4V 1M2

Dear Mr. Merrit,

Thank you for the opportunity to present our recommendations re: tritium standards in Ontario drinking water to the Ontario Drinking Water Advisory Committee (ODWAC) on March 28th, 2008, on behalf of the Occupational and Environmental Working Group of the Toronto Cancer Prevention Coalition (TCPC).

As I'm sure you will agree, all Ontario residents have the right to safe drinking water, including adequate protection from cancer and other negative health effects associated with exposure to tritium, other radionuclides and toxic chemicals in our drinking water.

To protect the health of all Ontario residents, including women and our most vulnerable populations (fetus, infants and children) we recommend the following:

- 1) The Province should adopt its own Drinking Water Objectives for Radionuclides, based on the same level of protection required for toxic chemicals in water (risk of 1/1,000,000 fatal cancers), and should provide protection against non-fatal cancers, teratogenic effects and other non-cancer illnesses.
- 2) The current standard for tritium should be reduced to 20 Bq/l tritium in drinking water, immediately.
- 3) The standard should be reduced further to 5 Bq/l tritium in drinking water, phased- in over 5 years, with a further phase-out.
- 4) The Medical Officer of Health (MOH) should provide mandatory warnings and advice to the public at tritium levels of 5 Bq/l or more. The MOH should be notified by nuclear plant operators whenever levels exceed background levels, to ensure adequate public health protection.
- 5) The MOH and public should have immediate and direct access to information on tritium levels in drinking water through a web-site (updated daily) and other communications, for all communities in proximity to nuclear generating plants.
- 6) Alternative drinking water supplies should be provided to the public from the local municipality, the OPG, and/or the source, once tritium levels exceed 20 Bq/l. The standard should be measured and reported on in real time.
- 7) Monitoring for tritium and other radionuclides should occur daily for the drinking water intake locations near OPG nuclear stations. In cases of spills or accidents, daily monitoring should include the entire body of water where the spill occurred, until levels are reduced to background.

The recommendations above are based on several key themes:

- A. Health and environmental protection needs to be the primary objective in all decisions affecting the safety of our drinking water and the health of the public and our ecosystem.
- B. Tritium is a known carcinogen that can cause cancer at levels below the current standard, particularly in women, fetuses, infants and children. This represents well over half of the population in Ontario.
 - Tritium is a known carcinogen (classified by EPA and IARC) that can initiate cancer at low levels of exposure (BEIR VII, 2006).
 - Those living near nuclear facilities, and nuclear plant workers, have higher rates of cancer than the general population. For example, a study in Pickering showed that children living within 50km. of a nuclear power station experience higher rates of leukemia (McArthur, 1988). In addition, the largest study conducted of nuclear workers from 15 countries (including Canada) concluded that there is a 1-2% increase in ca deaths at typical occupational exposure levels (IARC, 2005).
 - The current safety margin for exposure to tritium is too high, even for the standard reference male. The CERRIE (Committee Examining the Radiation Risks of Internal Emitters) report of 2004 estimates that tritium may be 15 times more harmful than currently estimated by the nuclear establishment.
 - There is no safe level of exposure to radiation (BEIR VII, 2006).
 - Exposures to women, children, infants and fetuses are higher than exposures to the standard male, due, in part, to a higher fat to muscle ratio in women (tritium is lipophilic). Fetuses, infants and children receive a higher dose per kg. body weight due to their small size. In addition, fetuses, infants and children are more vulnerable to the effects of tritium as their systems and organs are still developing (e.g. rapidly growing cells in fetal tissue, genetic materials and blood forming organs). Current scientific knowledge estimates:
 - The dose to women is approximately 46 times higher than the dose to a man
 - The dose to fetuses, infants and children is approximately 1000 – 100 times the does to a man.
- C. Tritium exposure can impact on DNA, resulting in negative health effects that can affect those exposed and future generations.
 - Tritium can affect the protein cursers that make up the chromosomal strands in DNA – creating mutations, resulting in cancers, hormone disruption, miscarriages, birth defects, sterility and hypothyroidism – in those exposed, and in offspring, exhibiting generational effects (genetic damage). (BEIR 7, 2006)
- D. A precautionary approach should be taken when setting environmental standards to protect the health of our most vulnerable populations (i.e. fetuses, infants and children), minimize negative health impacts on future generations and to account for cumulative, additive, supra-additive and synergistic effects of multiple toxic exposures.

- The Canadian Nuclear Safety Commission document, Standards and Guidelines for Drinking Water (2008), reports only on cancer deaths and has not considered cancer risks to vulnerable populations (i.e. fetuses, infants and children), or other health- based considerations, in the development of standards.
- The Ministry of the Environment (Drinking Water Systems Regulation O. Reg. 170/03, June 2003) states that “ingestion of radionuclides in drinking water may cause cancer in exposed individuals and hereditary damage in children. It is assumed that no threshold exists below with the probability of induced effects is zero.
- Canadians are exposed to numerous toxic chemicals, as well as tritium and other radionuclides on a regular basis, and build up a body burden of these toxins, as seen in biomonitoring studies, such as Environmental Defence’s Toxic Nation reports (levels of radionuclides were not measured). Risk assessment is based on the toxicity of each substance individually; however, this does not reflect real world experience, as the additive, supra-additive and synergistic effects from the interaction between substances in vivo are not considered.
- The additive, supra-additive and synergistic effect of tritium, other radionuclides and other chemicals is discussed in Annex H of the UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation) 2000(b) report and referred to in the BEIR 7 report.
http://books.nap.edu/openbook.php?record_id=11340&page=330.

E. The public has a right to be protected from *all* toxic substances equally, be they radionuclides or toxic chemicals.

- Environment Canada describes good drinking water as devoid of disease organisms, harmful chemicals and radioactive matter.
- The standard for tritium should be the same as the standard for toxic chemicals in drinking water, to provide protection from fatal cancers from a lifetime (70 year) exposure, non-fatal cancers, teratogens and non-cancer illnesses.
- As described by the Advisory Committee on Environmental Standards (ACES) committee in 1994, the (still) current standard for tritium is based on a cancer risk of:
 - 340 fatal ca per million people (1 in 3000) compared to Canadian Federal Drinking Water objectives for toxic chemicals set at a lifetime risk of 1 in 1,000,000 fatal cancers per million people (for the average man – not women or children).
 - the difference in standards is based on inconsistencies in the calculation of life-long exposure, whereby exposure to tritium and other radionuclides is based on exposure for one year, versus the more realistic exposure of 70 years established for toxic chemicals.

F. The Ontario Power Generation (OPG) has the capacity to meet the standards set by the ACES in 1994 and have already lowered their standard to 100Bq/l voluntarily.

- Routinely, tritium levels in water tested at the closest municipal water treatment plants measure between 5-7Bq/l, as stated on the OPG website.

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- The OPG (then, Ontario Hydro) built a Tritium Removal Facility in its Darlington nuclear station in 1990. This technology has enabled the OPG to significantly reduce levels of tritium in Ontarians' drinking water, as noted above.
- The regulations should reflect the *current* capacity of the CANDU reactors, not outdated standards.

G. Given the serious consequences of nuclear spills and accidents, as well as unsafe drinking water (e.g. Walkerton), water monitoring should be conducted daily for radionuclides at all of the drinking water intake locations near nuclear generating stations. In cases of spills or accidents, daily monitoring should include the entire body of water where the spill occurred, until levels are reduced to background. In addition:

- The Medical Officer of Health (MOH) should be notified immediately by the nuclear plant operator if radionuclide levels are above background levels to allow for measures to be taken to warn and protect the public.
- Immediate action should be taken to provide safe drinking water, when levels of tritium are above those deemed to be safe (e.g. above 20bq/l).
- The Medical Officer of Health (MOH) and the public should be provided with up-to-date information about the levels of tritium and other radionuclides in the drinking water, in keeping with increased transparency and the right-to-know.

As a final note, given the Ontario Government's commitment to health protection and Toxic Use Reduction, the current standard for tritium is, at best, outdated and inconsistent with current approaches, and at worst, may not adequately protect the public's health.

In a press release on November 20, 2007, Premier McGuinty announced that Ontario will pursue a Toxic Use Reduction Strategy. "The McGuinty government's new toxins reduction strategy will include a range of measures to protect our health. It will include the introduction of new toxics reduction legislation to reduce pollution, inform and protect Ontarians from toxic chemicals in the air, water, land and consumer products."

Your committee has the unique opportunity to protect the health of all Ontarians in making your recommendations re: the standard for tritium in Ontario drinking water. We sincerely hope that you will err on the side of precaution and health protection and recommend the adoption of an immediate standard of 20bq/l. tritium in our drinking water.

If you have any questions regarding this letter, please don't hesitate to contact me at nancybradshaw@rogers.com.

Sincerely,

Nancy Bradshaw
Co-Chair, Toronto Cancer Prevention Coalition,
Occupational and Environmental Sub-Committee

Occupational and Environmental Committee of the Toronto Cancer Prevention Coalition

Cc. Dr. Robert Kyle, MOH, Durham Region

Dr. David McKeown, MOH, Toronto

Ms. Fiona Nelson, Chair, Toronto Cancer Prevention Coalition

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