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

## **Executive Summary and Table of Contents**

**(full report with appendices is available at [www.cela.ca](http://www.cela.ca))**

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## Executive Summary

This report surveys radon testing and remediation requirements and responsibilities across Canada at the federal, provincial and municipal levels of government. The focus is primarily, but not exclusively, on legal requirements relevant to public buildings, and on national and provincial/territorial building codes, although many other laws are also discussed. Legal analysis is provided in relation to government responsibilities to test and remediate public buildings, the municipal government role in the permitting of new or substantially renovated buildings, and governmental duty to disclose information with respect to radon test results to building occupants. Research for this report included a cross-Canada review of regulatory requirements in relation to radon protection, including existing legislation and regulations at the federal and provincial/territorial levels, as well as a survey of common law theories of liability potentially applicable to situations where a plaintiff is injured by exposure to radon. As such, only a brief examination is provided of law reform possibilities and policy/programmatic opportunities under existing legislation.

Overall conclusions from this review indicate the following:

### Evidence for Concern and the Public Response

- Strong scientific evidence demonstrates that radon-induced lung cancer is a significant public health risk, with children at greater risk than adults (as is often the case with exposure to toxic substances/radiation).
- Colourless and odourless, radon arises from the natural breakdown of uranium in the earth. It is an *indoor* pollutant. Radon can infiltrate the built environment, our homes, schools, workplaces, etc., where people spend over 80% of their time. Radon can only be detected via testing.
- Longstanding recognition of radon as a public health concern internationally, and in Canada, has led to the establishment of guidelines for levels of radon in indoor air. The current Radon Guideline reference level of 200 Becquerels per cubic metre (Bq/m<sup>3</sup>), established by Health Canada, is 4-fold lower than a previous guideline reference level of 800 Bq/m<sup>3</sup> but still higher than the guidelines set by the World Health Organization (100 Bq/m<sup>3</sup>) and in the United States (4 pCi/L, equivalent to about 148 Bq/m<sup>3</sup>).
- Health Canada's surveys of indoor radon levels in federally owned or operated buildings and of private homes across Canada indicate certain geographic areas in Canada of particular concern, (parts of Manitoba, New Brunswick, Saskatchewan, and the Yukon), but also that high radon levels may be present anywhere and therefore that all buildings should be tested.
- There is a lack of public concern about radon health risks, perhaps due to radon being impossible to detect without testing and that it is an indoor pollution source that arises from natural sources.

- Important efforts continue nationwide in government- and NGO-sponsored programs to retrofit buildings to achieve greater energy efficiency but they rarely consider the need to test for, and if necessary mitigate, elevated radon levels that are known to result from tightening the building envelope. Alongside the general lack of public awareness about radon, risk created by energy retrofits is another aspect of this issue that is often overlooked.

### **Divided and Overlapping Jurisdiction in Law and Policy Across Canada**

- Numerous pieces of legislation are administered under the purview of several government ministries, departments, and agencies at all three levels of government in Canada that are potentially applicable to the regulation of indoor air and radon.
- No lead agency is responsible for the regulation of indoor air, or for radon specifically, and a high degree of fragmentation and inconsistency exists within and across each province/territory and across Canada.
- Where explicit radon protection is encoded in law, it is generally captured by provincial/territorial building codes and, at the federal level, in the *Canada Labour Code* (thus, applicable only to federal government workplaces). Given the predominant role of provincial/territorial governments, requirements tend to differ across the country.
- The Federal-Provincial-Territorial Radiation Protection Committee has yet to entirely fulfill its stated mandate as an intergovernmental Committee to “advance the development and harmonization of practices and standards for radiation protection across jurisdictions, and to communicate these to the people of Canada.”
- Municipal governments can also play a role in the implementation of radon protective measures within key areas of local jurisdiction such as bylaw-making powers governing property maintenance standards, building standards, permits and inspections, and other areas where they are empowered to issue orders necessary to direct compliance with applicable provincial/territorial laws. Consequently, the interpretation and application of radon protection can vary significantly from region to region and municipality to municipality.

### **The National Radon Program and Radon Testing**

- The federal government has provided important leadership in addressing radon risks under the National Radon Program including:
  - establishing a Radon Guideline with recommendations for radon prevention in new buildings, guidance on when to remediate, and revising, in 2007, the “reference level” for radon, (previously set at 800 Bq/m<sup>3</sup>), to 200 Bq/m<sup>3</sup>;
  - extensive radon testing in federal buildings and in homes via a cross-Canada survey;
  - updating, through the work of the National Research Council, radon protection measures in the National Building Code (NBC 2010);
  - researching radon testing and mitigation techniques;

- developing a Canadian certification program for radon mitigation professionals; and
  - conducting education and awareness programs repeatedly advising Canadians that all homes should be tested for radon.
- Health Canada entered into data sharing agreements with provinces/territories in advance of conducting the cross-Canada radon survey, but has no legal mandate to require provinces/territories to share radon survey data with each other or with the federal government. Likewise, test results for radon in public buildings by government agencies are not compiled centrally, that is, for all of Canada, although several provinces/territories have done so within their own jurisdictions and provided access on-line to radon risk maps. These survey results generally do not include radon tests conducted in private homes.
  - The federal government has made Memorandum of Agreement transfers to provinces/territories to fund pilot projects and research related to radon protection but has not provided any formal programs to support/fund provincial/territorial radon protection programs/policies.
  - In a pilot project of radon testing in several child care centres in Winnipeg participants had limited previous knowledge about radon, agreed with the importance of making information available to the child care sector and families, and felt that, given their many other responsibilities, radon testing would be unlikely to occur unless it was mandatory.
  - Notably, some US states have developed legislation and supplementary guidelines requiring radon test results be reported to the government, as well as mandatory testing and notification requirements in tenanted buildings, and public schools. Likewise, some states required licensed childcare facilities to test for radon in indoor air, as well as requirements that public notices be posted by building owners to inform building users of radon test results.

### **Application and Enforceability of the Federal Radon Guideline**

- As an advisory statement only, the federal Radon Guideline provides a reference level at which Health Canada recommends that Canadians take action to remediate radon levels in indoor air, but absent provincial legislative provisions, no federal requirements exist for mandatory action (for testing, disclosure of test results, or remediation) regardless of the radon level. Compliance is voluntary, and responsibility for testing, remediation, and associated costs, rests with the property owner.
- At the federal level, all three of the Radon Guideline, the NBC 2010, and the Naturally Occurring Radioactive Materials (NORM) Guidelines (discussed further below) are advisory. To become law, they must be adopted by a provincial/territorial government.
- Overall, there is no legal requirement of general application in any piece of Canadian legislation/regulation that requires: testing of radon in indoor air, remediation where a

high radon level is found, or disclosure of test results. The only exception is the Construction Code of Quebec that requires radon testing during construction and mitigation (if indoor radon is above 800 Bq/m<sup>3</sup>), as well as disclosure of test results, and only in certain locations where soil gas presents a danger. As well, the federal Radon Guideline reference level of 200 Bq/m<sup>3</sup> is encoded in law only in the Ontario Building Code and only for three specific high-radon regions of the province.

- The only other instance where there is a legal requirement that radon in indoor air be maintained below a set reference level is in federal workplaces subject to the *Canada Labour Code* (applicable to federal employees only). However, the action level in regulations under the *Canada Labour Code* is 800 Bq/m<sup>3</sup> (i.e., four times higher than the reference level in the federal Radon Guideline). Until these action levels are harmonized (anticipated during 2015), the benchmark provided as a reference or rationale for mandatory mitigation measures in federal workplaces would be the higher level of 800 Bq/m<sup>3</sup> contained under the general duty clause in the Canada Occupational Health and Safety Regulations (passed under the *Canada Labour Code*).

### **Health Care Savings; and a Proposed Tax Credit for Radon Remediation Costs**

- If the approximately 7% of homes in Canada with radon levels above the federal Radon Guideline reference level of 200 Bq/m<sup>3</sup> were remediated, savings in health care costs due to prevented lung cancer deaths could be in the range of \$18 million per year. These savings, and the number of radon-induced lung cancers, would likely be more than double this amount if the federal reference level were lowered to 100 Bq/m<sup>3</sup>, the level recommended by the World Health Organization.
- Following on the federal government's leadership on radon research, testing, certification of radon mitigation professionals, and public outreach, a logical next step would be an income tax credit to help homeowners offset mitigation costs. Such a move would help send a strong signal to Canadians to take this issue more seriously than seems currently to be the case and increase public uptake of the message about the need to test for radon.

### **Provincial Law and Policy**

- Areas of legislation relevant, or potentially relevant, to radon protection in public buildings include those governing: construction via building codes; occupational health and safety; occupier's liability; real estate transactions; education; the environment; public health; and tenanted properties.
- *Notwithstanding the discussion and recommendations contained herein, it is important to note that the review of laws and policy in this report is current to June of 2014. This review occurred while considerable forward momentum is ongoing at the provincial/territorial level to revise building codes in light of amendments to the National Building Code enacted in 2010 (and further revisions and errata to NBC, 2010 that took effect during 2012) including many provisions and Appendix Notes related to radon.*

### ***Building and Labour Codes***

- While most provincial/territorial building codes have been, or are being, revised to incorporate radon protection provisions of the NBC, 2010, (see Appendices 1 and 2, and summary in Table 1 in Section 4.1) the “reference level” in the federal Radon Guideline of 200 Bq/m<sup>3</sup> is incorporated into the Building Code of Ontario only, and only for designated areas of the province.
- Hence, in only three instances the law requires that radon in indoor air be maintained below a set reference level. These are limited to:
  - (As noted above) in federal workplaces subject to the *Canada Labour Code* (applicable to federal employees only, and where the reference level for radon is currently set at 800 Bq/m<sup>3</sup> though this level is expected to be lowered to 200 Bq/m<sup>3</sup> in 2015);
  - Three designated regions in Ontario (the City of Elliot Lake in the Territorial District of Algoma, the Township of Faraday in the County of Hastings, and the geographic Township of Hyman in the Territorial District of Sudbury) wherein the federal Radon Guideline reference level of 200 Bq/m<sup>3</sup> is mandatory for design and construction activities subject to the Ontario Building Code; and
  - The Quebec Construction Code, requiring the installation of a subfloor depressurization system, in locations where soil gas presents a danger, if radon test results are above 800 Bq/m<sup>3</sup>.
- For employment settings to which the NORM (Naturally Occurring Radioactive Materials) Guidelines apply, there is considerable uncertainty concerning applicability to workplaces not engaged in activities itemized in the NORM Guidelines. In addition to these itemized workplaces, the NORM Guidelines apply to workplaces in any building where radon can infiltrate, regardless of what occupation may be occurring within. However, occupational health and safety inspectors receive few to no complaints about indoor radon and subsequently take little to no enforcement action. Thus, case law does not provide much guidance, and interpretations of the legal responsibilities (regarding inspection, enforcement and what standard to apply) across provinces/territories is not uniform. In the research for this report some provincial/territorial compliance offices indicated that they apply the NORM Guidelines while others went so far as to say that radon in indoor air is not an occupational health and safety issue and that any enforcement of radon in indoor air would be an exception as there is no agreed upon level other than regulations for radiation workers. This variability in enforcement within the occupational health and safety context does not provide for consistent worker protection. Moreover, it is conceivable that some workers could be over-exposed to radon in both the workplace and their homes if high radon levels existed in both of these indoor spaces.

### ***Limited Case law***

- Aside from evolving provisions in Building Codes and the *Canada Labour Code* regulations discussed above, no provincial/territorial laws have been specifically drafted to regulate radon in indoor air. Nor have any provincial/territorial laws been considered and deemed applicable to radon by the courts. Rather, this research found little to no relevant case law as few radon complaints are made and there is a lack of clarity

concerning what specific legislation requires with respect to radon. However, general provisions in provincial statutes may be relevant. Such provisions may relate to building/indoor safety and maintenance and are commonly included in legislation related to public health, occupational health and safety, education, occupier's liability, and tenant protection. For example, buildings are generally required to be kept free of health hazards under public health legislation, and rental properties are required to be maintained in a state that is "habitable" under tenancy legislation.

- Likewise, the review of case law under provincial/territorial statutes confirmed what would generally be expected, that is, where there are not strong powers in the law, there is unlikely to be strong case law. Rather, in looking at these various provincial/territorial statutes, if there was ambiguity in the law, the research addressed how these areas had been dealt with in the courts. For example, gaps were found in the law in terms of clarity of scope for the powers of health inspectors and occupational health and safety inspectors. This gap was mirrored by interviewing provincial/territorial officials across the country where considerable variance was evident as to what they considered to be included within their duties and responsibilities with respect to radon. With very little reference to radon in indoor air, or even to indoor air alone, in either the statutes or related case law, the subjects chosen during the case law research were situations (either in the statute law or the common law) where indoor air was the subject of duties to inspect or where such duties would potentially be applicable.

### ***Public Health Legislation***

- Provincial/territorial public health legislation is generally quite broad, potentially allowing for its application to radon in indoor air. In addition to providing public health officials with powers to deliver public education, collect data, and carry out research, provincial/territorial public health legislation typically also includes provisions for inspection and enforcement with respect to hazards to public health, some of which may be relevant to the protection of public health from problems with indoor air quality.
- Public health officials recognize the health risks associated with radon in indoor air to be as important as exposure to mould, and the science supporting action on radon to be strong. Yet, the public lack awareness of the risks, and as radon is not identifiable by the senses, public health receives few to no complaints about indoor radon and subsequently takes little to no enforcement action. The opinion, by public health officials on the role and powers of public health units to carry out an inspection based on a complaint about indoor radon, to test for radon on inspection, or order testing or remediation, is variable within and across provinces/territories. Due to the low number of complaints received, health units are rarely faced with the need to take enforcement action on radon in indoor air. As such there is lack of clarity among these officials on what suffices as a rationale to initiate an inspection (e.g., does a building's being located in a radon-high area suffice or are high test results necessary?). Similarly, there is lack of clarity on what the limits of their powers are in terms of requiring long-term radon testing upon inspection, and what standard to enforce. Case law does not provide much guidance, nor interpretations of these legal responsibilities.

- While radon in private homes tends to be treated as an owner/occupier problem, public health authorities can play a role in tenanted and public buildings. But for limited circumstances where provincial adoption has occurred, the Radon Guideline and its reference level of 200 Bq/m<sup>3</sup> do not have the force of law. It can however be referenced by public health authorities when assessing complaints, and could be enforced at the discretion of a Public Health Inspector.

### ***Education Legislation***

- Provincial/territorial education legislation in the provinces and territories tends not to include provisions relating specifically to indoor air quality or radon, but generally incorporates provisions relating to the health, safety, and welfare of students. These statutes usually impose responsibilities on school boards and their employees to supervise pupils, ensure cleanliness, provide ventilation, inspect equipment, and undertake related obligations.

### ***Occupiers' Liability Legislation***

- Provincial/territorial occupiers' liability legislation imposes a duty of care on the occupier of property for the safety of those making use of their property and buildings. Where such statutes exist, they stipulate the required standard of care. Most such legislation has framed the statutory duty on occupiers quite generally (i.e., a duty to take reasonable care to make the premises safe.) Several provinces in Canada have enacted occupiers' liability legislation (including: Alberta, British Columbia, Manitoba, Nova Scotia, Ontario and Prince Edward Island). In Quebec, occupiers' liability is codified in the Civil Code. The common law is in effect in provinces and territories that have not enacted such legislation. Under the common law, occupiers of premises have an affirmative, non-delegable duty of care to invitees onto their property.

### ***Real Estate Legislation***

- The testing of private homes for radon is currently not required during real estate transactions in Canada. Some provinces have property disclosure statements annexed to prescribed forms under real estate legislation/regulations which provide the option of including, as part of the real estate transaction, the disclosure of the seller's actual knowledge with respect to the condition of the property. In some cases property disclosure statements include disclosure with respect to the presence of radon gas. Regardless of whether a property disclosure statement is completed in the course of the real estate transaction, failure to disclose actual knowledge by the seller may constitute a common law breach of an implied warranty. Most standard form real estate terms exclude any implied warranties by express provision in the agreement. However, in Canada, several provinces and territories (including Alberta, British Columbia, Manitoba, Ontario, and Quebec) have enacted home warranty legislation to provide consumer protection for the purchasers of new homes. Under such legislation new homes are statutorily deemed to come with implied warranties of habitability and many include good workmanship and construction in accordance with applicable law.

### ***Tenancy Legislation***

- In terms of landlord duties, most provincial/territorial legislation requires that property owners keep residential rental properties in a state that is "habitable" - safe and fit for people to live in. Depending on the statutory language within each piece of provincial/territorial legislation, and the related case law, it may be sufficient to capture the need for remediation if radon levels test high.

### ***Municipal Powers***

- Finally, within the range of provincial/territorial statutes reviewed herein, municipal governments can also play a role in the implementation of radon protective measures within key areas of local jurisdiction such as bylaw-making powers governing property maintenance standards, building standards, permits and inspections, and other areas where they are empowered to issue orders necessary to direct compliance with applicable provincial/territorial laws.

## **Common Law Theories of Liability**

Statutory requirements aside, liability for the failure to test, remediate or disclose test results relating to indoor radon may arise under the common law either in tort law or contract law. These opportunities for redress are detailed under Section 6, below. Under tort law, there are three possible theories of liability potentially applicable to situations where a plaintiff is injured by exposure to radon in public buildings: (i) negligence, (ii) products liability, and (iii) fraud and misrepresentation. Under contract law, there are several kinds of assurances (or ‘warranties’) that are inherent in real estate transactions. These may be either express, or implied. Of particular relevance to the case of radon in indoor air is the implied warranty of habitability.

## **Consolidated List of Recommendations**

Recommendation 1: Ensure consistent messaging about radon across all government and non-governmental outreach materials and reintroduce language such as “radioactivity” and “radiation” to describe radon risks, thus using more commonly understood terminology about a radiation-related cancer risk.

Recommendation 2: Across all government-, utility-, and NGO-sponsored programs advancing and/or delivering energy efficiency retrofit programs, incorporate information about the need to test for radon and related information about radon remediation.

Recommendation 3: Federal and provincial/territorial governments should implement comprehensive data sharing arrangements and establish public registries to make radon test results, and related risk mapping, publicly available. Such registries should include the ability to add results from tests conducted in schools, child care centres and other institutional settings, as well as tenanted buildings, pending passage of provincial and territorial law making the submission of such test results mandatory. Pending the establishment of data sharing arrangements and public registries of this information, requests under provincial/territorial

freedom of information legislation could be made to determine what testing has been done, and what follow-up occurred.

Recommendation 4: Lower the federal Radon Guideline reference level to 100 Bq/m<sup>3</sup> in line with recommendations made by the World Health Organization.

Recommendation 5: The federal government should amend the *Income Tax Act* to add a tax credit of up to \$3000 available to individual Canadians for radon mitigation by experts certified by the Canadian National Radon Proficiency Program where a three-month test indicates an indoor radon level above the Canadian Radon Guideline reference level of 200 Bq/m<sup>3</sup>.

Recommendation 6: All provincial/territorial governments should ensure that radon protection and mitigation provisions in their respective Building Codes are updated in accordance with the NBC, 2010. These amendments to provincial/territorial building codes should also specifically include the federal Radon Guideline reference level (currently set at 200 Bq/m<sup>3</sup>) for all new construction and major renovations, i.e., in both public and private settings, such that design and construction be required to maintain the average annual indoor radon concentrations below the reference level. These amendments should also require radon testing during construction, and mitigation if the reference level is exceeded, with mandatory public notice of tests results before and after mitigation.

Recommendation 7: Ensure swift passage of revisions to regulations under the *Canada Labour Code* to harmonize the radon action level for federal workplaces with the federal Radon Guideline reference level of 200 Bq/m<sup>3</sup>.

Recommendation 8: All provincial/territorial governments should ensure that the NORM Guidelines are clearly applied to workplaces within their jurisdictions, including workplaces engaged in non-NORM activities, given the fact that radon can infiltrate any building regardless of what occupation may be occurring within.

Recommendation 9: The Federal-Provincial-Territorial Radiation Protection Committee, towards fulfilling its stated mandate to “advance the development and harmonization of practices and standards for radiation protection across jurisdictions...,” should convene a task force of public health and occupational health and safety inspectors from across Canada to investigate and clarify duties and responsibilities for inspecting indoor environments for radon, addressing mitigation when necessary, and public reporting of test results. Multi-stakeholder consultation should support this effort including seeking two-way information flow among organizations such as the Canadian Institute of Public Health Inspectors, the National Research Council of Canada, the Canadian National Radon Proficiency Program, the Canadian Centre for Occupational Health and Safety, the Canadian Labour Congress, CAREX Canada, the Canadian Real Estate Association, etc.

Recommendation 10: Provincial/territorial legislation and supplementary guidance governing public health, occupational health and safety, residential tenancies, education, and occupiers’ liability should be amended to address indoor air quality and radon protection, including referencing the federal Radon Guideline reference level, and placing duties on school boards,

licensed child care facilities, landlords, employers, building owners, etc. to ensure adequate indoor air quality, mandatory radon testing, radon mitigation if necessary to achieve indoor radon levels below the federal Radon Guideline reference level, and mandatory public notification of test results and mitigation strategies.

Recommendation 11: Provinces and territories should enact home warranty legislation such that new homes are statutorily deemed to come with implied warranties of habitability which include good workmanship and design and construction practices, and reference indoor air quality standards and incorporate specific reference to soil gas ingress and radon.

Recommendation 12: Provinces and territories should add legislative language providing enforcement branches of public health units, and occupational health and safety branches, with the power to deploy a long term radon test upon inspection, and require remediation if radon test results are above 200 Bq/m<sup>3</sup>.

Recommendation 13: Include property disclosure statements as annexes to prescribed forms under real estate legislation/regulations providing that sellers will disclose whether there is a known presence of radon in their homes before signing an agreement to sell or transfer real property. The property disclosure statements should include explicit reference to the disclosure of the seller's actual knowledge with respect to radon gas.

Recommendation 14: CAREX Canada or a similar agency, in conjunction with the Canadian National Radon Proficiency Program, should conduct research, using dosimetry monitoring, to investigate radon exposure among workers conducting radon mitigation and make recommendations, as necessary, to prevent hazardous exposure in these occupations.

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