Prevention of Radon Exposure: Policy, Education and Awareness.

Preventing the Burden of Occupational Cancer in Canada

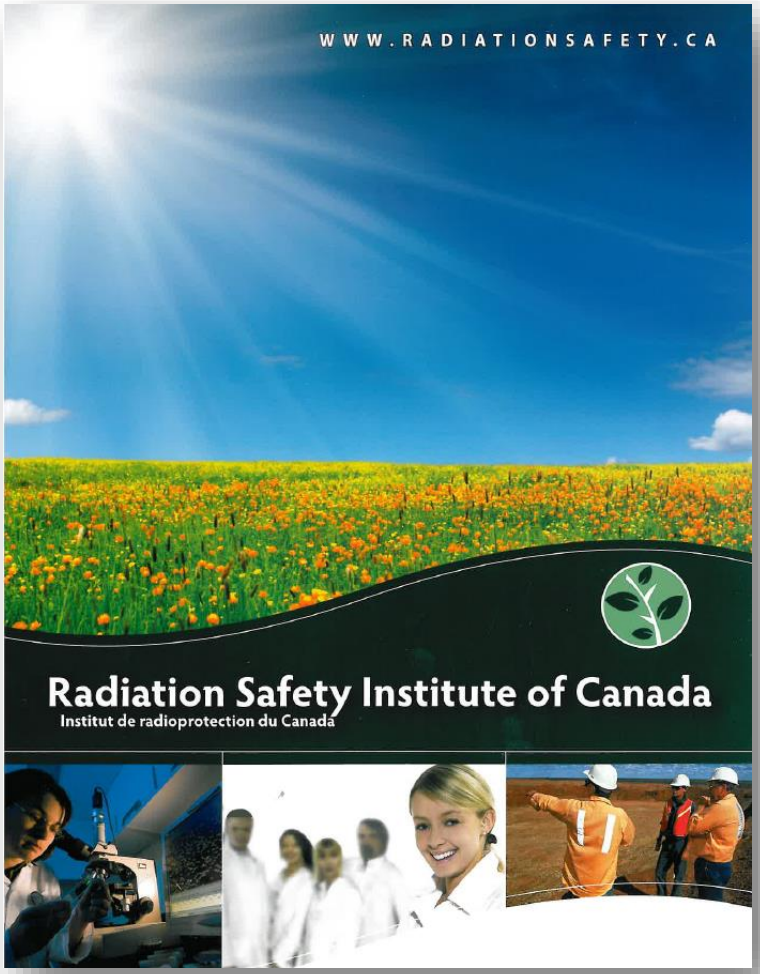
Radiation Safety Institute of Canada
Institut de radioprotection du Canada

Good Science in Plain Language®

Natalia Mozayani, RSIC Executive Director

Who We Are

- Independent
- Not-for-profit
- Sole concern is **radiation safety**
- “Good Science in Plain Language”®



RSIC's Radon Connection

1953	• Uranium. Discovered in Elliot Lake
1955	• Elliot Lake settlement established.
1955 to 1990	• Elliot Lake produces most of the world's uranium.
1974	• Elliot Lake miners go on strike over health and safety conditions and high incidence of lung cancer and silicosis.
1974	• The government appoints a Royal Commission to investigate health and safety in mines. • Chaired by Dr. James Ham.

Image by Selflearner1 via Wikimedia Commons

RSIC's Radon Connection

- Outcomes of the Ham Commission
  - More the 100 recommendations
    - Mine health and safety
    - Administration of health and safety
    - Creation of joint labour-management health and safety committees
  - 1976 Bill 139 establishes the Employee's Health and Safety Act.
  - 1978 Bill 70 establishes the Occupational Health and Safety Act.

RSIC's Radon Connection

The work conditions are best described in the words of the Commission findings:

- *"W*orkers have not known the levels of dust, radiation and noise in which they've been working (...).*The potential hazards in the enclosed spaces underground are many. (…) The regular processes of drilling, blasting, mucking, and crushing generate fine respirable mineral dusts which are potential causative agents in pneumoconiosis (literally 'lung-dust disease'). (…) The radioactive gases radon and thoron emanate from rock faces and arise from the elements uranium and thorium which are present in many rock formations, especially in uranium mines".*

Report of the Royal Commission on the Health and Safety of Workers in Mines – James M. Ham, Commissioner – June 30, 1976 – pages 10 and 11.

RSIC's Radon Connection

- Elliot Lake claimed at least 220 lives of otherwise healthy miners
- It is the single biggest case of deaths directly related to radon exposure in Canada

RSIC's Radon Connection

- July 11, 1980

  In the midst of the ensuing public controversy, and the perceived failure of the mining companies and federal and provincial regulatory authorities to protect the miners, the Radiation Safety Institute of Canada is founded.

Radon Exposure & RSIC "Burden of Proof"

1981 -1982

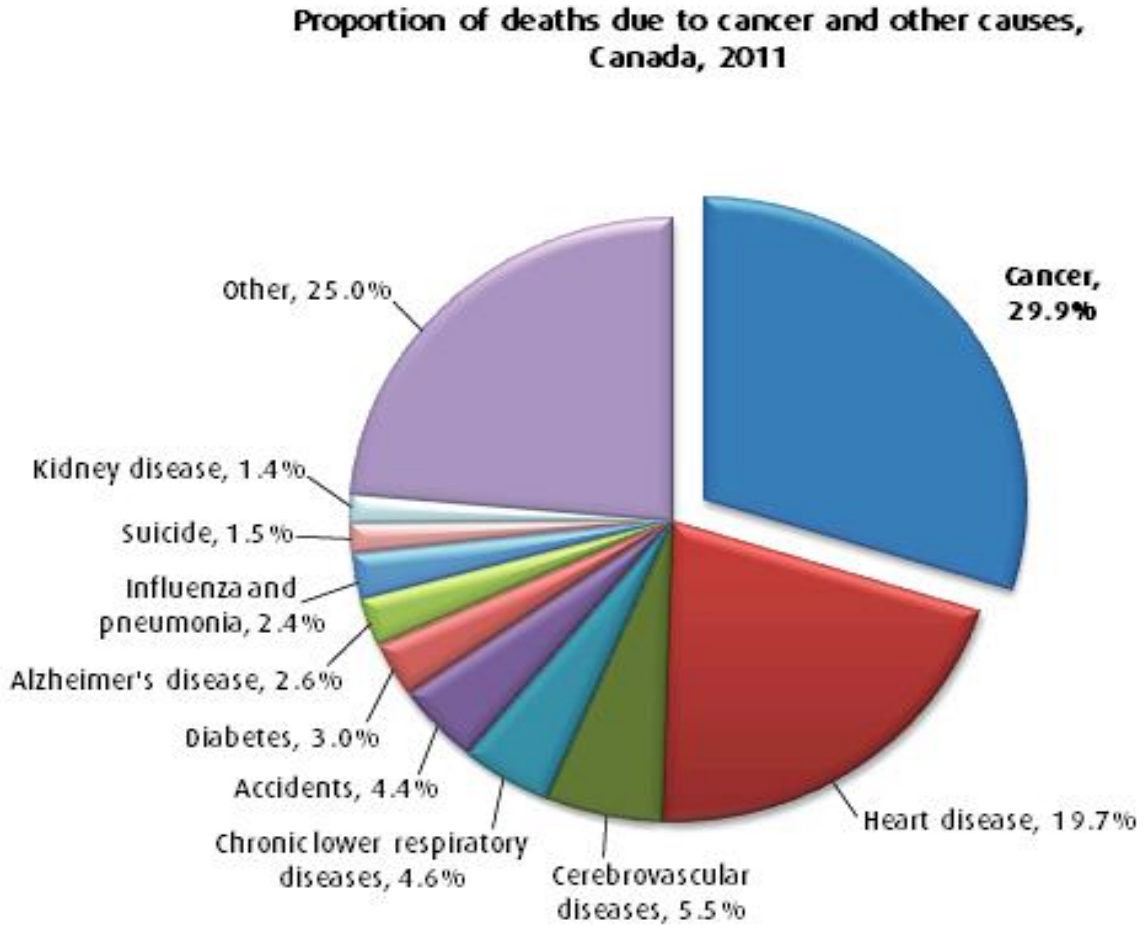
RSIC assumes responsibilities for the Elliot Lake Center radiation safety programs, among these:

- Early lung cancer screening program: sputum cytology + chest radiography program by March 1982 512 workers enrolled. Objective - catch cancer at early and potentially curative stage
- PAD (Personal Alpha Dosimetry) program initiated on experimental basis in Ontario and Saskatchewan

RSIC's Mandate From 80s to Today

PREVENTION

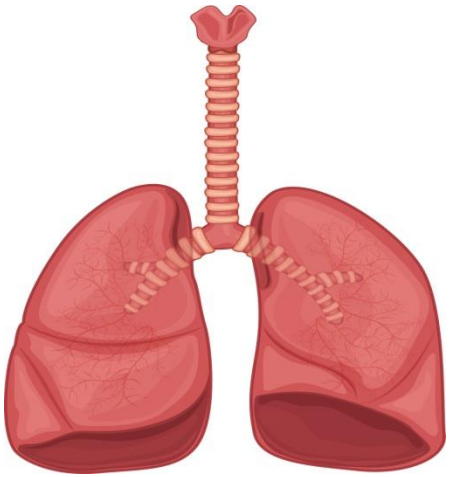
Radon Exposure and Lung Cancer Prevention



Note: The total of all deaths in 2011 in Canada was 242,074. **Adapted from:** Statistics Canada. Leading causes of deaths in Canada, 2011, CANSIM Table 102-0522, accessed on: //www.cancer.ca/en/cancer-information/cancer-101/cancer-statistics-at-a-glance/

Radon Exposure and Lung Cancer Prevention

Lung cancer is **#1 cause** of deaths due to cancer, in both men and women in Canada.



At 17%, the five year survival rate for lung cancer remains the lowest of all the major cancers

Radon Exposure and Lung Cancer Prevention

Radon = Known Carcinogen

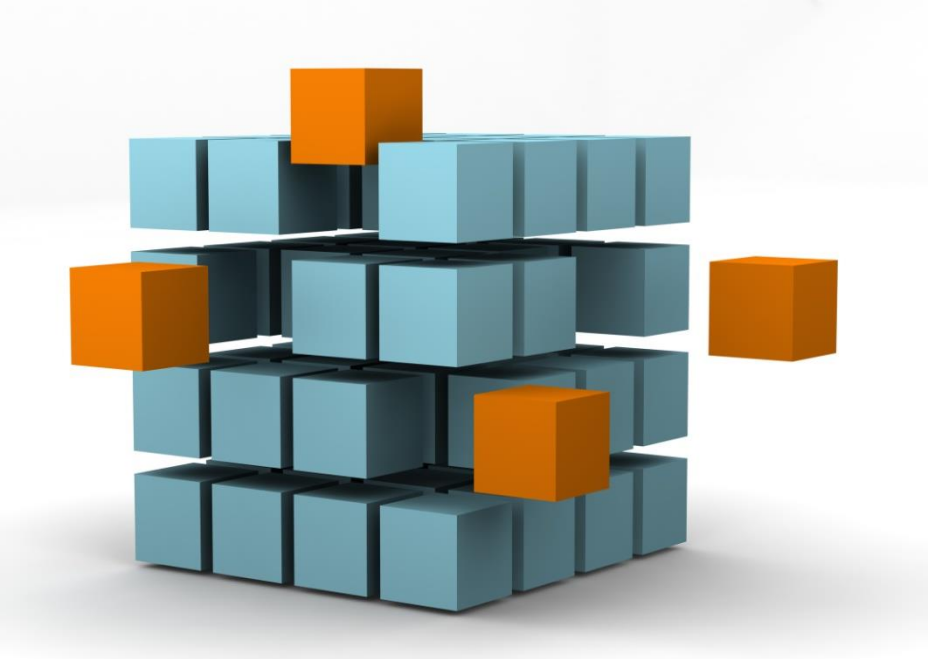
WHO exposure reference levels are lower than the current Canadian guidelines

Health Canada estimates 16 % of lung cancers are attributable to radon exposure

Radon: Canadian Policy and Law

- Canadian Radon Policy Landscape

- No central agency responsible for radon in Canada
- No nationally applicable regulation
- Considerable degree of differences between provinces
- Broad definitions & little case law



Radon: Canadian Policy and Law

Federal Guidelines

- Canadian Guidelines for Management of Naturally Occurring Radioactive Material (NORM)
- Government of Canada Radon Guideline (established by Health Canada based on guidance approved by FPTRPC)
- The National Building Code

Law

Federal:

- Canada Labour Code
- Nuclear Safety and Control Act and Regulations (for Uranium mines and mills)

Provincial

- Construction Code of Quebec
- Ontario Building Code
- Real Estate Legislation (AB, BC, MB, ON QC)
- Labour regulations " General Duty Clauses"

Radon: Canadian Policy and Law

Ontario: Regulations for Mines and Mining Plants

- Reg. 854, s. 290 (1) Every employer shall ensure that the airborne concentration of radon daughters to which workers may be exposed in an underground mine is reduced to the lowest practical level in accordance with good industrial hygiene practice. O. Reg. 583/91, s. 8.
- (2) An employer shall ensure that no worker who is continuously employed by the employer during a year inhales air which exposes the worker to more than one WLM. O. Reg. 583/91, s. 8
- The NORM guideline and the Canadian Centre for Occupational Health and Safety equate one WLM to 800 Bq/m^3.

Radon: Canadian Policy and Law

Ontario: Regulations for Mines and Mining Plants

- An employer is required to have the air tested for the presence of radon daughters by a competent person.
- The tests must be conducted at specific intervals depending on the operational status of the mine and measured levels.
- The employer is also required to keep a record of the results, give a copy to the joint health and safety committee or worker health and safety representative and post the results of all tests for the viewing of workers for at least fourteen days.

Radon: Canadian Policy and Law

The Ontario Building Code: Regulation 332/12 section 9.1.1.7 (Radon)

- (1) In addition to all other requirements, a building in the following designated areas shall be designed and constructed so that the annual average concentration of radon 222 does not exceed 200 Becquerel per cubic meter of air and the annual average concentration of the short lived daughters of radon 222 does not exceed 0.02 working levels inside the building:
- (a) The City of Elliot Lake in the Territorial District of Algoma,
- (b) The Township of Faraday in the County of Hastings, and
- (c) The geographic Township of Hyman in the Territorial District of Sudbury.

Radon: Canadian Policy and Law

NORM Guidelines /Ontario Application

- Canadian Naturally Occurring Radioactive Material (NORM) guidelines set occupational limits for exposure to radon in non-uranium mines.

- (Section 25(2)(h) of the OHSA, requires an employer to take every precaution reasonable in the circumstance to protect a worker.

- With respect to radon, the MOL's RPFS considers the NORM guideline to be the reasonable precaution in the circumstances.

Radon: Canadian Policy and Law

Exposure	Annual Dose	NORM Classification
< 200 Bq/m^3	1 mSv	Unrestricted
200 Bq/m^3 – 800 Bq/m^3	1 mSv – 5 mSv	Norm Management - Application of ALARA program which may include changes in work practice and changes to work procedures
>800 Bq/m^3	> 5 mSv	Radiation Protection Management -A Radiation Protection Management should be implemented (radiation protection program, dosimetry for workers, provide protective equipment). -The program should include steps to reduce the radon levels to below 800 Bq/m^3.
3000 Bq/m^3	20 mSv	Occupational exposure limit

Radon: Canadian Policy and Law

NORM Classification – Initial Assessment and Thresholds:

- If a workplace falls under the six prone industries and stores, handles or disposes of material containing NORM in excess of the diffuse or discrete limits in the guideline, or;
- Has a suspected incremental effective does rate in excess of 0.3 mSv annually

Radon Education and Awareness Building Initiatives as Prevention Tool

Radon: Canadian Policy and Law

Select Radon Initiatives

TAKE ACTION ON RADON

- 2007 review of the national radon reference level from 800 Bq/m3 to 200 Bq/m3
- National Radon Program: 2009-2010 Cross Canada Survey of Radon Concentrations in Homes: 14,000 homes tested, 7% above guideline
- 2007-2013 nearly 13,000 federal workplaces were tested for radon
- CARST
- C-NRPP Certification
- National Radon Campaign
- Bill 11 (Ontario)

Radon: Canadian Policy and Law

Ontario , Bill 11 . If passed would :

- enact the *Radon Awareness and Prevention Act, 2014* and amend the *Building Code Act, 1992* with respect to radon.
- provide for the establishment of the Ontario Radon Registry, and require radon measurement specialists and laboratories to provide the Registry with specified information.
- The Minister (Municipal affairs and Housing) would be required to educate the public about radon, and to encourage homeowners to measure the radon levels in their homes and take remedial action if necessary.
- The Minister would also be required to ensure that the radon level in every provincially owned dwelling is measured and that remedial action is taken, if necessary. Similarly, owners of enclosed workplaces are required to ensure that the radon level in an enclosed workplace is measured and that remedial action is taken, if necessary.
- The *Building Code Act, 1992* would be amended to provide authority for regulations that require dwellings to be constructed in a way that minimizes radon entry and facilitates post-construction radon removal.

Radon: Canadian Policy and Law

Recommendations on Way Forward:

- Data sharing
- Harmonization of reference level across jurisdictions
- Tax credits for remediation
- All provinces to enact home warranty legislations
- Provinces and territories to strengthen enforcement language
- Amend real estate regulations to include radon disclosures

For a More Detailed Policy Review:

Canadian Environmental Law Association
EQUITY. JUSTICE. HEALTH.

Radon in Indoor Air:
A Review of Policy and Law in Canada

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"Good science in plain language"®

Thank you for listening!

Radiation Safety Institute of Canada