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**COMMENTS BY**  
**CANADIAN ENVIRONMENTAL LAW ASSOCIATION**  
**RE: PROPOSAL TO ADOPT THE CANADIAN DRINKING**  
**WATER QUALITY GUIDELINE FOR RADIOLOGICAL**  
**CHARACTERISTICS AS AN ONTARIO DRINKING WATER**  
**OBJECTIVE FOR RADIONUCLIDES**

*EBR Registry Number: PA9E0006*  
*Type of Posting: Policy*  
*Ministry: Environment*  
*Comment Period: August 26, 1999 to October 25, 1999*

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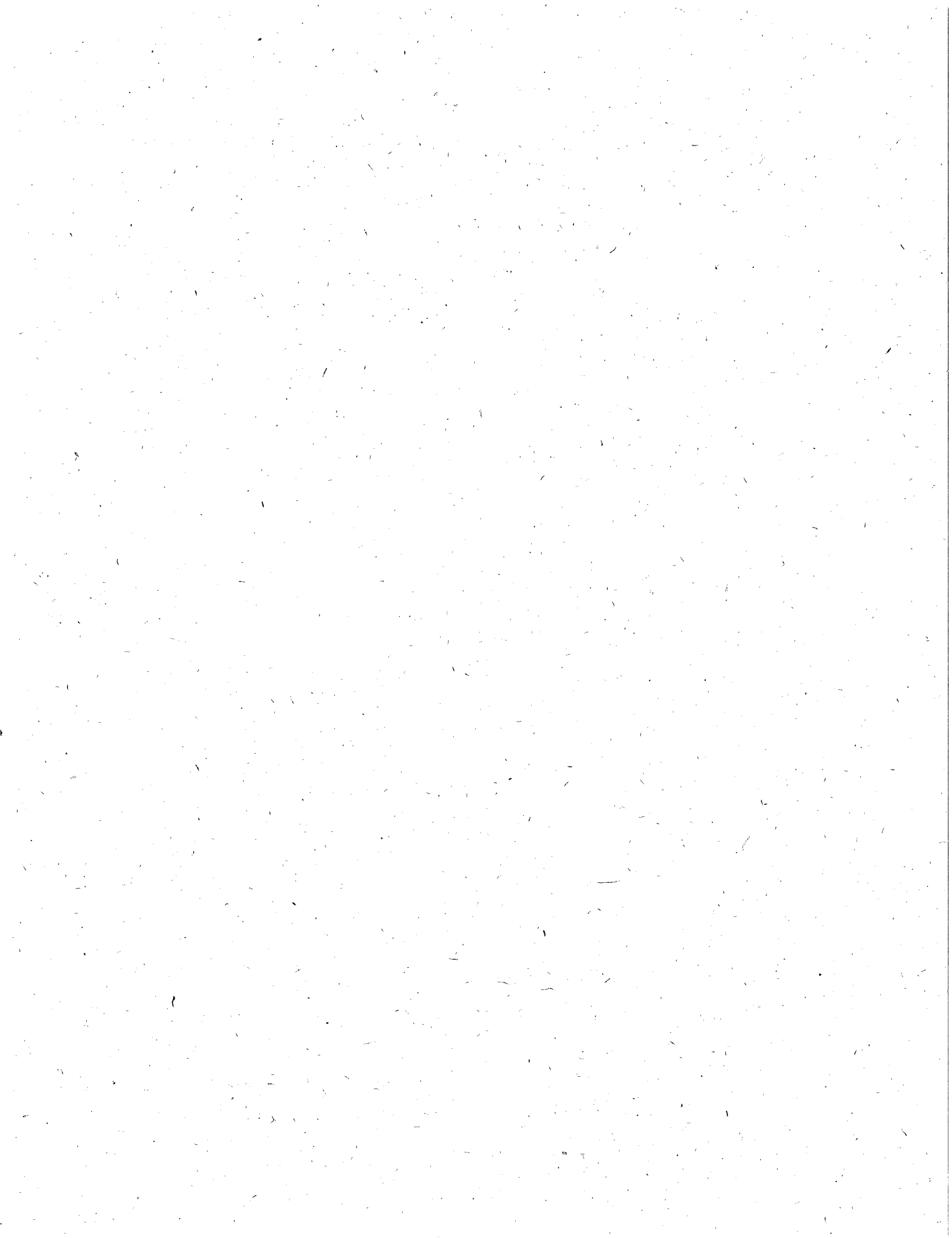
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CANADIAN ENVIRONMENTAL LAW ASSOCIATION  
L'ASSOCIATION CANADIENNE DU DROIT DE L'ENVIRONNEMENT

**COMMENTS BY CANADIAN ENVIRONMENTAL LAW ASSOCIATION  
RE: PROPOSAL TO ADOPT THE CANADIAN DRINKING WATER QUALITY  
GUIDELINE FOR RADIOLOGICAL CHARACTERISTICS AS AN ONTARIO  
DRINKING WATER OBJECTIVE FOR RADIONUCLIDES.**

**EBR Registry Number: PA9E0006  
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Comment Period: August 26, 1999 to October 25, 1999**

**Attention:**

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Standards Development Branch  
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**PART I - INTRODUCTION**

The Canadian Environmental Law Association (CELA) is a public interest group founded in 1970 to use and improve laws to protect the environment and conserve natural resources. Funded as a community legal clinic specializing in environmental law, CELA represents individuals and citizens' groups before trial and appellate courts and administrative tribunals on a wide variety of environmental issues. In addition to environmental litigation, CELA undertakes public education, community organization, and law reform activities.

CELA has a long history of concern as to the ecological, economic, health and justice impacts of nuclear power generation, and a lengthy history of comment, public participation and client representation in matters arising from nuclear power. CELA is a participant, along with 150 other citizens groups from across Canada, in the Campaign for Nuclear Phase-out and supports the phase-out of nuclear power and the nuclear industry in Canada. As will be discussed below, the subject Policy proposal is another example of the compromise of environmental protection, contrary to the interests of public health and ecological sustainability, that arises from the desire to support an unsustainable nuclear industry.

The purpose of these submissions is to comment on the above noted proposal for Policy, the Proposal to Adopt the Canadian Drinking Water Quality Guideline for Radiological Characteristics as an Ontario Drinking Water Objective for Radionuclides, EBR Registry Number PA9E0006, posted by the Ministry of the Environment, with a comment period between August 26, 1999 and October 25, 1999, posted on the Environmental Bill of Rights (EBR) electronic registry.

## **PART II - RECOMMENDATIONS**

### **Recommendation #1:**

**The Province of Ontario should adopt its own Drinking Water Objectives for Radionuclides. The level of protection that should be achieved in adopting such Drinking Water Objectives should be analogous to the level of protection that Ontario follows for Drinking Water Objectives for chemical substances in water; in particular, should provide a risk of no more than one in a million excess fatal cancers, and should provide protection against non-fatal cancers; teratogenic effects and other non-cancer illnesses.**

### **Recommendation #2:**

**CELA advocates an immediate 20 bq per litre limit in drinking water for tritium (tritiated water) with a phase-in over five years to reach 5 bq per litre. That 5 bq per litre level should in turn eventually be reduced as tritium levels in background continue to decline because of the passage of time from the dates of the above-ground weapons tests to eventually reach zero.**

**Recommendation #3:**

With respect to the rest of the radionuclides listed in the Canadian Guideline and therefore proposed for Ontario, CELA advocates a policy of zero discharge to drinking water. There is no rationale contained in the Guideline as to why such radionuclides should be discharged to the environment, or to drinking water in particular, at all.

**Recommendation #4:**

An assessment of other environmental effects must be conducted immediately, and protection for non-human adverse effects also provided, for example in Ontario Surface Water Quality Objectives.

**Recommendation #5:**

The policy should provide for mandatory advice to the public whenever radionuclide levels in sources of the local drinking water are measured at or above background levels. For example, for tritium, warnings should be provided whenever levels are at 5 becquerels per litre or more.

**Recommendation #6:**

The results of the monitoring for radionuclides in drinking water should be available on a web-site, and in newspapers, widely advertised and up-dated daily, for all of the communities in proximity to the nuclear generating plants.

**Recommendation #7:**

Provision of alternative drinking water sources by the local municipality and/ or Ontario Power Generation or the source responsible for the levels, should follow at levels at or above 20 bequerels per litre. The standard should be based on instantaneous basis, instead of being averaged annually. For the times during which the standard is exceeded, alternative supplies must be provided.

**Recommendation #8:**

The Guideline should also specify monitoring frequency for radionuclides, which should be daily for all of the drinking water intake locations near Ontario Power Generation nuclear generating stations.

**Recommendation #9:**

**Other monitoring periods at other locations could be established based on results and based on known emitters of radionuclides. In cases of spills or accidents where drinking water intakes much further away may include tritiated water, monitoring frequency for all of the drinking water intakes in that Great Lake should be increased to daily until the levels return to background.**

**Part III - General Comments on the Proposed Ontario Drinking Water Objectives for Radionuclides**

CELA opposes the adoption of the Canadian Drinking Water Guideline for Radiological Characteristics as the Ontario Drinking Water Objectives for Radionuclides.

Instead, the Province of Ontario should adopt its own Drinking Water Objectives for Radionuclides. The level of protection that should be achieved in adopting such Drinking Water Objectives should be analagous to the level of protection that Ontario follows for Drinking Water Objectives for chemical substances in water; in particular, should provide a risk of no more than one in a million excess fatal cancers, and should provide protection against non-fatal cancers; teratogenic effects and other non-cancer illnesses.

The publication, "Assessment and Management of Cancer Risks from Radiological and Chemical Hazards", (1998, Joint Working Group, AECB, Health Canada and Ontario Ministry of Environment and Energy) is the basis for the proposed policy. Its primary conclusion is that:

"The consensus of the Joint Working Group is that it does not appear fruitful at this time to consider harmonizing the regulation of ionizing radiation and genotoxic chemicals..." (at page 3).

It is unacceptable that risks to public health and to the environment should be greater merely because the substances are radioactive. However, this is the very approach taken in the Canadian Drinking Water Quality Guideline that Ontario proposes to adopt.

For example, the risk of cancer fatalities from tritium at the proposed levels would be 340 excess fatal cancers per million people. The chemical drinking water objectives are almost all set at levels that provide a risk of 1 to 10 excess fatal cancers per million people.

The primary reason for this difference is because the excess cancers predicted from exposure to the radioactive substances is calculated by assuming one year of consumption of the drinking water. Then the risk for a whole life time is calculated as if that year of consumption is the only consumption.

On the contrary, for the chemical substances, the assumption is that people consume the drinking water for their whole lifetime - commonly set at a 70 year exposure.

The Advisory Committee on Environmental Standards was charged to enquire into this very issue in 1994 for the purpose of setting a drinking water standard for tritium. It reviewed the above-described differences in approach to standard setting, and concluded that it was not appropriate to assume only a one year exposure in calculating the risk.

Based on the one year exposure calculation, a figure of 7,000 Becquerels per litre (Bq/l) for tritium had been proposed as the interim drinking water standard. This is the same figure now proposed under the Canadian Guideline (assuming tritium is the only radioactive substance in the drinking water - there is a recognition that if other radionuclides are present, the standard would have to be below 7,000 Bq/l). ACES advised that in order to more rationally and realistically estimate the risk and to make it comparable to the approach for chemical substances, it needed to divide the 7,000 figure by 70 years. It thus arrived at a recommended interim figure of 100 Bequerels per litre.

ACES also reviewed the history of creation of tritium exposure from human activities and noted that the background levels of tritium are gradually declining; most of this background having arisen from tritium released to the environment in above-ground atomic weapons tests and being distributed globally. ACES noted that routine releases of tritium to the environment from CANDU nuclear generating stations are one of the largest sources of environmental tritium exposure.

ACES agreed that exposures should be reduced to background levels and therefore advised that the drinking water standard should be set at 100 bq per litre immediately, with a five year phase in to 20 bq per litre. This was to give Ontario Hydro time to put into place any additional measures needed to reach the 20 bq per litre standard. ACES noted that neither standard should be a problem in any event, given the average levels noted at the drinking water

intakes nearest the nuclear generating stations, which have generally been below that level.

We would note that if the Province had followed ACES' advice immediately, we would already have reached the 20 bq per litre level with a phased in approach.

CELA would therefore advocate an immediate 20 bq per litre approach, with a phase-in over five years to reach 5 bq per litre, which is commonly measured as "background". That 5 bq per litre level should in turn eventually be reduced to zero as tritium levels in background continue to decline because of the passage of time from the dates of the above-ground weapons tests.

This approach is consistent with a "virtual elimination" policy for toxic emissions to the environment. There is no necessity to continue discharge of large levels of tritium to the environment. All levels pose risks of excess cancers. Tritium can be removed at source at the generating plants, or at least at the plants with Tritium Removal Facilities, as is presently done.

The other reasons to keep to a more protective approach with routine levels of tritium emissions from generating stations is to allow for the unfortunate fact that Ontario Hydro has had several spills of large quantities of tritium to the Great Lakes, and unfortunately, drinking water intakes are located near all three of the generating station complexes. In addition, tritium is discharged to the same water bodies by U.S. generating stations. Therefore, even to keep the level of protection established by the standard, a much more cautious level needs to be set so that when people are exposed to higher levels from accidents and spills, they are not even further jeopardized.

With respect to the rest of the radionuclides listed in the Canadian Guideline and therefore proposed for Ontario, CELA advocates a policy of zero discharge to sources of drinking water. There is no rationale contained in the Guideline as to why such radionuclides should be discharged to the environment, or to sources of drinking water in particular, at all. It is of particular concern that the Guidelines might imply releases of such substances to the environment at or below Guideline levels are acceptable; when the risk posed by such releases at those Guidelines is 70 or more times greater than other non-radioactive substances. Once again, this is because of the methodology, that is, the process of establishing Guideline levels based on only one year of consumption of the drinking water.

Another major issue is the lack of knowledge about synergistic effects between different radionuclides and chemical pollutants that may also be present in the drinking water. The methodology by which the Canadian guideline levels were set does not account for these types of effects.



Furthermore, the Canadian guideline levels have not taken into account non-carcinogenic effects at the specified levels. In other words, a level has been set based on carcinogenic effects, but if non-carcinogenic effects were included in the assessment, levels might have to be set much lower. Non-carcinogenic effects must also be protected against. Non-fatal cancers, and other illnesses are also of great concern to people and should not be a risk they take from drinking water from their municipal supply.

The Canadian guideline levels have also been set without taking account of other sources, such as organically bound tritium from local gardens and locally produced fruit, which may provide even greater relative risks than tritiated water.

In addition to the effects to human health, there appears to be no accounting for adverse effects on other aspects of the environment, including other species and their ecosystems, which the Environmental Protection Act and Ontario Water Resources Act mandate the Ministry of Environment to protect. Although these are drinking water guidelines, not the surface water guidelines, action is implied only for levels that exceed drinking water guidelines. An assessment of other environmental effects must be conducted immediately, and protection for non-human adverse effects also provided.

There appears to be no assessment for the most vulnerable sectors of the population. For example, the particular issues of radiological effects on children might include greater exposure to children; developmental susceptibility; greater uptake of contaminants; differing metabolism and other differences between risks to children compared to risks to adults. Assessments based on a methodology geared to adults is insufficient to protect children. A similar concern applies to pregnant women and their unborn children. Effects on future generations from impacts to today's young girls and adolescents do not appear to have been assessed.

All of these issues are of particular concern in the face of troubling reports of excess leukemia incidence in children, for example, in the vicinity of the Pickering Nuclear Generating Station.

The policy should provide for mandatory advice to the public whenever radionuclide levels in sources of the local drinking water are measured at or above background levels. For example, for tritium, warnings should be provided whenever levels are at 5 becquerels per litre or more. This notice will provide members of the public with the option to avoid consumption of the local drinking water at those times. For those who are risk averse; those who are particularly vulnerable, and others, this is ethically a mandatory requirement. People should not be forced to consume radioactive substances in their drinking water without their knowledge or consent. This requirement is especially crucial if the level

remains at 7000 bequerels per litre as proposed, since presumably no action will be taken by local authorities below that level, to reduce or omit the exposure, nor to provide alternative sources for the local drinking water.

The results of the monitoring for radionuclides in drinking water should be available on a web-site, and in newspapers, widely advertised and up-dated daily, for all of the communities in proximity to the nuclear generating plants. Individuals who choose to avoid the risks of consumption of radionuclides could therefore check local levels frequently in order to adjust their sources of consumption.

A related concern is that the levels are specified on an annualized basis. Therefore, instantaneous examples (as opposed to annualized averages) of exceedances over the standard would not result in any action nor be considered an exceedance of the Guideline because of the averaging effect of an annualized standard.

A far preferable approach would see, as ACES recommended in their report, provision of alternative sources of drinking water (by the local municipality and/or Ontario Power Generation or the source responsible) at levels at or above 20 bequerels per litre. The standard should be set based on instantaneous basis, so that for the times during which the standard is exceeded, alternative supplies must be provided.

It is urgent to avoid further contamination of drinking water supplies, especially intentional, at a time when concern for protection of fresh water drinking supplies is at an all time high, and when governments and the public are realizing that large portions of our fresh water are not renewable.

The Guideline should also specify monitoring frequency for radionuclides, which should be daily for all of the drinking water intake locations near Ontario Power Generation nuclear generating stations. Other monitoring periods at other locations could be established based on results and based on known emitters of radionuclides. In cases of spills or accidents where drinking water intakes much further away may include tritiated water, monitoring frequency for all of the drinking water intakes in that Great Lake should be increased to daily until the levels return to background.

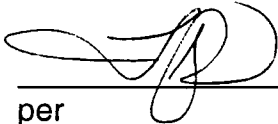
## **CONCLUSION**

The Province of Ontario should NOT proceed with adoption of the Canadian Drinking Water Quality Guideline for Radiological Characteristics as an Ontario Drinking Water Objective for Radionuclides. The Province of Ontario should

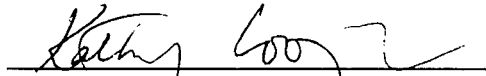
immediately set the drinking water objective for tritium at 20 bq / l; and the drinking water objective for other radionuclides at zero.

Submitted this 25<sup>th</sup> day of October, 1999

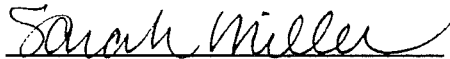
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cc Ivy Wile , Interim Environmental Commissioner of Ontario  
cc Hon. Tony Clement, Minister of Environment, Ontario

## References

Advisory Committee on Environmental Standards, A Standard for Tritium, A Recommendation to the Minister of the Environment and Energy, ACES Report 94-01, May, 1994, ISBN: 0-7778-2979-7 (102 pp)

Advisory Committee on Radiological Protection, Toxicity and Dosimetry of Tritium: A Review A report prepared for the Advisory Committee on Radiological Protection (ACRP-10) by D.K. Myers and J.R. Johnson, Published January 1991

Federal-Provincial Subcommittee on Drinking Water of the Federal-Provincial Committee on Environmental and Occupational Health, "Summary of Guidelines for Canadian Drinking Water Quality", April 1998 (7 pp)

Health Canada; Atomic Energy Control Board, Assessment and Management of Cancer Risks from Radiological and Chemical Hazards, Canada, Joint Working Group, 1998, ISBN: 0-662-26624-2 (58 pp)

Ministry of Environment and Energy, Ontario, Rationale Document for the Development of an Interim Ontario Drinking Water Objective for Tritium, December, 1994, Queen's Printer for Ontario, ISBN: 0-7778-3826-5

Ministry of Environment and Energy, Ontario, "Backgrounder on a recommended Interim Ontario Drinking Water Objective for Tritium", Fall, 1993 (2 pp)

Bertell, Rosalie, "Why tritium absorbed in food poses cause for concern", Toronto Star (letters) Sat. March 16, 1991

Boyle, Theresa, "Spill renews call for birth defect study", Toronto Star, August 8, 1992, p. A4.

CP Wire, "Tritium leak closes nuclear unit", Mon. 23 Aug 1999

Energy Probe, FactSheet: "Estimated Risk of Cancer from Regulated Levels of Carcinogens in Drinking Water", (undated)

Fairlie, Ian, "Tritium: The Overlooked Nuclear Hazard", The Ecologist 22:5 pp 228-232 (1992)

Gibson, Robert, "Ontario considers tough standard for tritium in drinking water," Alternatives 21:1 pp 6-7 (1995)

Gorrie, Peter, "Experts differ on risk of tritium at Pickering", Toronto Star, February 19, 1991, p. A1.

Halpin, Pat, "Tritium release brings changes at nuclear plant", Kitchener Waterloo Record, November 25, 1995, p. B3.

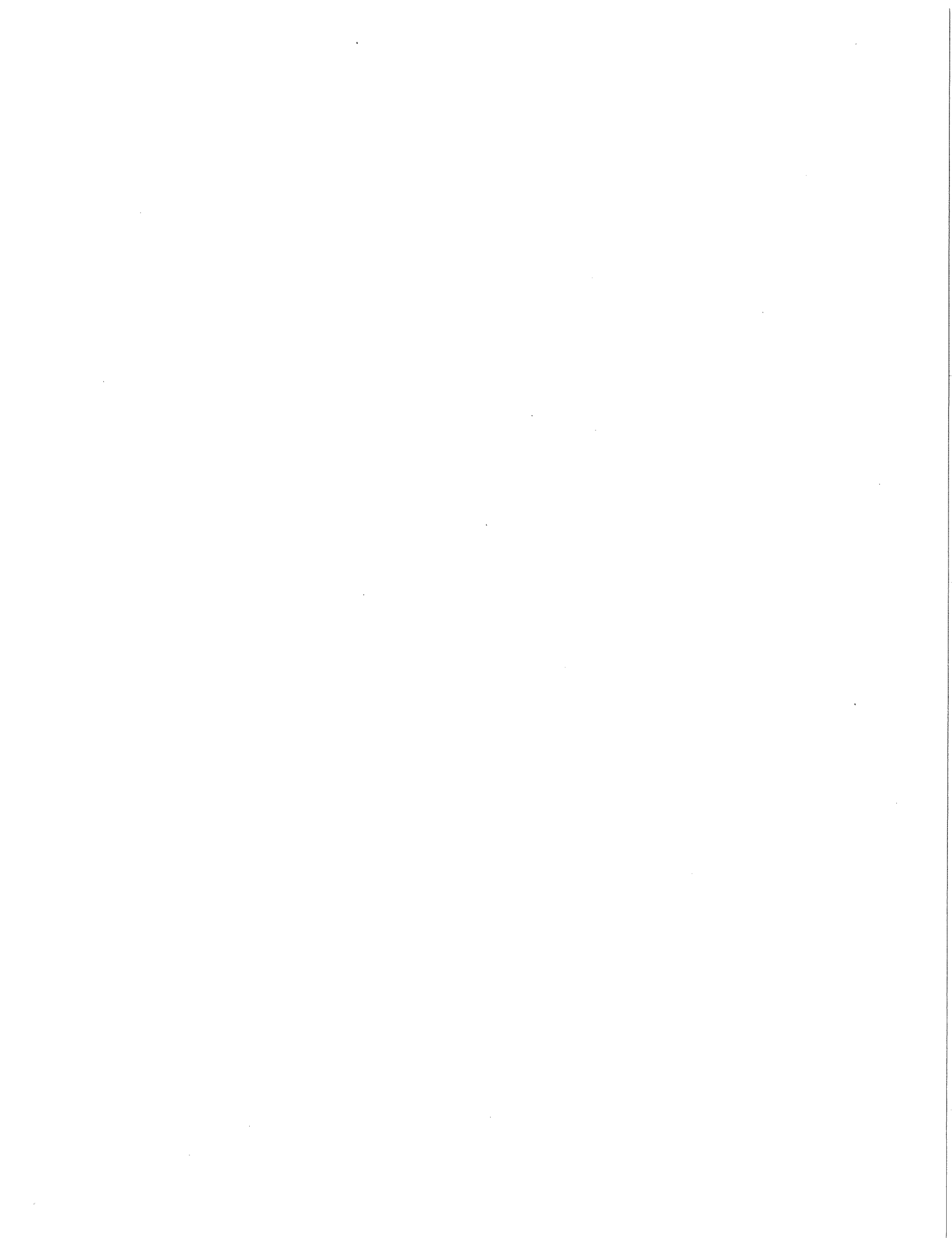
Kock, Irene, "Ontario considering reduction in tritium drinking water standard", The Great Lakes United, 9:2 pp 1-2 (1994)

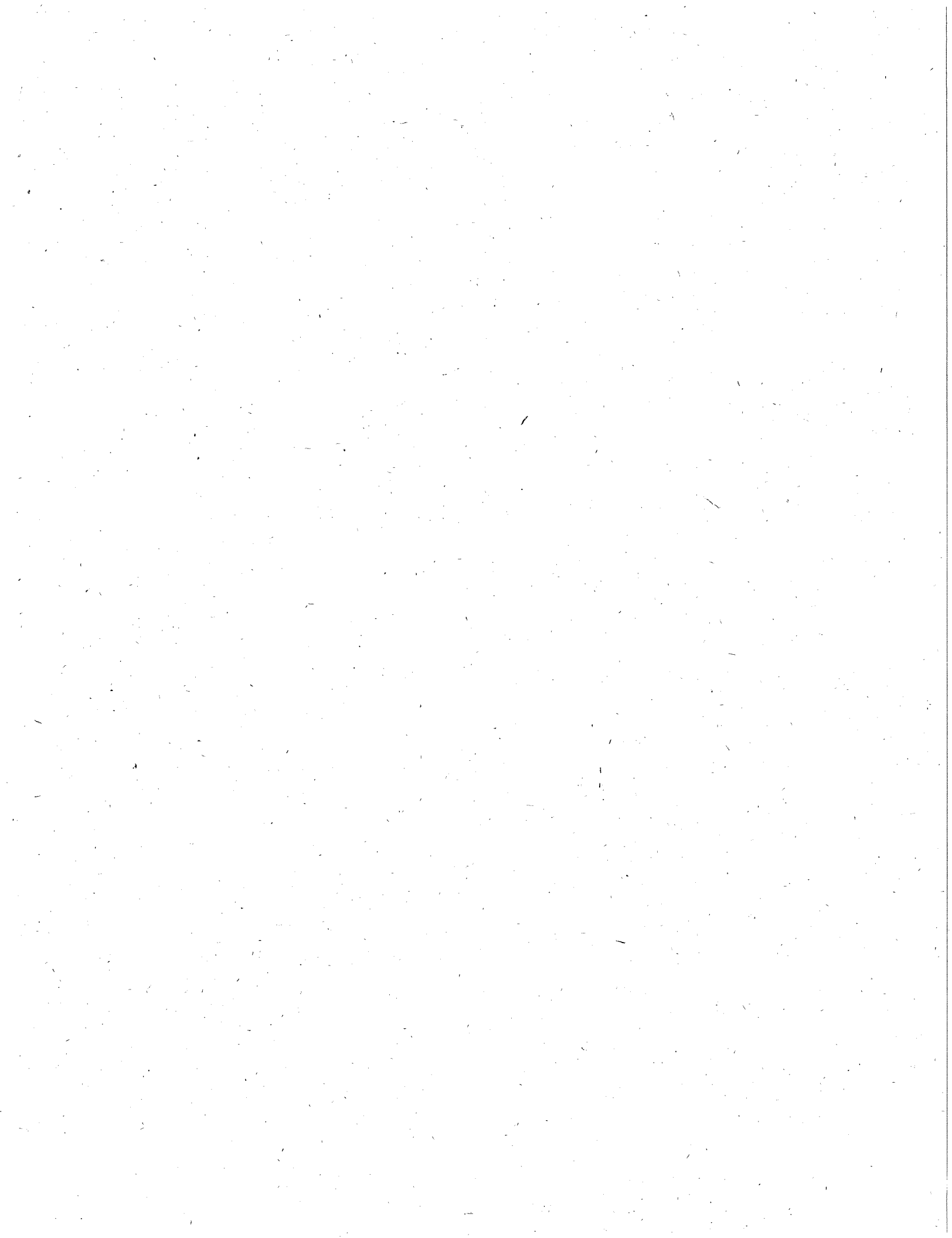
Nuclear Awareness News, "Tritium High in Pickering Grass", Winter, 1991/1992, p. 11

Nuclear Awareness News, "Radiation Double Standard", Fall, 1998

Rosenberg, Dorothy Goldin, "Double Standard: The Case of Tritium in Ontario" Connections 1:5 pp 4-5 (1995)

Spears, Tom, "Nuclear plant leaks puzzle scientists", Ottawa Citizen, Thurs. Feb. 28, 1991.







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