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

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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 ($Bq/m^{3)}$, established by Health Canada, is 4-fold lower than a previous guideline reference level of 800 Bq/m^3 but still higher than the guidelines set by the World Health Organization (100 Bq/m^3) and in the United States (4 pCi/L, equivalent to about 148 Bq/m^3).

- 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 issues 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^3), to 200 Bq/m^3;
    - 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^3), 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^3 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^3 (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^3 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^3 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^3, 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^3 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^3 though this level is expected to be lowered to 200 Bq/m^3 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^3 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^3.

- 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^3 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^3 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^3.

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^3) 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^3.

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^3.

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.

1.0 Introduction and Scope

This report provides a survey of radon testing and remediation requirements across Canada at the federal, provincial and municipal levels of government. The policy and legal framework for radon in indoor air is reviewed through a survey of existing guidance and/or legal requirements and a discussion of roles and responsibilities for each level of government.

Responsibilities of government are discussed with respect to radon testing, remediation, and disclosure of test results with a focus on legal requirements relevant to public buildings. The role of municipal governments is addressed mainly with respect to the approvals process for the construction of new buildings in high radon areas, and a brief review of other mechanisms to implement radon protection measures at the municipal level.

Throughout, with respect to public buildings, government roles have been considered as one or more of: a property owner, a statutory body or regulator, an employer, or a service provider (in the latter case a government may be either the property owner or the provider of services to the public in a rental property).

While occupational exposure to radon in public buildings is discussed, an examination of occupational exposures to radiation, that is, radiation exposure as part of the nuclear fuel cycle, was beyond the scope of this review. Likewise, the research conducted for this report focused mainly on canvassing the legal framework and existing enactments, including reviewing common law theories of liability. As such, only a brief examination is provided of law reform possibilities and policy/programmatic opportunities under existing legislation; and nor does this policy-level review address in any detail the guidance or standards related to specific details for conducting radon mitigation.

The report is organized into seven sections and three appendices. Sections 1 and 2 provide overall context summarizing what is known about radon sources and exposure pathways, health concerns, and the jurisdictional framework encompassing governmental roles and responsibility for radon across Canada. Sections 3, 4, and 5 describe these roles and responsibilities at the federal, provincial and municipal levels of government respectively. Section 6 provides a discussion of potentially applicable common law theories of liability under contract and tort law. Section 7 notes conclusions and recommendations.

In the first two appendices, summaries and/or excerpts are provided of the law and policies reviewed herein. Appendix 1 captures the range of federal and provincial/territorial guidance and laws discussed. Appendix 2 provides further detail with respect to radon provisions in the National Building Code, 2010 as well as a summary of the regulation of construction in the provinces and territories. The content from laws and policies excerpted in both of these appendices is current to June of 2014. Finally, a third appendix provides two case studies to illustrate issues that might arise at the local level for public health officials addressing radon risks.

2.0 Introductory Context: Sources, Health Concerns, Jurisdictional Roles and Responsibilities

2.1 Radon Sources and Exposure Pathways

Radon[1] is a naturally occurring radioactive gas produced by the decay of uranium in soil and rock in the earth's surface. Airborne radon can attach to suspended particulate matter, enter the lungs through inhalation, and upon further breakdown emit alpha particles that damage lung tissues.[2] Invisible, odourless and tasteless, radon can only be detected by testing.

In Canada, units of measure for radon in indoor air are reported in Becquerels per cubic metre (Bq/m^3) whereas the measurement unit more commonly used in the United States is picocuries per liter (pCi/L).

Radon gas moves freely though soil. When it escapes from the ground into the atmosphere it is diluted and is considered a negligible health risk. When it enters buildings that have confined or poorly ventilated spaces, radon can accumulate to levels considered a health risk. Radon can enter buildings through dirt floors, or cracks and crevices in walls, floors, or around pipes.

Heavier than air, radon tends to accumulate in the lower levels of buildings. Recent surveys by the federal government have confirmed that while radon is ubiquitous in the environment, its concentration levels are not uniform across the country.[3] However, average radon concentration levels (based on geological data) are not necessarily indicative of indoor radon levels.[4] Radon levels in indoor air vary depending on geology (i.e., the amount of uranium in the ground), available entry points into the building, ventilation systems, and whether there is negative air pressure in the building's envelope. Radon levels differ significantly from house to house. As such, it is not possible to rely on test results from neighbourhood averages.

There is emerging awareness about the ability for indoor radon levels to increase due to energy efficiency retrofitting if radon awareness is lacking. When well-executed, energy retrofits can improve ventilation, reduce environmental contaminants, and create a healthier indoor environment.[5] However, radon levels increase when homes are made more air-tight. A recent British study found increased radon levels following energy retrofits and noted that population-wide lung cancer risk would increase significantly unless radon-specific remediation was

[1] Radon-222, the most stable isotope of radon.
[2] Health Canada website, Environmental and Workplace Health, "What are the Health Effects of Radon?": http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/effects-effets-eng.php
[3] "Canadian Association of Radon Scientists and Technologists, "Radon Potential Map of Canada" (2014) online: http://www.carst.ca/en/maps.html
[4] Health Canada, "Cross-Canada Survey of Radon Concentrations in Homes, Final Report" ((March 2012) ISBN: 978-1-100-20115-3, online: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/pdf/radiation/radon/survey-sondage-eng.pdf.
[5] Canadian Environmental Law Association, "Healthy Retrofits: The Case for Better Integration of Children's Environmental Health Protection into Energy Efficiency Programs" (March 2011), online: http://www.cela.ca/sites/cela.ca/files/CELA773-Healthy-Retrofits-report.pdf

incorporated into efforts to achieve greater energy efficiency of dwellings.[6] Likewise, in the US, commentators have raised concerns about federal funding for low income weatherization programs that don't also extend to covering the costs of radon mitigation if tightening the building envelope results in elevated radon levels.[7] Tests were conducted in 2011 by the US Department of Energy to determine radon levels pre- and post-weatherization in homes included in the federal Weatherization Assistance Program (for low income homeowners). Despite repeated statements that these results would be released in January of 2012, then the fall of 2013, then in March of 2014, they have yet to be released (as of October, 2014), raising concern about whether high radon levels were found in the face of no budget to pay for mitigation.[8] Similarly in Ontario, among numerous laudable programs to address weatherization, including for low income residents, recognition of this problem is almost non-existent.[9] Recent guidance concerning healthy housing published in the US does address radon concerns, as discussed further in Section 3.2 below.

In 2009 and 2010, Health Canada conducted a cross-Canada survey of 14,000 homes which found that there are no areas within Canada that can be said to be 'radon-free'.[10] Results also showed that:

- About 7% of homes in Canada have radon levels above the federal Radon Guideline reference level of 200 Bq/m^3.
- Radon levels vary quite significantly across the country.
- It is impossible to predict whether any one house will have a high level of radon.[11]

2.2 A Known Carcinogen

The International Agency for Research on Cancer (IARC) classifies radon as a known cause of cancer.[12] Strong scientific evidence indicates that as the second leading cause of lung cancer

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[6] Milner, J., C. Shrubsole, P. Das, B. Jones, I. Ridley, Z. Chalabi, I. Hamilton, B. Armstrong, M. Davies, and P. Wilkinson. 2014. "Home Energy Efficiency and Radon Related Risk of Lung Cancer: Modelling Study." *BMJ* 348 (jan09 1): f7493–f7493. doi:10.1136/bmj.f7493.

[7] Melton, P. "Pushing Weatherization Feds Look the Other Way on Radon" *Environmental Building News* 23(3), March 2014, online: http://www2.buildinggreen.com/article/pushing-weatherization-feds-look-other-way-radon

[8] *Ibid.*

[9] A search for "radon" on the websites of the following government departments, energy companies, and organizations with energy conservation programs yields zero results: Ontario Ministry of Energy, Ontario Ministry of Environment (other than broader government search engine links to Bill 11, see section 4.1 herein), Enbridge, Union Gas, Ontario Power Authority, SaveONenergy, GreenSaver, and Green Communities Canada. In addition, there is no reference to radon in a key federal government guidance document produced by Natural Resources Canada called "Keeping the Heat In" that served as the principal guidance document for energy efficiency work conducted under the now-terminated EcoEnergy Retrofit for Homes Program during 2007-2011. See Natural Resources Canada, "Keeping the Heat In" Ottawa, 2010, on-line: http://www.nrcan.gc.ca/energy/efficiency/housing/home-improvements/15768

[10] Health Canada, 2012. *Supra* note 4.

[11] Government of Canada, Health Canada website, "Healthy Living: Radon", online: http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/radon-eng.php; Canadian Cancer Society website: "Harmful Substance and Environmental Risks: Radon", online: http://www.cancer.ca/en/prevention-and-screening/be-aware/harmful-substances-and-environmental-risks/radon/?region=on

[12] IARC: IARC monographs on the evaluation of carcinogenic risks to humans. Man-made Mineral Fibres and Radon. Volume 43. Lyon, France: International Agency for Research on Cancer; 1988.

after smoking, exposure to indoor radon is responsible for approximately 16% of lung cancer deaths in Canada.[13] Smokers exposed to high levels of radon are at much greater risk. Health Canada reports that high radon exposure creates a 1 in 20 chance of lung cancer in the general population while this risk level rises to 1 in 3 for smokers.[14]

The link between radon and lung cancer was first discovered through studies of uranium miners. The presence of radon in indoor air has gained increasing attention over the past three decades as research has confirmed it as a threat to human health. Beginning in the 1980's in the United States,[15] research has since confirmed the link between cancer and exposure to indoor radon.[16] In children, due to differences in lung shape and size, and faster respiration rates, their radon doses may be higher than for adults. The risk of radon-induced lung cancer from childhood exposure may be almost twice as high as the risk to adults exposed to the same amount of radon.[17]

2.3 Jurisdiction – Overview of Government Roles and Responsibilities

Jurisdiction over radon in indoor air arises in multiple contexts intersecting with many areas of federal, provincial and municipal jurisdiction. This report focuses mainly, but not exclusively, on radon in public buildings, and considers the following contexts:

- new construction
- employment settings
- provision of government services
- real estate transactions
- rental properties

The following discussion summarizes why and how jurisdiction over radon is a shared responsibility across all three levels of government in Canada.

Canada's Constitution divides jurisdictional powers between the federal government and the provincial/territorial governments. The federal government has powers over matters of a national interest or that cross provincial boundaries, such as consumer products. Provincial and territorial

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[13] Chen, J., D. Moir, and J. Whyte. 2012. "Canadian Population Risk of Radon Induced Lung Cancer: A Re-Assessment Based on the Recent Cross-Canada Radon Survey." *Radiation Protection Dosimetry* 152 (1-3): 9–13. doi:10.1093/rpd/ncs147.

[14] Government of Canada, Health Canada website, "Radon – Another Reason to Quit", online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_smokers-fumeurs/index-eng.php.

[15] The 1984 Watras case, where a worker set off radiation alarms entering a Pennsylvania nuclear power plant due to radiation levels from indoor radon in his home, brought awareness to the problem of indoor radon. See for example: Philadelphia Inquirer "As Radon Levels Soar in Pa. Homes, Action Lags" (March 20, 1985), online: http://www.aces.edu/fcs/hndh/radon/documents/Watras_story.pdf; Reading Eagle – Berks County News, "Radon Victim Helping Others Battle Problem" (September, 15 1988), online: http://news.google.com/newspapers?nid=1955&dat=19880915&id=QyoyAAAAIBAJ&sjid=nuQFAAAAIBAJ&pg=2821,7013573

[16] Sethi TK, El-Ghamry MN, Kloecker GH: Radon and lung cancer. *Clin Adv Hematol Oncol* 2012, 10(3):157–164; Hubaux, Roland, Daiana D. Becker-Santos, Katey SS Enfield, Stephen Lam, Wan L. Lam, and Victor D. Martinez. 2012. "Arsenic, Asbestos and Radon: Emerging Players in Lung Tumorigenesis." *Environmental Health* 11 (1): 89.

[17] Agency for Toxic Substances and Disease Registry. 2010. *ATSDR Case Studies in Environmental Medicine - Radon Toxicity*.

powers are those that concern matters of a more regional or local nature including the power to pass enabling legislation giving municipalities powers to act at an even more local level.

Neither 'health' nor 'environment' is an enumerated head of power, (that is, an area where jurisdiction and law-making power is specifically situated), under the Canadian Constitution. As broad subjects that intersect with several heads of power, the courts have determined that health and the environment are areas of shared jurisdiction.[18] As such, both the federal and provincial/territorial governments may act in relation to the environment and health under their respective legislative powers, as set out in ss. 91 and 92 of the *Constitution Act*.[19]

Legal definitions of "environment" have tended to refer only to the 'natural,' or outdoor, environment. Built, or indoor, environments have received relatively little legislative attention, despite increasing evidence of health risks associated with indoor environments, and in particular, indoor air quality.[20]

2.3.1 Federal Jurisdiction

Areas of federal power that may be relevant to indoor air may include the federal criminal law power where the courts have held that the legitimate scope of such power includes the protection of public health and of the environment. Additional areas may include the power to regulate interprovincial works and undertakings, and the federal spending power.[21]

The federal government holds jurisdiction over federal employees and nuclear energy and has included radon-related provisions in the National Building Code, a document that is created nationally and is provided to provinces and territories as a model code that requires provincial/territorial legislative action to have the force of law.

2.3.2 Provincial Jurisdiction

Areas of provincial power that are relevant to indoor air quality include: property and civil rights,[22] matters of a local and private nature,[23] municipalities,[24] the management and sale of public lands belonging to the province,[25] the establishment, maintenance, and management of hospitals,[26] prisons,[27] education,[28] and local works and undertakings.[29]

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[18] Friends of the *Oldman River Society v. Canada (Minister of Transport*), 1992 CanLII 110 (SCC), [1992] 1 SCR 3, at para. 99, online: http://canlii.ca/t/1bqn8.
[19] *Ibid*.
[20] Pollution Probe, "Achieving Health Indoor Environments: A Review of Canadian Options", online: (main body of report): http://www.pollutionprobe.org/old_files/Reports/IAQ%20front%20section.pdf Appendices online: See Joseph Castrilli, "Appendix III – Legal Aspects of Indoor Air Quality in Canada," pp. 163 – 168.
[21] *Ibid*.
[22] The *Constitution Act*, 1867, 30 & 31 Vict, c 3, s. 92(13).
[23] *Ibid* at s. 92(16).
[24] *Ibid* at s. 92(8).
[25] *Ibid* at s. 92(5)
[26] *Ibid* at s. 92(7)
[27] *Ibid* at s. 92(6)
[28] *Ibid* at s. 93
[29] *Ibid* at s.92(10)

Provinces and territories have jurisdiction over:

- naturally occurring radioactive material and the health effects of radon;
- the design and construction of new buildings;
- employment; and
- provincial/territorial services including schools, hospitals, and public health promotion.

Explicit radon protection, if enacted, is generally captured by provincial/territorial building codes and labour codes. Given the provincial/territorial role in radon protection, requirements tend to differ across the country. These variations continue despite the existence of a Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC), an intergovernmental Committee established to support Federal, Provincial and Territorial radiation protection agencies. The stated mandate of the FPTRPC is to advance the development and harmonization of practices and standards for radiation protection across jurisdictions, and to communicate these to the people of Canada.[30]

2.3.3 Municipal Jurisdiction

Local governments can also play a role in the regulation of indoor air quality and the implementation of radon protective measures. Municipalities derive their powers from the provincial/territorial legislatures that create them, and which delegate to them certain powers. Municipalities tend to be delegated the responsibility for public services such as water supply, sewage and garbage disposal, public health, roads, sidewalks, building codes, parks, etc. Having jurisdiction over issues such as land use planning and approvals, municipalities are responsible for passing zoning by-laws, and issuing building permits. For example, once a building code is adopted by a province or territory, enforcement falls to the local government. Municipal building by-laws generally include property maintenance standards, as well as requirements for the approval of building permits prior to construction, the authorization of building inspections, and include powers to issue orders necessary to direct compliance with the applicable (provincial/territorial) code.

2.3.4 Divided and Overlapping Jurisdiction Across Canada

In summary, 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. There is no lead agency 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.[31] Within this jurisdictional context, this report highlights the most relevant laws, policies and programs, and discusses what legal requirements, either statutory or common law, exist in relation to radon in indoor air.

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[30] Federal Provincial Territorial Radiation Protection Committee website: http://www.hc-sc.gc.ca/ewh-semt/radiation/fpt-radprotect/index-eng.php

[31] *Ibid* at at p. 41 (main body of report); and Appendix III, pp. 163 – 168.

3.0 The Federal Role

3.1 Introduction - The National Radon Program

The federal government role in addressing radon occurs under the umbrella of a National Radon Program that includes activities related to research and monitoring, the creation of national guidelines, and educational outreach to Canadians. Key among these activities is the revision in 2007 to the federal Radon Guideline and the subsequent incorporation of the reference level of 200 Bq/m^3 into the *National Building Code*. The only area of federal purview that includes legislated requirements concerning radon (outside of the nuclear fuel cycle) is within the Occupational Health and Safety Regulations under the *Canada Labour Code*.

This section describes the multiple elements of the National Radon Program and certain occupationally-related issues with a primary focus on the radon provisions in the *National Building Code*. Appendices 1 and 2 provide further detail in each area.

The federal government's stated role in relation to indoor radon protection includes:

> education and awareness about radon and the associated health effects, establishing measurement techniques and protocols, conducting research into effects of radon exposure, and developing guidelines.[32]

These activities are captured within the National Radon Program wherein Health Canada works in partnership with the provinces and territories.[33] This program was initiated in 2008 to support the revised Radon Guideline in indoor air, described in further detail below. The program consists of five components:

1. establishment of a national radon laboratory
2. radon testing projects
3. development of a radon database and mapping
4. radon research
5. education and public awareness

Within these five areas, and as described in more detail below, the federal government has conducted extensive testing of buildings – both federally-owned buildings and as part of a cross-Canada survey of homes. As well, to support the revised radon provisions in the National Building Code, the federal government developed the Canadian National Radon Proficiency Program for radon remediation specialists and has conducted extensive public education, much of which was launched during the first annual Radon Action Month in November of 2013.

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[32] Health Canada Website, "Radon: Is it in your home? Information for Health Professionals": http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_brochure_profession/index-eng.php

[33] Health Canada website, "Healthy Living – Radon": http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/radon-eng.php#a7 See also the Government of Canada's Radon Guideline, online: http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/guidelines_lignes_directrice-eng.php

3.2 The Canadian Radon Guideline

The Radon Guideline provides recommendations on when remedial action should be taken, and during what timeframes, to reduce radon levels in indoor air. It also contains a "reference level" for radon in the indoor air of "dwellings" and the current level is 200 Bq/m^3. Health Canada established its first Radon Guideline reference level at 800 Bq/m^3 in 1988, and initiated public education campaigns. In June 2007, based on new research and a public consultation, the reference level was lowered from 800 Bq/m^3 to 200 Bq/m^3.[34] The revised level is based on the risk to health, available mitigation technology and cost to mitigate.[35]

Guidance elsewhere is more protective. For example, the US radon guidance level, established by the US Environmental Protection Agency, is 4 pCi/L, equivalent to about 148 Bq/m^3. Moreover, in the National Healthy Housing Standard, issued this year by the National Center for Healthy Housing and the American Public Health Association, radon concerns are addressed and the US guidance level is noted alongside a "stretch provision" encouraging the use of 2 pCi/L as the radon guidance level, wherever feasible.[36] Similarly, the World Health Organization also recommends a more stringent level of 100 Bq/m^3 to minimize health hazards due to indoor radon exposure while noting that if this level cannot be reached under prevailing country-specific conditions, the reference level should not exceed 300 Bq/m^3.[37]

The federal Radon Guideline is advisory, not legally binding, and is meant as a reference, to encourage radon testing, and to provide guidance on when remedial action should be taken to reduce indoor radon levels in homes and public buildings (where the latter are considered a 'dwelling').[38] It also provides a model for provincial or municipal regulation, especially with respect to building codes and related standards. Incorporation of the Radon Guideline reference level into legislation where it can be established as a legally binding standard is a matter of provincial/territorial jurisdiction.

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[34] Government of Canada's Radon Guideline, online: http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/guidelines_lignes_directrice-eng.php

[35] Health Canada, "ARCHIVED: Responses to Public Comments on the Proposed Revision of the Radon Guideline", online: http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/public-comment-radon-eng.php and "ARCHIVED: Responses to Peer Reviewer Comments on the Proposed Revision of the Radon Guideline", online: http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/peer-pair-comment-radon-eng.php

[36] National Center for Healthy Housing and American Public Health Association, "National Healthy Housing Standard" May, 2014, on-line: http://www.nchh.org/Policy/NationalHealthyHousingStandard.aspx. A "stretch provision" is intended for users of the standard wanting to go above the minimum requirements or who can integrate compliance with the provisions during property renovation.

[37] World Health Organization, 2009, WHO Handbook on Indoor Radon – A Public Health Perspective. Hajo Zeeb and Ferid Shannoun (eds.), online: http://whqlibdoc.who.int/publications/2009/9789241547673_eng.pdf

[38] Note that 'public buildings' means those considered dwellings, which have a high occupancy rate and/or residency period for members of the public. The types of buildings include hospitals, schools, long-term care residences and correctional facilities. See: Health Canada, Guide for Radon Measurements in Residential Dwellings (Homes), HC Pub.: 4171 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_homes-maisons/index-eng.php; Guide for Radon Measurement in Public Buildings (Schools, Hospitals, Care Facilities, Detention Centres" HC Pub: 4175 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_building-edifices/index-eng.php.

The Radon Guideline states that:

- Remedial measures should be undertaken in a dwelling whenever the average annual radon concentration exceeds 200 Bq/m³ in the normal occupancy area.[39]
- The higher the radon concentration, the sooner remedial measures should be undertaken.
- When remedial action is taken, the radon level should be reduced to a value as low as practicable.[40]
- The construction of new dwellings should employ techniques that will minimize radon entry and will facilitate post-construction radon removal, should this subsequently prove necessary.

The Radon Guideline recommends that the higher the radon concentration, the sooner remediation measures should be undertaken as follows:

> 600 Bq/m³	Remediate within 1 year
200 - 600 Bq/m³	Remediate within 2 years
200 Bq/m³	No action required[41]

The Radon Guideline applies to the 'normal occupancy area' of 'dwellings', which includes residential homes and public buildings with a high occupancy rate, such as: schools, hospitals, long-term care residences, and correctional facilities.[42] It does not apply to uranium mines, (regulated by the Canadian Nuclear Safety Commission), other mines (such as fluorspar mines regulated by provincial mining authorities), and other workplaces addressed by other guidelines for naturally occurring radioactive materials (the NORM guidelines, discussed further below with respect to occupational exposure).

3.3 Radon Testing Programs

During 2009-2010 Health Canada's National Radon Program conducted the "Cross-Canada Survey of Radon Concentrations in Homes."[43] As summarized in Section 2.1 above, the findings

[39] The term "normal occupancy area" means any part of a dwelling where a person is likely to spend more than 4 hours/day and excludes areas such as an unfinished basement, a crawl space, a storage area, cold room, furnace room, or laundry room.

[40] "As low as practicable" refers to what can be achieved using conventional radon reduction methods in a cost-effective manner, whereby reasonable efforts are made to maintain radiation exposures as low as possible, with social and economic factors taken into consideration. In a small number of cases, the application of all reasonable remediation techniques will leave a residual radon level greater than 200 Bq/m^3. It is not the intention of the Guideline to recommend excessive or unreasonable remediation costs in order to achieve a marginal increase in benefit. Such situations should be evaluated on a case-by-case basis. For additional information see: Health Canada website, "Government of Canada Radon Guideline": http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/guidelines_lignes_directrice-eng.php

[41] Health Canada website, "Environmental and Workplace Health – How to Fix My Radon Problem?: http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/remediation-attenuation-eng.php

[42] Health Canada, Guide for Radon Measurements in Residential Dwellings (Homes), HC Pub.: 4171 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_homes-maisons/index-eng.php; Guide for Radon Measurement in Public Buildings (Schools, Hospitals, Care Facilities, Detention Centres" HC Pub: 4175 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_building-edifices/index-eng.php

[43] Health Canada, 2012. *Supra* note 4.

indicated that no areas of Canada are "radon free." The study found that 6.9% of homes in Canada likely have radon gas levels above the guideline of 200 Bq/m^3. This level is similar to the results of a 1970's Cross Canada survey. Sampling across Health Regions provided an estimate of the geographic distribution of radon levels across Canada and results indicate that radon levels vary significantly across the country. Areas with the highest indoor radon levels were found in Manitoba, New Brunswick, Saskatchewan, and the Yukon.[44]

Participants in the study were all home owners. As a prerequisite for participation all participants had the control and legal right to ultimately remediate the building. A radon report letter was sent by Health Canada after testing, providing test results, referencing the Radon Guideline, recommending remediation timeframes, and providing links to resources. It is not known whether participants whose homes tested high engaged in remedial action.

Health Canada states in the Cross Canada study that the results can be used by governments and health professionals to assist in determining priorities for radon outreach and education efforts, as well as to encourage testing and remediation where necessary, and emphasizes that the study results should not be used as a tool to inform radon risk potential or whether or not to test a home for radon. Health Canada also plans to use the radon data to support the development of a radon potential mapping methodology for Canada.

Hence, while Health Canada encourages use of these survey results, the agency does not have a clear legal mandate to require provinces/territories to share such data with each other and the federal government, and when this is done it is normally done voluntarily or subject to an agreement. At the outset of the Cross-Canada Survey, Health Canada entered into data sharing agreements with the provinces/territories, allowing study results to be provided to them. The study results are intended as a tool to support policy development and planning.[45] For example, Public Health Ontario used the information from the Cross-Canada Survey in its provincial burden of illness risk analysis of radon,[46] and Nova Scotia used it for its online radon risk assessment mapping tools.[47]

Extensive testing has also occurred in federal workplaces. From 2007 to 2013 Health Canada tested nearly 13,000 federal workplaces for radon. The stated purpose was to identify federal workplaces with radon levels above the Radon Guideline to allow federal employers and building managers to address the need for remediation where necessary.[48] Participation by

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[44] *Ibid.*

[45] Personal Communication with Health Canada, Jan 28, 2014.

[46] Emily Peterson, et al., "Lung cancer risk from radon in Ontario, Canada: how many lung cancers can we prevent?" Cancer Causes Control (2013) 24:2013-2020, online: http://www.publichealthontario.ca/en/BrowseByTopic/EnvironmentalandOccupationalHealth/Pages/Radon-Burden-of-Illness.aspx#.Uy8SxvldWuI

[47] Government of Nova Scotia website, Department of Natural Resources, "Potential for Radon in Indoor Air in Nova Scotia" (2013): http://www.novascotia.ca/natr/meb/download/dp486.asp. To access the radon risk map see: "OFM ME 2013-28 Map Showing the Potential for Radon in Indoor Air in Nova Scotia (1:750,000)": http://www.novascotia.ca/natr/meb/download/mg/ofm/htm/ofm_2013-028.asp. And to access the interactive map,, searchable by postal address, see: "DP ME 486, Version 1, 2013, Digital Data Showing Potential for Radon in Indoor Air" at http://gis3.natr.gov.ns.ca/Radon/index.html.

[48] Health Canada website, Environmental and Workplace Health, "Radon Testing in Federal Buildings – Highlights": http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/buildings-edifices-eng.php

federal workplaces was voluntary. Health Canada provided 3-month radon detectors and laboratory results to participating federal workplaces. Each individual federal department (or building manager) was responsible for deploying the radon tests and submitting them to Health Canada's National Radon Laboratory for analysis. Test results were returned to the building owner, who in turn was responsible for communicating the results to the federal department and/or employees. Information returned to the building owner included the building's tested radon level, whether remediation was required and informational resources. Notably, these federal workplaces would be subject to the mandatory but much higher radon reference level of 800 Bq/m^3. As discussed further in Section 3.5.2 below, the radon reference level established under the Occupational Health and Safety Regulations under the *Canada Labour Code* is the only federally mandated radon exposure limit for circumstances outside of workers involved in the nuclear fuel cycle.

Health Canada's website notes that this study found approximately 3.8% of the federal buildings tested with average radon concentrations above the Radon Guideline. Of the 12,865 federal workplaces tested, 12,371 had radon levels below the Radon Guideline reference level of 200 Bq/m^3, 426 had radon levels between 200 Bq/m^3 and 600 Bq/m^3, and 68 had radon levels above 600 Bq/m^3.[49] During the testing of federal workplaces the National Research Council of Canada undertook an evaluation of the testing program and identified barriers including difficulty getting buy-in from departments to conduct testing in their buildings, a lack of interest by those at the operational level, fewer buildings meeting testing criteria than initially anticipated, and differing expectations on responsibility for distributing/collecting radon detectors in federal buildings.[50]

Beyond the Cross-Canada survey of residences and the program to test federal workplaces, testing for radon in public buildings in most of Canada, including schools and workplaces, has been inconsistent (see Section 4.5 below concerning radon testing in certain Quebec school boards). Testing has been undertaken by various government departments, with the majority of testing programs being pilot projects which provide an estimate of radon concentration levels based on samples taken of particular geographic areas. To date, radon test results have not been compiled centrally. That said, the data from Health Canada's sampling of homes and federal workplaces have been compiled and made available online. As well, the Yukon Territory has compiled all radon test results in an online registry and map.[51] Testing data has also been compiled by Prince Edward Island in their Radon Project,[52] and into online graphics such as the map of British Columbia,[53] and the interactive map of Nova Scotia.[54] It is generally the case that radon tests conducted privately are not included in the above data analyses or radon risk maps.

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[49] *Ibid.*

[50] "Radon Management: Issues and Options", prepared for BC Ministry of Health, Health Protection Branch by M&M McBride Associates Management Consulting Inc., (2012), online: http://www.health.gov.bc.ca/library/publications/year/2012/radon-management.pdf .

[51] Government of Yukon, Yukon Housing Corporation website, "Radon": http://www.housing.yk.ca/radon.html

[52] Government of Prince Edward Island, Department of Health and Wellness, "Radon Survey at Selected Sites Across Prince Edward Island" (2008), online: http://www.gov.pe.ca/photos/sites/infopei/7108%20Radon%20Final%20report%20(rev).pdf

[53] BC Centre for Disease Control website, "Radon": http://www.bccdc.ca/healthenv/Contaminants/Radon/default.htm

[54] Government of Nova Scotia website: http://novascotia.ca/natr/meb/geoscience-online/radon_about.asp

Another example of radon testing is a Vanguard Initiative conducted during 2014 by the Canadian Partnership for Children's Health and Environment (CPCHE) with the Canadian Child Care Federation (CCCF). CPCHE and CCCF conducted a pilot project to test radon levels in six child care centres in Winnipeg. The objectives of this pilot included engaging the child care centres in testing their facilities and sharing information with client families about radon in the home. Among child care centre participants, staff noted that they had previously known little about radon and agreed with the importance of making information available to the child care sector and families. They also felt that, given their many other responsibilities, radon testing would be unlikely to occur unless it was mandatory. This view was held in all the centres that participated including among staff at a centre where an elevated level was found and at a smaller home-based facility with a small budget.[55]

3.4 Education, Public Awareness, and Additional Guidance

Since launching the Take Action on Radon initiative during the first annual Radon Action Month in November of 2013, many stakeholders have become involved. While this additional multi-stakeholder involvement is important, the following discussion focuses on the federal government.

Health Canada has produced a wide range of public education materials and activities to raise awareness on the health risks posed by indoor radon alongside instructional information on testing and remediation. In addition to guides specific to health professionals[56] and professional contractors,[57] Health Canada provides the following resources relevant to the public and to public buildings:

- Radon: Is it in your home?[58]
- Radon: Reduction Guide for Canadians[59]
- Guide for Radon Measurements in Residential Dwellings[60]
- Guide for Radon Measurement in Public Buildings (Schools, Hospitals, Care Facilities, Detention Centres)[61]

In addition, under Part IX of the *National Housing Act*, the Government of Canada provides funds to Canada Mortgage and Housing Corporation (CMHC) to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research. While "Radon – A Guide for Canadian

[55] Canadian Partnership for Children's Health and Environment, 2014 Vanguard Initiative to promote radon awareness among child care/early childhood professionals and the families they serve. Project Report prepared by Erica Phipps, CPCHE Executive Director, for Health Canada; and personal communication with Erica Phipps.
[56] Health Canada Website, *Supra* note 32.
[57] Health Canada, "Reducing Radon Levels in Existing Homes: A Canadian Guide for Professional Contractors", online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_contractors-entrepreneurs/index-eng.php
[58] Health Canada Website, *Supra* note 32.
[59] Health Canada, "Radon: Reduction Guide for Canadians", HC Pub.: 130389 (2013), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_canadians-canadiens/index-eng.php
[60] Health Canada, Guide for Radon Measurements in Residential Dwellings (Homes), HC Pub.: 4171 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_homes-maisons/index-eng.php; Guide for Radon Measurement in Public Buildings (Schools, Hospitals, Care Facilities, Detention Centres" HC Pub: 4175 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_building-edifices/index-eng.php
[61] *Ibid*.

Homeowners" is out of print and no longer distributed by the CMHC, the following CMHC reports are available:

- Cold Climate Radon Mitigations: A Canadian's Perspective[62]
- Radon Mitigation Planning Inspection and Mitigation System Installation[63]
- Fixing Houses with High Radon – A Canadian Demonstration[64]

Finally, detailed radon mitigation guidance for new and existing buildings is currently being prepared through Working Groups established by the Canadian General Standards Board and will likely result in performance-based standards audited by the Canadian Standards Association and then recommended to the federal government as the basis for revised national standards in this area.[65]

3.5 Radon Protection for Federal Workplaces and Federal Employees

This report discusses requirements under the Naturally Occurring Radioactive Materials Guidelines (the NORM Guidelines) and the Occupational Health and Safety Regulations under the *Canada Labour Code*. An examination of occupational exposures to radiation within the nuclear fuel chain is beyond the scope of this report.[66]

3.5.1 The NORM Guidelines

The Naturally Occurring Radioactive Materials Guidelines (NORM Guidelines)[67] set out procedures for the detection, classification, handling and material management of radiation exposure in Canada, outside of the nuclear fuel cycle. NORM can include many different types of naturally occurring radioactive materials, including radon.

These guidelines were prepared by the Canadian NORM Working Group of the Federal Provincial Territorial Radiation Protection Committee. The NORM Guidelines are an attempt to reduce inconsistent application of radiation protection standards across Canada. Unlike the

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[62] Cold Climate Radon Mitigations: A Canadian's Perspective: ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Ca1%20MH%2010C51_W.pdf ; and Radon Mitigation Planning Inspection and Mitigation System Installation: ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Radon_Mitigation(W).pdf

[63] Radon Mitigation Planning Inspection and Mitigation System Installation: ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Radon_Mitigation(W).pdf

[64] Fixing Houses with High Radon – A Canadian Demonstration http://www.cmhc-schl.gc.ca/odpub/pdf/66063.pdf?lang=en

[65] Personal Communication with Cosmina Panu-Anghel, Canadian General Standards Board, October 7, 2014.

[66] For occupational exposure to radiation as part of the nuclear fuel cycle the Canadian Nuclear Safety Commission (CNSC) sets two types of exposure limits: one for occupationally exposed persons and another for the general public. The CNSC regulates radon and radon progeny in Canada's nuclear facilities to protect nuclear energy workers, and members of the public through the Radiation Protection Regulations (Radiation Protection Regulations, SOR/2000-203, <http://canlii.ca/t/l67l> retrieved on 2013-12-20), enacted under the federal *Nuclear Safety Control Act* (Nuclear Safety and Control Act, SC 1997, c 9.) For more information see: Canadian Nuclear Safety Commission, "Radon and Health", Revision 2, January 2012 (ISBN 978-1-100- 17765-6) p. 8, online: http://nuclearsafety.gc.ca/pubs_catalogue/uploads/February-2011-Radon-and-Health-INFO-0813_e.pdf

[67] Health Canada, "Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials" (2013), Prepared by the Canadian NORM Working Group of the Federal Provincial Territorial Radiation Protection Committee. Online: http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/norm-mrn/index-eng.php.

nuclear fuel cycle and man-made radionuclides, (under the jurisdiction of the CNSC), NORM-related activities fall under the jurisdiction of provincial/territorial governments. They apply to employment environments, including occupational exposures where workers have been "incidentally exposed" to background radiation in indoor air. "Incidentally exposed workers" are considered in the Guidelines as members of the public who work in an occupational exposure environment and whose regular duties do not include exposure to NORM sources of radiation.[68]

There are multiple industries that require the application of radiation protection, and to which the NORM Guidelines apply, including: mineral extraction and processing, oil and gas production, metal recycling, etc. In addition to employment settings where NORM activities occur, the NORM Guidelines are intended to be applied to all occupational exposures, including those "incidentally exposed" to background radiation via the infiltration of soil gas into indoor air; hence, radon.

During Health Canada's collaborative development of the federal Radon Guideline with this same Working Group, (i.e., the NORM Working Group of the Federal Provincial Territorial Radiation Protection Committee), the Working Group deemed that the NORM Guidelines provided adequate coverage for workplaces and opted not to extend the Radon Guideline to workplaces in order to avoid confusion.[69] The NORM Guidelines were updated during 2014 such that the federal Radon Guideline reference level now aligns with the incidentally exposed (non-NORM) worker limit of 200 Bq/m^3.[70]

Despite this recent update the on-line version of the NORM Guidelines, published in 2011, are unchanged. They indicate that background radiation gives rise to an average indoor radon concentration of about 45 Bq/m^3. As no distinction can generally be made between background and workplace generated radon, (unlike with other NORM materials), the background level of radon is included in the derived working limits (DWLs) in the NORM Guidelines.[71] The DWL provides an estimate of dose from the quantities that may be directly measured in the workplace. A Radiation Assessment program may compare measurement results to DWLs.[72]

The DWL for radon is 200 Bq/m^3. The "Unrestricted Classification"[73] applies to all circumstances where the average radon concentration is less than 200 Bq/m^3, and as such no remedial action is required. The unrestricted classification in the guideline derives from a situation where the estimated incremental annual effective dose to the public is less than 0.3 mSv/a (millisieverts/annum) and to the worker is less than 1.0 mSv/a. In these "unrestricted" circumstances, no further action is considered necessary.

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[68] *Ibid* at 11.
[69] Health Canada, Archived documents. *Supra* note 35.
[70] Personal communication with Lothar Doehler, Manager, Radiation Protection Service, Occupational Health and Safety Branch, Ontario Ministry of Labour, September 29, 2014.
[71] The NORM Guidelines do not distinguish between background radon and radon released by industrial practice (practice radon). As such, the dose limits included in the NORM Guidelines are based on *total dose* from radon exposure - not the incremental dose from practice (as used elsewhere in the NORM Guidelines). See: Health Canada, "Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials" (2013), at 18-19, online: http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/norm-mrn/index-eng.php.
[72] Health Canada, 2013. *Supra* note 67 at 18.
[73] *Ibid* at 13.

The NORM Guidelines recommend[74] that:

- all workplaces be tested for potential elevated levels of radon gas in indoor air;
- steps be taken to reduce radon levels when radon levels are above 200 Bq/m^3;
- workplaces expected to have radon levels above 200 Bq/m^3 be periodically reviewed post-remediation to ensure conditions have not changed; and
- workplaces implement radiation protection programs appropriate to the level of radon concentration.

Where the annual average concentration of radon gas in a workplace is expected to be above 200 Bq/m^3, the NORM Guidelines recommend testing to estimate the annual average concentration. Where the estimated annual average concentration of radon gas in an occupied area is more than 200 Bq/m^3, but less than 800 Bq/m^3, the NORM Classification "NORM Management" should be applied, and steps to reduce exposure should be taken, including:

- introduction of public and incidentally exposed worker access controls;
- changes in work practices;
- reducing the radon concentration levels to below 200 Bq/m^3)
- periodic review to ensure conditions have not changed.

If the estimated annual average concentration of radon gas is more than 800 Bq/m^3, then the NORM Classification is 'Radiation Protection Management,' and the Guidelines provide that a Radiation Protection Management Program be implemented, requiring the initiation of a dose monitoring program which should include, where possible, steps to reduce the radon concentration to below 200 Bq/m^3.[75]

3.5.2 The *Canada Labour Code*

In Canada, federal employees are governed by the *Canada Labour Code*,[76] and its regulations which still reference the former Radon Guideline reference level of 800 Bq/m^3. Health Canada expects that the *Canada Labour Code* will soon be harmonized with the revised level of 200 Bq/m^3 anticipated to happen sometime in 2015.[77]

The Canada Occupational Health and Safety Regulations,[78] (enacted under the *Canada Labour Code)*, stipulate requirements for maintaining a healthy and safe work environment. These are requirements for federal government organizations and recommendations for other Canadian institutions. Section 10.26 (4) of these regulations require that no employee (other than nuclear energy workers) be exposed in the course of any year to a concentration of radon that on average, over the year, is higher than 800 Bq/m^3. While there is no legal requirement for employers to

[74] *Ibid* at 13-20.
[75] *Ibid* at pp. 13-16, 18-20.
[76] *Canada Labour Code*, RSC 1985, c L-2, online: http://canlii.ca/t/522fd.
[77] Personal communication with Kelley Bush, National Radon Program, Health Canada, Sept 30, 2014.
[78] Canada Occupational Health and Safety Regulations, SOR/86-304.

test for radon, the only way for an employer to know if they are compliant with the *Canada Labour Code* is to test.[79]

As discussed above, the NORM Guidelines recommend that all workplaces be tested for radon (Section 3.5.1 above) and the federal government has also conducted extensive radon testing of federal workplaces (Section 3.3 above). While the federal workplace testing program did not provide data on whether buildings were remediated, Health Canada hopes that building owners/managers would remediate to the updated Radon Guideline reference level of 200 Bq/m^3.[80] Whether remedial action takes place or not falls to the enforcement side of the *Canada Labour Code*. Health Canada reports that they will be trying to follow this over the next few years to see how remediation is accomplished. Health Canada has engaged in some follow up work, such as furnishing detectors for some buildings which tested high initially and which have since been remediated.[81]

Radon protection provisions in provincial/territorial occupational health and safety legislation are discussed in Section 4.2 below.

3.6 The National Building Code

The *National Building Code, 2010*[82] (hereinafter, NBC 2010) is one of five national model codes relating to building construction in Canada. Produced by the Canadian Commission on Building and Fire Codes and the National Research Council of Canada, it addresses the design and construction of new buildings, as well as substantial renovations to existing buildings. NBC 2010 requirements are linked to one or more of the following objectives: safety; health; accessibility for persons with disabilities; and fire and structural protection of buildings.

Measures to prevent soil gas from entering homes were first introduced into the National Building Code in 1995. Updates occurred in 2005 and 2010 with further revisions and errata published in 2012. Note however that these post-2010 revisions are implicitly included in this report, when the document is referred to as the *National Building Code, 2010 (*NBC 2010*)*.[83]

NBC 2010 requirements to address protection from radon in new construction and renovations appear in Parts 5, 6, and 9 and their corresponding appendices. The changes made in 2012 added significant technical revisions from past editions, including measures to reduce radon in new buildings. Among others, these most recent changes include radon protections such as the

[79] Health Canada website, Environmental and Workplace Health – Radon: Frequently Asked Questions": http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/faq_fq-eng.php#reaction.
[80] Personal communication with Kelley Bush, National Radon Program, Health Canada, January 28, 2014.
[81] *Ibid*.
[82] National Research Council of Canada: Canadian Commission on Building and Fire Codes, "National Building Code of Canada 2010," 13th ed., Second Printing (including revisions and errata released Dec. 21 2012), ISBN: 0-660-19975-7.
[83] *Ibid*.

addition of references to the federal Radon Guideline (Part 9), and the requirement that radon protection be incorporated into engineering practice (Part 6).[84]

Thus, with respect to radon protection in new construction and renovations, NBC 2010 provisions appear in Parts 5, 6, and 9 and their corresponding appendices, and include:

- requirements relating to the control of soil gas ingress (including requirements relating to the installation of air and soil gas barrier systems, rough-ins for future radon mitigation,[85] and airtight sump pits to prevent the entry of radon;)[86]
- requirements that engineers and designers consider radon protection in their designs (Parts 5 and 6)[87]
- Appendix Notes and Illustrations added in 2012 to elaborate on previous radon protective measures.[88]

Each of these Parts of the NBC 2010 is summarized below with additional specific details provided in Appendices 1 and 2.

3.6.1 NBC Part 5 - Environmental Separation

Part 5 of the NBC, 2010 addresses soil gas control, sets targets for the control of air leakage, and details air barrier system requirements to minimize the ingress of airborne radon from the ground with an aim to control the indoor radon concentration. Air leakage is controlled, or venting to the exterior permitted,[89] so as to "minimize the ingress of airborne radon from the ground with an aim to controlling the indoor radon concentration to an acceptable level." [90]

Part 5 requires the installation of an air barrier to provide the principal resistance to air with consideration given to the "health of safety of *building* users."[91] An Appendix to Part 5 notes that an air barrier system can reduce the likelihood of infiltration of dust and other pollutants which can lead to serious health or safety hazards. This Appendix specifies that the installation of an air barrier system should occur in components and assemblies in contact with the ground to control the ingress of radon. It references the Radon Guideline reference level of 200 Bq/m^3 for

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[84] See: Health Canada website, Environmental and Workplace Health – Radon: Frequently Asked Questions": http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/faq_fq-eng.php#reaction.

[85] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Subsections 5.4.1.1, 5.4.1.2, A-5.4.1.1 and Sections 9.13, 9.18 and 9.25. See also: Health Canada, "Radon: What you Need to Know," Newfoundland and Labrador Chapter of the Canadian Home Builder's Association (June 11, 2013), online: http://chbanl.ca/wp-content/uploads/2013/06/Health-Canada-Presentation.pdf

[86] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Section 9.14, Article 9.14.5.2.

[87] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Articles 5.4.1.2, and 6.2.1.1, and Division B, Appendix A, A-5.4.1.2 (1) and (2), and A-6.2.1.1.

[88] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2.

[89] Note this section applies "[w]here a *building* component or assembly separates interior *conditioned space* from exterior space, interior space from the ground, or environmentally dissimilar interior spaces." Italics are not added herein but denote defined terms the NBC.

[90] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Section 5.4, Subsection 5.4.1, Article 5.4.1.1, pp. 5-5.

[91] *Ibid*.

indoor radon concentration, stating that "[m]easures may be necessary to reduce the radon concentration to a level below the Health Canada guideline."[92]

Part 5 also details the requirements for materials used to resist air leakage; specifies the air leakage limit and exemptions to the limit.[93] It also sets out that air barrier systems must be continuous,[94] and sets compliance standards with which the structural design of air barriers systems subject to air pressure loads must conform.[95] The Appendix to Part 5 details materials and system requirements; notes the circumstances in which it may be acceptable to have air leakage characteristics in exceedance of the maximum provided; provides recommended maximum air leakage rates; and recommendations with respect to testing of air barrier airtightness.[96]

3.6.2 NBC Part 6 - Heating, Ventilating and Air-Conditioning

Part 6 includes provisions on radon prevention in engineering practice, and details the requirements for ventilation (i.e., natural vs. mechanical) based on building use.[97] It also requires that heating, ventilating and air-conditioning systems be designed, constructed and installed in conformance with good engineering practice. Included in a list of examples of good engineering practice is EPA/625/R-92/016, "Radon Prevention in the Design and Construction of Schools and Other Large Buildings."[98] Appendix Notes for Part 6 discuss the differences in humidification and pressurization in new and existing buildings and provides recommendations with respect to pressurization requirements, as well as HVAC design/system changes. The Appendix also includes a section on radon control which references the federal Radon Guideline, stating that: "[m]easures may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada."[99]

3.6.3 NBC Part 9 - Housing and Small Buildings

The majority of radon protection provisions appear in Part 9. In the newest version of the NBC 2010, air barrier requirements have been consolidated and prescriptive measures included on providing a rough-in for a future radon mitigation system.[100] Part 9 includes measures for

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[92] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Appendix Note, A-5.4.1.1, pp. A-59 – A-60.
[93] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Section 5.4, ss. 5.4.1.2 (1) and (2).
[94] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2. Note that under Sentence 5.4.1.2 (3) continuity is required:

a) across construction, control and expansion joints,
b) across junctions between different *building* assemblies, and
c) around penetrations through the *building* assembly.

[95] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Section 5.4, Sentence 5.4.1.2(4).
[96] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Appendix Note, A-5.4.1.1, pp. A-60 – A-61.
[97] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Subsections 6.2.2., 9.32.3 (noting requirements for ventilation, and mechanical ventilation systems).
[98] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Article 6.2.1.1., pp. 6-1.
[99] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Appendix Note, A-6.2.1.1., p. A-64.
[100] Health Canada, "Radon: What you Need to Know," Newfoundland and Labrador Chapter of the Canadian Home Builder's Association (June 11, 2013), online: http://chbanl.ca/wp-content/uploads/2013/06/Health-Canada-Presentation.pdf

resisting the ingress of soil gases, requirements for air and soil gas barriers in assemblies in contact with ground (and crawl spaces), and provision of control joints to reduce cracking of foundation walls and airtight covers for sump pits to reduce radon ingress.[101] The Appendix to Part 9 states that various sections require the application of certain radon exclusion measures in all dwellings and that these measures are: low in cost, difficult to retrofit, and desirable for other benefits they provide.[102]

The provisions of Part 9 accomplish radon exclusion primarily by ensuring that the pressure difference across the ground/space interface is positive (air moves towards the outside) so that the inward flow of radon through any remaining leaks will be minimized. Resisting the ingress of *soil* gases from the ground into buildings is required for all buildings.[103] Details are included for measures to control soil gas ingress. For dwelling units and residential occupancies a rough-in for a radon extraction system should be provided. Further, requirements are noted for the installation of an air barrier system to address protection from soil gases, provision of the means to depressurize the space between the air barrier and the ground. Such measures allow for the future mitigation of high radon concentrations.[104] The Appendix also addresses the completion of a subfloor depressurization system, and indicates that so doing may be necessary to reduce the radon concentration to a level below 200 Bq/m^3.[105]

For occupancies that are neither dwelling units nor residential occupancies, Part 9 requires less protection from radon ingress with Appendix Notes explaining that since the Radon Guideline is established based on the time that occupants spend inside buildings, the installation of a means for the future removal of radon may not be required in buildings that are occupied by persons for less than 4 hours per day. The Appendix A notes that radon problems in such buildings (or parts of buildings) may be addressed by providing a means for increased ventilation.[106]

Finally, Part 9 addresses radon gas infiltration and requirements relating to air barrier systems. Requirements are included for barriers to air leakage and provide that air barrier systems separating conditioned spaces from unconditioned spaces or the ground must be a continuous barrier. Further, the air barrier system must prevent air leakage from the exterior or ground inward "sufficient to … minimize the ingress of soil gas."[107]

3.7 Enforceability and Applicability of Federal Guidance on Radon

At the federal level, all three of the Radon Guideline, the NBC 2010, and the NORM Guidelines are advisory. To become law, they must be adopted by a provincial/territorial government.

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[101] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Appendix Note A-9.13.4, p. A-180.
[102] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Appendix Note, A-9.13.4, p. A-180.
[103] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Article 9.13.4.2. (1), p. 9-82. See also Appendix A, A-9.13.4, p. A-180.
[104] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Article 9.13.4.2., p. 9-82. See also Appendix A, A-9.13.4, p. A-180.
[105] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Appendix Note, A-9.13.4.3, p. A-181.
[106] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Appendix Note, A, A-9.13.4.2 (3), p. A-181.
[107] National Research Council, 2010 and 2012. *Supra* note 82 at Volume 2, Subclause 9.25.3.1. (1) (b) (iii).

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 or fund provincial/territorial radon protection programs/policies.[108]

As a "reference level" or "action level," the Radon Guideline is a level at which Health Canada recommends that Canadians take action to remediate radon levels in indoor air but absent provincial/territorial 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.[109] Options for enforceability of the Radon Guideline and radon-related provisions of the NBC, 2010 at the provincial/territorial level are discussed in Section 4 below.

For the NORM Guidelines, there is uncertainty concerning applicability to workplaces not engaged in NORM activities,[110] as further discussed in Section 4.2 below. Moreover, as noted in Section 3.5.2 above, for employment settings to which the NORM Guidelines apply, the action level is the same as the federal Radon Guideline (i.e., 200 Bq/m^3) but the action level in regulations under the *Canada Labour Code* is 4 times higher. Without harmonization, the benchmark provided as a reference or rationale for mandatory mitigation measures in federal workplaces would be the higher level of 800 Bq/m^3contained under the general duty clause in the federal regulations. Until these action levels are harmonized, employees are not provided with equal protection from exposure to indoor radon at work.

3.7.1 Potential Savings in Health Care Costs

Finally, beyond the notion of making the Radon Guideline enforceable in law, it is possible to conservatively estimate health care savings from prevented lung cancer deaths if radon mitigation occurred in the estimated 6.9% of homes in Canada with radon levels above the federal Radon Guideline reference level, as follows:

- Using data on the number of dwellings in Canada (excluding apartments), 6.9% of that total would be slightly over 600,000 dwellings.[111]

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[108] Personal communication with Kelley Bush, National Radon Program, Health Canada, Sept 30, 2014.
[109] See: Health Canada, Guide for Radon Measurements in Residential Dwellings (Homes), HC Pub.: 4171 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_homes-maisons/index-eng.php; Guide for Radon Measurement in Public Buildings (Schools, Hospitals, Care Facilities, Detention Centres" HC Pub: 4175 (2008), online: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_building-edifices/index-eng.php.
[110] Personal communication with provincial and territorial Ministries of Labour yielded mixed results with respect to the applicability of the NORM Guidelines to workplaces not engaged in NORM activities (i.e., incidentally exposed workers).
[111] The total number of dwellings in Canada, excluding apartments, in 2011 is 13,319,250, of which 66% are single-detached, semi-detached/duplex, and row housing. Thus, taking 66% of the total, there would be 8,790,705 dwellings not including dwellings in apartment buildings. With Health Canada's estimated of 6.9% of homes at or above 200 Bq/m^3, 6.9% of 8,790,705 = 606,560 dwellings. See: Canada Mortgage and Housing Corporation, June 2014 CHS – Demography, 2013 http://www.cmhc-schl.gc.ca/odpub/esub/64693/64693_2014_A01.pdf?fr=1406060567698

- Total direct (drugs, hospitals, physicians) and indirect (mortality) costs of lung cancer in Canada in 2011 were $398,000,000.[112]
- Chen, et al, calculate that the attributable risk of lung cancer deaths in Canada from radon is 16%, (hence, 16% of $398,000,000 = $63,680,000), and that at the current Canadian action level of 200 Bq/m^3 the number of lives saved if radon mitigation occurred in homes above this level, would be 927 out of a total of 3261 estimated radon-induced lung cancers.[113] This total of 927 deaths is ~28% of 3291. Thus, 28% of 63,680,000 = $17,830,400.

From these calculations it is possible to conservatively estimate annual savings of nearly $18 million in health care costs as a result of prevented radon-induced lung cancer deaths. This calculation is rough since radon remediation would not occur all at once, and cancer arises across a long latency period. Nevertheless, significant health care savings and prevention of suffering would occur.

3.7.2 A Federal Tax Credit for Radon Remediation?

During the preparation of this report, in response to discussions among radon remediation professionals, a proposal for a federal tax credit was developed for inclusion in the annual Green Budget Coalition submission to the federal government for budget year 2015. [114] Borrowing and refining an idea initially developed by Bob Wood, President of the Canadian Association of Radon Scientists and Technicians (CARST), the Green Budget Coalition is recommending that the federal government amend the *Income Tax Act* to provide a tax credit to homeowners incurring costs for radon remediation, and consequently, to increase public awareness about a serious health issue. Given that Health Canada has already taken many important steps, including researching and defining the problem and creating a national certification program for radon mitigation professionals, a tax credit would be a logical next step to encourage otherwise limited public uptake of the government's awareness-raising messages.

4.0 The Provincial Role

The issue of radon in indoor air potentially arises within many areas of provincial/territorial jurisdiction. However, relatively little provincial/territorial legislation is specifically directed at the regulation of indoor air, and even less on radon protection. Similarly, limited case law under these statutes exists with respect to radon in indoor air.

Areas of law seemingly most relevant to indoor radon are those related to the environment and health, yet legislation in both areas largely neglects the regulation of radon in the (non-industrial)

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[112] Public Health Agency of Canada, March, 2014. Economic Burden of Illness in Canada, 2005-2008. And Economic Burden of Illness in Canada on-line tool: http://ebic-femc.phac-aspc.gc.ca/index.php Custom report generator: http://ebic-femc.phac-aspc.gc.ca/custom-personnalise/national.php?clear=1 (Customized report: total direct and indirect costs of bronchus and lung cancer deaths)

[113] Chen et al 2012. *Supra* note 13.

[114] Green Budget Coalition, Recommendations for Budget 2015, "Indoor Air – Include Radon Remediation as a Tax Credit," November, 2014, on-line: http://www.greenbudget.ca.

indoor environment. Rather, radon protection requirements or policies are generally captured by provincial/territorial building codes and labour codes (or occupational health and safety regulations), both of which address indoor air quality. Radon-related requirements also vary within and across provinces/territories.

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
- health
- tenanted properties

Each of these areas is summarized below and more details are included in Appendix 1 to this report. The statutes and regulations reviewed below have not necessarily been drafted to regulate, or deemed applicable by the courts to the issue of, radon in indoor air. Where relevant case law has been identified in the research for this report, it is discussed.

4.1 Regulation of Construction via Building Codes

As noted, the NBC 2010 provisions are advisory, and become legally binding only if incorporated into provincial/territorial law, that is, into provincial/territorial building codes (or, in some cases via provincially-delegated municipal authority). Enforcement tends to fall to local governments.

Provincial/territorial adoption of the NBC 2010 (with the 2012 revisions and errata)[115] would generally entail adoption of the Appendix Notes to the NBC in which the Radon Guideline reference level of 200 Bq/m^3 is included. The appendix notes to provincial/territorial codes are not legally binding but provide guidance on how to interpret the code(s).

Unlike other statutes, several provincial/territorial building codes are not publicly available on-line. Nor is the NBC, 2010 upon which the majority of codes are based (in whole or in part), and, like some provincial/territorial building codes, it must be purchased, at considerable cost. The federal government provides an on-line summary of Building Codes across Canada[116] and Appendix 2 to this report provides a comprehensive survey of the radon protection provisions in the NBC, 2010 and details whether and where radon protection provisions are incorporated into

[115] As discussed in Section 3.6 above, measures to prevent soil gas from entering homes were first introduced into the National Building Code in 1995. Updates occurred in 2005 and 2010 with further revisions and errata published in 2012. These post-2010 revisions are implicitly included in this report, when the document is referred to as the *National Building Code, 2010* (NBC 2010).

[116] Government of Canada Website, Canada Business Network "Building Codes, Regulations, and Related Standards": http://canadabusiness.ca/eng/page/3941/

provincial/territorial building codes. Given the provincial/territorial jurisdiction over the design and construction of buildings and the advisory nature of NBC 2010, adoption into provincial/territorial building codes varies depending on the degree to which the NBC, 2010 radon protective provisions have been adopted.[117]

To facilitate comparison, most provincial/territorial building codes can be easily cross-referenced with the NBC 2010 as section titles and numbering have been made consistent. To date, all provinces but Ontario and Prince Edward Island have substantially adopted, in some cases with additions and modifications, the NBC 2010. Where existing codes only incorporate the radon provisions from the NBC 2005, plans are generally in place to update to the NBC 2010 provisions (and related 2012 revisions and errata). Notably, only Ontario has adopted the federal Radon Guideline's reference level of 200 Bq/m^3 into the provincial building code and only in certain parts of the province. Some other provinces have noted the reference level in their Building Code appendices but not in the Code text. Hence, for provinces/territories where the NBC 2010 has been adopted in full, including the 2012 revisions and errata, it can be assumed that the NBC 2010 appendix notes containing radon protection explanations and reference to the 200 Bq/m^3 reference level are adopted unless otherwise specified (these would include British Columbia, Nova Scotia, Manitoba, Saskatchewan, Yukon, Northwest Territories, Newfoundland, and New Brunswick).

A summary is provided in the following table.

Summary of Provincial/Territorial Adoption of NBC 2010 Radon Provisions
(see Appendix 2 to this report for full details)

Provincial/Territorial Building/Construction Code	**Adoption of NBC Radon Provisions (Yes/No/Partial)**	**Variations**
Alberta	Partial. Includes some but not all of NBC provisions. Updates to adopt the NBC, 2010 are anticipated in the fall of 2014.[118]	Alberta Building Code includes revisions and errata approved to June 2009, but does not include any of the 2012 radon related additions to the NBC, 2010. Does not include explicit radon protection provisions in Section 5.4, as does the same section in the NBC 2010 but provides some comparable measures for addressing air leakage. Does not refer to Good Engineering Practice reference for radon as provided in NBC. Addresses only some of the radon provisions of Section 9 of the NBC.
British Columbia	Yes. Substantially based on the NBC.	
Manitoba	Yes.	Incorporates all the NBC radon-protection provisions and includes additional Manitoba-specific provisions.
New Brunswick	Partial. Updates currently	Municipalities directed to enact standards that adopt the NBC, 2005. Regulatory amendments currently proposed would update

[117] *Ibid.*
[118] Personal communication with James Orr, Director, Standards Development, Building and Fire Safety Services Alberta Municipal Affairs, July 18, 2014.

Provincial/Territorial Building/Construction Code	Adoption of NBC Radon Provisions (Yes/No/Partial)	Variations
	proposed.	these requirements to NBC, 2010. Where municipalities have not enacted bylaws, Provincial Building Regulation applies and it also still refers to NBC, 2005.
Newfoundland and Labrador	Yes, where municipalities act.	Municipalities empowered to pass regulations related to building design and construction which must incorporate NBC, 2010. For small number of municipalities not thus empowered, different but similar requirements apply.
Nova Scotia	Yes	
Northwest Territories	Yes	
Nunavut	No. Pending.	Building Code Act not yet in force but provides for reference to NBC in whole or in part via regulations. Existing Guidelines allow for application of NBC under various circumstances but does not refer to radon specifically. Law governing municipalities allows for bylaw powers that can directly reference the NBC.
Ontario	Partial.	Erratum. Corrected text in boldface font: **Does not adopt the model NBC. Incorporates the federal Radon Guideline reference level of 200 Bq/m^3 in three regions known to have high radon levels. Incorporates radon protection provisions for these three regions in a supplementary standard.**
Prince Edward Island	Partial.	Non-municipally incorporated areas under provincial jurisdiction (about 70% of PEI) not subject to NBC but regulation-making power exists to do so. Municipally incorporated areas have jurisdiction over issuing building/development permits and three municipalities have fully adopted the NBC.
Quebec	Partial.	Quebec Construction Code includes NBC 2005 radon provisions and some but not all of the NBC 2010 provisions.
Saskatchewan	Yes	
Yukon	Yes	

In the West Kootenay's, a high radon area of British Columbia, a pilot study investigated radon levels in a subdivision constructed in compliance with 2006 NBC provisions, including radon protective provisions. The pilot study results found that newly constructed homes had higher radon levels than older homes, and that 32 of 33 new homes tested had radon levels in excess of the federal Radon Guideline reference level of 200 Bq/m^3.[119] Additional studies are underway in BC to assess the efficacy of updated (that is, incorporating NBC 2010 radon provisions) construction standards on radon protection. A pilot project led by the BC Lung Association in partnership with the City of Castlegar and the Fraser Basin Council is designed to acquire information about the types of homes with high radon levels and to inform provincial health policies and building construction standards. The pilot project is taking place in the Prince George and Castlegar areas. An Indoor Radon Study being conducted in both communities is

[119] "Golder Associates Ltd., "Radon Reduction in the West Kootenays: Case Studies of Mitigation Effectiveness", BC Lung Association Workshop Presentation to the Castlegar Rotary Club (February 19, 2013), online: http://www.bc.lung.ca/association_and_services/documents/8-DanaSchmidt.pdf

evaluating the efficacy of the British Columbia Building Code's radon protection measures. The BC Building Code adopts the NBC 2010 radon protection provisions. In the winter of 2014, testing was conducted to compare radon levels in homes built pre-2006 with homes built on or after 2006. As of November, 2014, study results have not yet been released.[120]

Given that the federal government's Radon Guideline is voluntary and, when provincially/locally mandated (currently only in three high radon areas in Ontario) is required during new construction and major renovations, its influence on existing homes is purely advisory. Hence, for existing homes not undergoing major renovations, the Radon Guideline can at best inform and motivate the population at an individual level. Testing and remediation (if need be) of existing homes is at the discretion of the property owner. An Ontario study using Statistics Canada data found that mandatory radon protection measures in building codes would be a more effective long-term approach to reducing radon-induced cancer risk than a retrofitting/remediation approach. Assuming development trends in Ontario remain consistent the study estimates that if radon-related building code measures were implemented in 2014, then in 37 years 50% of the Ontario housing stock would be built to that radon protective standard. The report concludes that if effective building codes were implemented, they could reduce between 23-50% of the radon-related illness burden 37 years from now.[121]

Finally, the opportunity to address radon health risks in Ontario in new and existing homes is the motivation behind a private member's bill in Ontario that has been introduced for a third time during 2014 and is scheduled for committee review in the fall. The purpose of Bill 11, the proposed Radon Awareness and Prevention Act, [122] is to raise awareness about radon, to establish the Ontario Radon Registry, and to reduce radon levels in homes and workplaces. The proposed Ontario Radon Registry would collate and map the results of radon testing across the province and make this information publicly available (absent disclosure of personal information). The bill proposes to require the Minister of Municipal Affairs and Housing to test for radon in the "normal occupancy area" of "provincially owned dwellings" (by Dec 31 2021), and to require reasonable action be taken to reduce the radon level if found to be above 200 Bq/m^3. Also included are amendments to the *Ontario Building Code Act* with the aim of strengthening radon protection provisions and to require a review of these requirements after five years.

4.2 Labour Codes and Occupational Health Legislation

The provinces and territories have jurisdiction to regulate workplace health and safety, except for federally-regulated sectors (including federal building and workers) as these fall under the *Canada Labour Code* (discussed in Section 3.5.2 above). For radon in occupational settings, the NORM Guidelines[123], described in Section 3.5.1 above, were developed jointly by a federal-

[120] For more information on the pilot studies, see: BC Lung Association, Radon Aware website: http://www.radonaware.ca/indoor-radon-studies/index
[121] Peterson et al, 2013. *Supra* note 46.
[122] Ontario Legislature, Bill 11, An Act to raise awareness about radon, provide for the Ontario Radon Registry and reduce radon levels in dwellings and workplaces, Session 1, Parliament 41 (First Reading Carried July 10, 2014), online: http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&BillID=3003&detailPage=bills_detail_the_bill.
[123] Health Canada, 2013. *Supra* note 67.

provincial-territorial Working Group to address Naturally Occurring Radioactive Materials (NORM) and thus include radon. They address occupational settings outside the nuclear fuel cycle (where jurisdiction is federal) and ostensibly apply to a wide range of occupations where NORM exposure is known to occur due to the types of materials that are handled (referred to as NORM activities). However, they also apply where radon exposure occurs in workplaces in the same manner as in a home or other building, that is, via the infiltration of radon from soil. The NORM Guidelines consider these "incidentally exposed workers" as members of the public who work in an occupational exposure environment and whose regular duties do not include exposure to NORM sources of radiation.[124]

Also as noted in the Section 3.5.1 discussion of the NORM Guidelines, NORM-related activities fall under the jurisdiction of provincial/territorial governments. However, there is uncertainty around the applicability of the NORM Guidelines to incidentally exposed workers versus workers engaged in NORM activities.[125] As a result, workplaces which may have high indoor radon levels due to the infiltration of radon into buildings may neither apply the NORM Guidelines, nor have any provincial/territorial health and safety exposure limits in place. This lack of clarity on the applicability of the NORM Guidelines extends to the enforcement branches of provincial/territorial occupational health and safety standards. Not all departments responsible for investigating compliance with occupational health and safety requirements under provincial/territorial law take the NORM Guidelines into consideration when assessing workplace complaints, work refusals or issuing orders with respect to remedying workplace hazards.

Beyond this uncertainty around provincial/territorial application of the NORM Guidelines, there is no explicit regulation of radon in indoor air (such as testing or mitigation requirements) in provincial/territorial occupational health and safety legislation/regulations.

While such legislation is designed to address workplace conditions, including aspects of indoor air quality, the focus has tended to be on industrial exposures.[126] However, some pieces of occupational health and safety legislation provide workers with protection either through indoor air quality or ventilation requirements. For example, in New Brunswick, Part III of the General Regulation,[127] under the *Occupational Health and Safety Act,*[128] explicitly addresses employers' duties with respect to indoor air quality, and the regulation defines "air contaminant" to include "any gas, fume, smoke, vapour, dust or other airborne concentration of a substance that may be hazardous to the health or safety of a person".[129] Under the regulation, employers are required to ensure that workplaces are well ventilated;[130] that worker exposures to air contaminants fall

[124] Health Canada, 2013. *Supra* note 67.
[125] Personal communication with provincial and territorial Ministries of Labour yielded mixed results with respect to the applicability of the NORM Guidelines to workplaces not engaged in NORM activities (i.e., incidentally exposed workers).
[126] Pollution Probe, 2000. *Supra* note 20.
[127] General Regulation, NB Reg 91-191, online: http://canlii.ca/t/l3r6.
[128] *Occupational Health and Safety Act*, SNB 1983, c O-0.2, online: http://canlii.ca/t/js5h
[129] General Regulation, NB Reg 91-191, at s. 2.
[130] *Ibid* at s. 20.

within threshold limits; and that air contaminants are kept at a level of concentration that does not constitute a hazard to the health or safety of an employee.[131]

Likewise, in Nova Scotia, the General Regulations,[132] enacted under the *Occupational Health and Safety Act*[133] requires employers to provide fresh air in the workplace sufficient to "render harmless all gases, vapours, dust or other impurities that are likely to endanger the health or safety of any person."[134] Similarly, in British Columbia, employers are required to investigate indoor air quality complaints and to take samples of airborne contaminants.[135]

In the absence of legislation providing explicit indoor air quality or ventilation requirements, the "general duty clause" in occupational health and safety legislation applies. This general duty is one which requires employers to maintain a safe workplace, and is common to all Canadian occupational health and safety legislation.

As well, the federal Radon Guideline can be applied if dealing with public buildings that are also considered 'dwellings' under the Radon Guideline (such as: jails, care residences, hospitals, schools). Such places are also workplaces and fall under provincial and territorial labour legislation whereby remediation requirements can be imposed under health and safety legislation with reference to the Radon Guideline.

4.3 Occupiers' Liability Legislation

Occupiers' liability refers to the duty that occupiers of property have toward those invited onto their property. The term "occupiers" generally refers to those with physical control of, or control over the conditions of, property (including buildings and their premises). Occupiers, therefore, can be property owners, landlords, tenants, as well as those responsible for security or maintenance, and there can be multiple occupiers (as in the case with landlord/tenant relations).[136] Under the common law, occupiers of premises have an affirmative, non-delegable duty of care to invitees onto their property. The common law has established the following as pre-requisites for attaching liability upon the occupier: (1) the damage must have been caused by an unusual danger; (2) the danger must be one about which the occupier knew or ought to have known; (3) the occupier must have failed to use reasonable care to prevent the invitee's injury or damage from the unusual danger; and (4) the invitee must have employed reasonable care for his or her own safety and security.[137] Several provinces in Canada have enacted occupiers' liability legislation (including: Alberta,[138] British Columbia,[139] Manitoba,[140] Nova Scotia,[141] Ontario[142]

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[131] *Ibid* at s. 24(1)
[132] Occupational Safety General Regulations, NS Reg 44/99, online: http://canlii.ca/t/5221j
[133] *Occupational Health and Safety Act*, SNS 1996, c 7, online: http://canlii.ca/t/lflb
[134] Occupational Safety General Regulations, NS Reg 44/99, at s. 15.
[135] Occupational Health and Safety Regulation, BC Reg 296/97, Part 4 — General Conditions, ss. 4.79 (1), (2), online: http://canlii.ca/t/52326
[136] Note however that whether a party is determined an 'occupier' depends on their actual control over the conditions of the premises and a landlord may, depending on the circumstances of a case, not have an obligation to repair or inspect the property. See: *Musselman et al v. 875667 Ontario Inc. et al*., 2012 ONCA 41
[137] *Indemaur v. Dames* (1866) L.R. 1 C.P. 274
[138] *Occupiers' Liability Act*, RSA 2000, c O-4, ss. 5-6, online: http://canlii.ca/t/j95m
[139] *Occupiers' Liability Act*, RSBC 1996, c 337, online: http://canlii.ca/t/51vbv

and Prince Edward Island[143]). The common law is in effect in provinces and territories that have not enacted such legislation. In Quebec, occupiers' liability is codified in the Civil Code.

Provincial occupiers' liability legislation generally supersedes the common law and imposes a duty of care on the occupier for the safety of those making use of their premises (property and buildings included). Where such statutes exist, they stipulate the required standard of care. Most such legislation has framed the statutory duty on occupiers quite generally (establishing the duty as one to take reasonable care in the circumstances to make the premises safe.) What constitutes reasonable care will necessarily be specific to each fact situation,[144] and many such Acts include a proviso "such care as in all circumstances of the case."[145] For additional detail on provincial/territorial occupier's liability legislation please refer to Appendix 1.

The Supreme Court of Canada, in *Waldick v. Malcom*[146], clarified the scope of statutory duties owed by occupiers to their visitors. In *Waldick* the plaintiff was injured in a fall on an icy parking area of a rural residential property in Ontario. In considering the statutory duty under Ontario's *Occupiers' Liability Act*,[147] the Supreme Court of Canada found that the onus on occupiers extends to inspecting the premises and that 'doing nothing at all' in the face of a known risk does not satisfy the standard of 'reasonable care'. Note that provincial/territorial legislation may eliminate the application of the common law test of 'unusual danger.' This is the case, for example, in the Alberta *Occupiers' Liability Act*[148] whereby occupiers are required to meet a standard of "reasonable care."[149]

As with the common law, provincial/territorial occupiers' liability legislation provides that an occupier cannot passively rely upon lack of knowledge of the premises' condition, but has a positive duty to inspect and take whatever reasonable steps are necessary to ensure its premises are safe. For example, the Ontario legislation has been deemed to require "positive action on the part of occupiers to make their premises reasonably safe."[150]

The court in *Waldick v. Malcom*[151] also considered the applicability of local custom to the determination of what constitutes reasonable care. The Court held that, as in the law of negligence, compliance with local custom is not determinative of whether a particular defendant met the requisite standard of care, stating that "the existence of customary practices which are unreasonable in themselves, or which are not otherwise acceptable to courts, in no way ousts the duty of care owed by occupiers" and further that "no amount of general community compliance

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[140] *The Occupiers' Liability Act*, CCSM c O8, online: http://canlii.ca/t/kb4v
[141] *Occupiers' Liability Act*, SNS 1996, c 27, online: http://canlii.ca/t/jq6d
[142] *Occupiers' Liability Act*, RSO 1990, c O.2, online: http://canlii.ca/t/1hwc
[143] *Occupiers' Liability Act*, RSPEI 1988, c O-2, online: http://canlii.ca/t/k3rn
[144] *Waldick v. Malcolm*, 1991 CanLII 71 (SCC), [1991] 2 SCR 456, online: http://canlii.ca/t/1fsk3; *Skoog v Canadian Tire* 2013 ONSC 144
[145] *Ibid.*
[146] *Ibid.*
[147] *Occupiers' Liability Act*, RSO 1990, c O.2, online: http://canlii.ca/t/1hwc
[148] *Occupiers' Liability Act*, RSA 2000, c O-4, s. 5, online: http://canlii.ca/t/j95m.
[149] *Stuart v. Canada*, [1989] 2 FC 3.
[150] *Waldick v. Malcolm*, 1991 CanLII 71 (SCC), [1991] 2 SCR 456 at p. 477.
[151] *Ibid.*

will render negligent conduct "reasonable ... in all the circumstances".[152] Likewise, while compliance with industry standards provides support for a defendant having met the standard of care, it is not determinative. Moreover, even adherence to legislated building code requirements is not determinative.[153]

In *Ingles v. Tutkaluk Construction Limited*, the Supreme Court of Canada laid out the duty of inspection owed by municipalities under provincial building legislation and regulations, holding that they must conduct a reasonable inspection in light of all of the circumstances,[154] and that what constitutes a reasonable inspection: "will vary depending on the facts of each case, including the likelihood of a known or foreseeable harm, the gravity of that harm, and the burden or cost which would be incurred to prevent the injury."[155] The Court found that the nature of an inspection may need to be more rigorous where an inspector is put on notice of the possibility that a construction project may be defective,[156] or where the work being inspected is integral to the building and could result in serious harm if it is defective.[157]

If a duty of care is owed by a governmental agency to an individual (and that duty is not exempted either by a statutory provision or because it was a true policy decision[158]), then in those circumstances the duty of care owed by the government agency would be the same as that owed by one person to another.[159] However, the standard of care imposed upon the Crown may

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[152] *Waldick v. Malcolm*, 1991 CanLII 71 (SCC), [1991] 2 SCR 456. See also *Stuart v. Canada*, which was a case where the plaintiff was injured from falling over a cement curb in the Calgary International Airport parkade. The parkade had rough flooring and low illumination. The Federal Court of Canada held that Section 3 of the federal *Crown Liability Act* operates so as to make s. 5 of the provincial statute applicable to the federal Crown. Despite signs warning of the condition of the floor, the Court held that the Crown had failed to take reasonable care in making the premises safe for individuals in the plaintiff's position. Stuart v. Canada, [1989] 2 FC 3. In *Stuart*, the court discussed the test for determining whether a danger is 'unusual'. Although the illumination of the parking lot was in accordance with standards at the time, the Court found that in combination with the design of the parkade floor it created an 'unusual danger'. The court laid out that the test of whether a danger is an 'unusual' one is an objective one, determined by whether or not the danger is one usually found in carrying out the activity for which the invitee came onto the property. Consideration was given to how easily the situation could have been remedied. Actual knowledge by the plaintiff is not relevant.

[153] *Musselman et al v. 875667 Ontario Inc. et al*., 2012 ONCA 41. In *Musselman et al v. 875667 Ontario Inc. et al*., the Court found the City of Toronto as well as the tenant/occupier liable for the unsafe condition of a staircase in a restaurant leading to basement washrooms. See: *Musselman et al v. 875667 Ontario Inc. et al*., 2010 ONSC 3177, aff'd in: *Musselman et al v. 875667 Ontario Inc. et al*., 2012 ONCA 41

[154] *Ingles v. Tutkaluk Construction Ltd*., 2000 SCC 12, online: http://canlii.ca/t/527s.

[155] *Ibid*.

[156] *Ibid*.

[157] *Ibid*.

[158] Whether a decision is a policy decision depends on the nature of the decision – not the actors. For example, decisions concerning budgetary allotments government agencies should be classified as policy decisions.

[159] *Just v. British Columbia*, 1989 CanLII 16 (SCC), [1989] 2 SCR 1228, online: http://canlii.ca/t/1cff2. In setting out these principles that govern the Crown's liability in tort, the Supreme Court of Canada affirms that, as a general rule, the traditional tort law duty of care applies to a government agency in the same way as it applies to individuals. As such, it must be determined that there is a *sufficient proximate relationship* between the aggrieved party and the government agency to warrant the imposition of a duty of care. There are two exemptions specific to the government, which must be considered in determining liability, and these are: (1) whether there is an explicit statutory provision exempting the Crown from liability; and (2) whether the negligent act in question arises from a pure policy decision. Note that a distinction is drawn throughout between policy and operational decisions. True policy decisions do not give rise to liability, however the implementation of these decisions may well be subject to claims in tort. See: *Just v. British Columbia*, 1989 CanLII 16 (SCC), [1989] 2 SCR 1228, at 1240-1245, online:

not be the same as that owed by an individual, and in some cases may be less stringent (such as in cases where the government is responsible for hundreds of kilometres of highways, or hectares of national parks). To determine this governmental standard of care, regard must be had to the circumstances; the frequency and method of inspection must be reasonable in light of all the surrounding circumstances, with consideration given to the nature and quantity of the risk involved, as well as the government's budgetary limits, and the personnel and equipment available.[160] That said, the courts have held that, unless there are special circumstances which may warrant a modification of the standard, there is no sound reason why the standard of care owed by the government ought not to be the same as that owed by one person to another's duty in respect of its ownership and operation of a public building which is visited daily by the general public.[161]

As such, if an occupier of a public building knew or ought to have known of the presence of high levels of radon, and someone is injured from exposure to radon, then the occupier may be held liable. Note that if an occupier has been provided with an indication as to potential risks of harm that may be faced by persons on their premises, and the occupier does nothing to mitigate that risk, it is less likely that the defendant will be found to have met the standard of care.[162] The extensive public outreach about, and testing for, radon conducted by the federal and provincial governments may amount to such 'notice,'[163] and will depend on to what extent: the danger was foreseeable or known; the occupier's conduct complied with acceptable standards of practice; there was an adequate system of inspection in place; and whether the risk could have been easily remedied.

4.4 Real Estate Transactions: Real Estate Law and Home Warranty Protection

The testing of private homes for radon is currently not required during real estate transactions in Canada. The common law principle of caveat emptor, or 'buyer beware,' is applicable to the purchase and sale of real property. In the absence of a property disclosure statement, a seller is not required to disclose all known facts affecting the value of property which may be material to the buyer. Unless hidden or intentionally disclosed, or serious enough to amount to a

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http://canlii.ca/t/1cff2. See also: *Province of New Brunswick v. Richard et al*, (2009 NBCA 40 (CanLII), online: http://canlii.ca/t/244z1), which was a case dealing with a province's negligence in relation to highway design, and failure to consider human factors (installation of warning signage). Five weeks after a highway was newly designed and constructed a driver was killed on a 90 degree turn which lacked signage of the upcoming turn. In its decision, the New Brunswick Court of Appeal found that the province had failed to adequately warn or provide indicators to users of the highway of the upcoming severe turn and that this created an extremely dangerous condition that caused the accident in question to occur. It concluded that this failure constituted a breach of the province's duty to users of the highway.

[160] *Just v. British Columbia*, 1989 CanLII 16 (SCC), [1989] 2 SCR 1228.

[161] In *Thomson v. Newfoundland*, a case where a plaintiff was injured falling on an icy staircase owned by a government agency, the Newfoundland Court of Appeal dismissed the appeal by the government appellant, holding that, in this particular case, the ice on the stairs amounted to an 'unusual danger' which the government appellant was liable because its employees "ought to have known of the hazard and did not take reasonable care to prevent the injury to the respondent". See: *Thomson v. Newfoundland*, 1994 CanLII 9776 (NL CA), online: http://canlii.ca/t/2dxh4

[162] *Mott v. Brantford* (City) 42 MPLR (4th) 261

[163] *Ingles v. Tutkaluk Construction Ltd*., 2000 SCC 12.

health/safety hazard or render the property unusable, the seller has no legal obligation to disclose to a potential buyer any deficiencies in the property. Generally, the seller's obligation to disclose will depend on whether there was actual knowledge of the defect.[164]

Some provinces have property disclosure statements annexed to prescribed forms under real estate legislation/regulations which provide for optional disclosure with respect to the presence of radon gas. Property disclosure statements are based on the seller's actual knowledge of the physical condition of the property, and may result in remedies in the case of a defect which would not otherwise have been available. In some cases property disclosure statements include disclosure with respect to the presence of radon gas. For example, in Québec it is recommended that seller's declarations include a reference to radon.[165]

In Manitoba, the Real Estate Brokers Regulation,[166] under the *Real Estate Brokers Act*, provides an optional Property Disclosure Statement annexed to a prescribed form.[167] It includes a sentence that the Seller indicate whether they are aware if any building on the property contains, or if the they have any reason to believe that it once contained radon gas. The form provides that the disclosure is to be "based on the Seller's actual knowledge and the accuracy of his or her recollection". While the Seller is required to give true and accurate responses based on his or her knowledge, the regulation provides that the responses in the disclosure form "do not constitute warranties as to the actual condition of the property."[168]

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. In general in Canada, if the seller has not tested for radon, and does not possess actual knowledge of any high levels, there is likely no implied warranty in relation to radon. In determining the existence of an implied warranty, consideration is given by

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[164] For an overview of legislated disclosure obligations across Canada see: Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf

[165] D14.9 À votre connaissance, y a-t-il d'autres facteurs dont vous n'avez pas fait état dans les présentes déclarations (ex: projet de développement ou de construction, problèmes environnementaux [par exemple : radon], bruit anormalement élevé, odeurs nauséabondes, etc.)? See: Health Canada, "Séance d'information sur le radon a l'intention des MRC de Québec" (January 2010), online: http://extranet.santemonteregie.qc.ca/userfiles/file/sante-publique/sante-environnementale/QAE-RAD-Radon-Info-MRC.pdf.

[166] Real Estate Brokers Regulation, Man Reg 56/88 R, online: http://canlii.ca/t/51v09.

[167] The *Real Estate Brokers Act* requires that the printed form of offer and printed form of acceptance (for a single family residential house or single family residential unit in a Condominium) be in a prescribed form (attached in Schedule A of the Regulation). Form 1 of the Schedule (Residential Form of Offer to Purchase), which is prescribed under The *Real Estate Brokers Act* for the purchase of single family residential houses, requires the Seller to complete a Property Disclosure Statement in a prescribed form (found in Appendix A) (Real Estate Brokers Regulation, Man Reg 56/88 R, Schedule A, Form 1). Appendix A (Appendix A to Residential Form of Offer to Purchase – Property Disclosure Form) under paragraph 15 provides a list of substances, including radon gas, and requires that the Seller indicate whether they are aware if any building on the property contains, or if they have any reason to believe that it once contained, any substance in the list. Real Estate Brokers Regulation, Man Reg 56/88 R, Schedule A, Form 1, s. 7, online: http://canlii.ca/t/51v09.

[168] Real Estate Brokers Regulation, Man Reg 56/88 R, Appendix A to Residential Form of Offer to Purchase – Property Disclosure Statement, online: http://canlii.ca/t/51v09.

the courts to the express wording of the real estate agreement. Most standard form real estate terms exclude any implied warranties by express provision in the agreement.

In Quebec, radon in indoor air may be considered a latent defect[169] if it meets the test as laid out in Article 1726 of the Civil Code of Quebec (CCQ), in that it is serious, not apparent, existing at the time of sale, but unknown to the buyer at the time of sale. A seller is bound to declare defects in the property to be sold if he or she knows about them, and failing to do so may be found by the courts as an intent to mislead the buyer requiring, under Article 1728 of the CCQ, the seller to restore the sale price as well as be bound to pay all damages suffered by the buyer. Under Quebec law, a defect may only be considered latent if it is determined that a prudent and diligent buyer could not have uncovered its presence. While a buyer cannot force a seller to test for radon, a buyer is able to conduct such a test at his/her own expense and is entitled to make an offer to purchase conditional on the completion radon remediation.[170] For more information on the law in Quebec please refer to Appendix 1.

With respect to the issue of "latent defect," in *Robert junior Beaudet c. François Bastien,*[171] the Court reviewed relevant case law and found that in the case of a building already constructed, the soil on which it is built can be a latent defect whether the cause is man-made (contamination) or natural.[172] In *Pouliot c. Leblanc,* homebuyers found the house to be above the federal Radon Guideline reference level. The buyers remediated and brought an action for the cost of the remedial actions. The court dismissed the action, finding for the defendants. In coming to its decision, the court considered whether a defect of the soil can amount to a latent defect under the *Quebec Civil Code*; whether a radon level above the federal Radon Guideline reference level of 200 Bq/m^3 can amount to a latent defect in the absence of a defect in construction; and the conditions required to establish a latent defect. In *Pouliot* the Court referred to information on the risk to health from exposure to radon, on which the federal Radon Guideline is founded and found that the risk depends on the level of exposure over the long term. The Court held that the use of the property was not compromised. The Court noted that in a real estate transaction a seller is required to disclose radon levels, if known.

A contrasting approach to real estate transactions in the UK is worth noting here.[173] A Radon Retention or Bond is an agreement entered into by the buyer and seller of a home. The bond is retained by the purchaser and held in trust, e.g., by a lawyer. After the home is purchased, a radon test can be done and the bond can pay for radon remediation, if it is necessary. If not, the funds are returned to the seller. This approach ensures that a proper long-term radon test is done, a step that may be impractical during the time available when the home is being offered for sale, and avoids any chance of the seller tampering with the test to avoid the consequences of a high result.

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[169] The French term for 'latent defect' is "vices caches." For discussion on the distinction between soil in its natural state versus contaminated soil and respective applicability of the concept of latent defect, see: *Robert junior Beaudet c. François Bastien* (2007 QCCQ 13454).
[170] CAA Quebec, "Radon in the House: Legal Questions", online: https://www.caaquebec.com/en/at-home/advice/tools-and-references/radon-in-the-house/legal-questions/
[171] *Robert junior Beaudet c. François Bastien* (2007 QCCQ 13454).
[172] For an analysis of the latent defect concept and its application to radon in indoor air, see: *Pouliot c. Leblanc* (2011 QCCQ 7882).
[173] BRE Global Limited: http://www.bre.co.uk/page.jsp?id=3150

Home warranty legislation is another tool enacted in several provinces and territories (including Alberta,[174] British Columbia,[175] Manitoba,[176] Ontario,[177] and Quebec[178]) 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. Seller's declarations are also beginning to include reference to radon.[179]

As well, some public health legislation (including Alberta,[180] British Columbia,[181] and Saskatchewan[182]) provide protections for purchasers in that where an order is issued, the regional health authority may file a notice of the health hazard with the Registrar of Land Titles.

4.5 Education Legislation

Education legislation in the provinces and territories generally incorporates provisions relating to the health, safety, and welfare of students, but is silent on the issue of indoor air quality. Provincial/territorial statutes usually impose responsibilities on school boards and their employees to supervise pupils, ensure cleanliness, provide ventilation, inspect equipment, and undertake related obligations.

These legal responsibilities are in addition to those existing in common law, primarily associated with the law of negligence.[183] Note that in addition to the above-described statutory duties, school staff and school boards may have common law duties of care to their students that are applicable to this topic. With a relationship that is fiduciary in nature, school authorities must conduct themselves in the same manner as a careful and prudent parent including the duty to guard against inherent and foreseeable elements of risk in the activities of the students.[184]

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[174] *New Home Buyer Protection Act*, SA 2012, c N-3.2, online: http://canlii.ca/t/525bd; New Home Buyer Protection (General) Regulation, Alta Reg 211/2013, online: http://canlii.ca/t/524nb. See also: Home Warranty Insurance Regulation, Alta Reg 225/2013, online: http://canlii.ca/t/524xn

[175] *Homeowner Protection Act*, SBC 1998, c 31, online: http://canlii.ca/t/51vmp

[176] *The New Home Warranty Act*, SM 2013, c 23, [not yet in force], online: http://canlii.ca/t/5253t.

[177] *Ontario New Home Warranties Plan Act*, RSO 1990, c O.31, online: http://canlii.ca/t/kqb6.

[178] The Civil Code of Quebec provides a five-year warranty (after building completion) against hidden defects. See:

[179] For example, in Québec it is recommended that seller's declarations include a reference to radon:

> D14.9 À votre connaissance, y a-t-il d'autres facteurs dont vous n'avez pas fait état dans les présentes déclarations (ex: projet de développement ou de construction, problèmes environnementaux [par exemple : radon], bruit anormalement élevé, odeurs nauséabondes, etc.)?

See: Health Canada, "Séance d'information sur le radon a l'intention des MRC de Québec" (January 2010), online: http://extranet.santemonteregie.qc.ca/userfiles/file/sante-publique/sante-environnementale/QAE-RAD-Radon-Info-MRC.pdf.

[180] *Public Health Act*, RSA 2000, c P-37, s.64 (1).

[181] *Public Health Act*, SBC 2008, c 28, s. 36.

[182] *Public Health Act*, 1994, SS 1994, c P-37.1, s. 29(1).

[183] Pollution Probe, 2000. *Supra* note 20.

[184] See for example: *Myers et al v. Peel County Board of Education* (1981), 123 D.L.R (3d)1 (S.C.C.); *Sked v. Henry* [1991], O.J. No. 339 (Ont. Crt. Gen. Div.); *Moddejonge v. Huron County* (1972), 2 O.R., 37(H.C.); *Portelance et al v. Board of Trustees of Roman Catholic Separate School* [1962], O.R. 365, (C.A.))

Many school boards have implemented radon testing. Information on the nature and scope of testing, remediation, and public disclosure is difficult to ascertain given variance by province/territory and by school board. While some school-based radon programs have been mandatory and province-wide, others have been informal, or pilot projects.[185] Consistency in terms of test results, and follow-up, being made publicly available also varies widely and is difficult to discern. An example, however, is Quebec, in which two pilot project have been implemented in primary schools. The first took place in 2007, and included testing in certain public elementary schools and public buildings within the municipalities of MRC de Granit and Haut-Saint-Francois. The results from this pilot project indicated elevated levels of radon in the indoor air of some public buildings and prompted a second pilot project focused on testing elementary schools situated in three priority zones. This second pilot project was part of an Intersectoral Action Plan on Radon (Plan d'action intersectoriel québécois sur le radon), and was put into effect by l'Institut national de santé publique du Québec (INSPQ), in collaboration with the Ministry of Health and Social Services, Ministry of Education, Leisure and Sport, Health Canada, as well as others. Funding for this program was provided by Health Canada and le ministère de la Santé et des Services sociaux du Québec.[186]

4.6 Environmental Legislation

As noted above, environment is an area of shared jurisdiction between the federal government and the provinces/territories. While legal definitions of 'environment' have been expanding in recent years to capture social, economic and cultural factors, the focus of environmental legislation in Canada has historically been on the outdoor environment. This stems, in part, from the development of environmental law in Canada and the nature of the environmental problems most pieces of environmental legislation were originally enacted to address. It is further compounded by the complexity inherent in attempting to regulate the indoor environment. While the existence of indoor air quality problems has led to increased attention on the regulation of sources contributing to indoor air pollution (such as via the federal regulation of consumer products or their component chemical ingredients), the majority of government action on indoor air has been in the form of guidelines, rather than regulatory requirements.

Environmental legislation that may be applicable includes laws that define 'environment' with explicit reference to 'buildings', and 'enclosed air.' For example, the Ontario *Environmental Assessment Act* (EAA)[187] includes explicit reference to 'buildings', 'enclosed air' and 'humans' in its definition of 'environment.'[188] The EAA is legislation that requires project proponents

[185] See: Patrick Poulin & Jean-Marc Leclerc, Rapport de recherche: "Projet de dépistage du radon dans des écoles primaires du Québec situées en zones d'investigation prioritaires," : Institut National de Santé Publique du Québec (April 2012), online: http://www.inspq.qc.ca/pdf/publications/1476_ProjDepistRadonEcolesPrimQc.pdf

[186] *Ibid*. For information about other radon testing programs that have been implemented since the early 1990's see Section 3.3.

[187] *Environmental Assessment Act*, RSO 1990, c E.18, online: http://canlii.ca/t/kxbr

[188] *Ibid*. "Environment" is defined in the Act as: (a) air, land or water, (b) plant and animal life, including human life, (c) the social, economic and cultural conditions that influence the life of humans or a community, (d) any building, structure, machine or other device or thing made by humans, (e) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or (f) any part or combination of the foregoing and the interrelationships between any two or more of them, in or of Ontario.

(public sector and designated private sector) undergo an environmental planning process outlining their proposed project and its environmental effects. The EAA explicitly includes the built environment ("any building, structure, machine or other device or thing made by humans") in its definition of 'environment', and includes enclosed air in its definition of 'air.' While indoor air issues have not been a predominant issue under the Act, the EAA has potential to apply to indoor air quality problems in the context of the establishment of projects subject to the Act, such as new, or significant additions to, public buildings.[189]

Although several pieces of environmental legislation could potentially be utilized for the establishment of regulations specific to radon in indoor air, an analysis of these law reform opportunities is beyond the scope of this report which is focused on existing enactments.

4.7 Public Health Legislation

Like environment, health is an area of shared jurisdiction between the federal government and the provinces/territories. Both the federal and provincial/territorial governments have enacted health legislation that grants broad authority to promote and protect public health.[190] However, as is the case with environmental legislation, most public health legislation so far lacks specificity in terms of application to indoor air, and regulatory authority over either radon protection specifically, or indoor air quality generally, has usually been exercised in cases involving contaminated land with pathways to nearby residences, or other significant sources presenting a hazard to human health.

Under public health statutes, geographic areas of responsibility are designated and local/regional public health agencies established. These agencies are, in turn, responsible for program and service delivery. They have their own governance structure, but are governed by provincial/territorial law, regulations, policies, directives and conditions of funding (See further discussion in Section 5.0 below regarding the Municipal Role in Radon Protection).

Public health agencies are provided with inspection and enforcement powers, in the course of which they interpret and implement legislative requirements. Among these requirements, regional public health inspectors can respond to complaints regarding indoor air quality that may pose human health risks. In the context of radon in indoor air, complaints may arise where users of a building do not have control over its condition, maintenance, or repair, such as can be the case with public and tenanted buildings.

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[189] *Environmental Assessment Act*, RSO 1990, c E.18. See also: Pollution Probe, 2000. *Supra* note 20.

[190] For example, the federal *Department of Health Act* provides the Minister of Health the 'powers, duties and functions' which include promoting and preserving the physical, mental and social well-being of the people of Canada; protection against risks to health and the spreading of disease; investigating and research into public health; and the promotion and preservation of the health of public servants and other employees of the Government of Canada (SC 1996, c 8) s.4 (2)). Similarly, Alberta's *Health Act* includes provisions for the appointment of a Health Advocate and establishment of a Health Charter, and states that the provision of health care services are the responsibility of health authorities (*Alberta Health Act*, SA 2010, c A-19.5, ss. 2, 3,7). Likewise, Ontario's Ministry of *Health and Long Term Care Act* requires the Minister to advise the Ministry on issues relating to the health of Ontarions, and oversee and promote health. It also details responsibilities relating to the provision of health services in the province (*Ministry of Health and Long-Term Care Act*, RSO 1990, c M.26, s.6 (1)).

The presence, or suspected presence, of a 'health hazard'[191] is usually the trigger for an inspection and/or order by a public health official. 'Health hazards' are often broadly defined, including the conditions of premises, and the presence of a particular substance (in some cases specifying gases) which is, or is likely to be, a threat to public health.[192] Inspection powers are largely the same within each province/territory, including powers to inspect both public and private property, including private residences ('dwellings'). The procedural requirements for undertaking an inspection of a dwelling are more onerous, and often require that the inspector have 'reasonable and probable grounds' to believe a health hazard exists, that inspections occur at 'reasonable times', and that there is either consent by the property owner or a warrant to enter for the purposes of the inspection. In tenanted buildings in which there are both private and public spaces (e.g., in an apartment building, or a shared house) the public health inspection powers must air on the side of caution and apply the more stringent procedural requirements for entry of private dwellings.[193]

Once right of access has been acquired, public health legislation generally confers powers to inspect the premises, including the powers, among others, to request information and documents and conduct tests on the premises.[194] If, after inspection, there are grounds to believe that a health hazard exists, or that there has been a contravention of the legislation or related regulations, a public health inspector may issue an order. Orders are generally permitted to include conditions such as: requiring the building be vacated, closed, or its use regulated; declaring the building unfit for human habitation; requiring the doing of work specified in the order; and requiring the removal of anything that the order states causes a health hazard.[195]

While generally quite broad, public health inspection and enforcement powers are also intended to be case-specific. For example, under Ontario's *Health Protection and Promotion Act* (HPPA), both the definition of 'health hazard' and an inspectors' power to issue orders have been held to be broad, but only applicable in case- or site-specific contexts.[196] For example, in *Pelletier v. Northwestern Health Unit*, it was held that a medical officer of health's authority does not include orders that are general in nature and applicable across the health unit.[197] Note that in *Pelletier*, the Court did not take issue with the characterization of second hand smoke as a health

[191] All provinces and territories adopt the term 'health hazard' except for Alberta (which used the term 'nuisance') and Quebec (which uses the term 'threat to health').
[192] For additional information on how each provincial/territorial Act defines 'health hazard' see Appendix I.
[193] *BPCL Holdings v. Alberta (BPCL Holdings v. Alberta,* 2006 ABQB 757. For example, in *BPCL Holdings* an application challenging minimum building standards required under provincial public health legislation, an Alberta court was asked to consider the distinction between private health and public health, and private spaces and public spaces. With respect to the public versus private space distinction, the building in question was rental accommodation, and the Act clearly included "all rental accommodation" in its definition of public space. The Court's discussion shed light, however, on the nature of the powers provided under the Act with relation to public vs. private spaces, noting the broad powers to regulate public space (such as the "location, operation, equipping and maintaining of public places" (found in s. 66(1)(s) of the Act) and the broad powers (under s. 59) to enter and inspect any public place) versus the much narrower powers (under s. 60) to enter and inspect any private place. The Court held that a rental apartment building appears to encompass elements of both private dwellings and a public place, and a public health officer wishing to enter an apartment unit for the purposes of inspection may have to comply with both, which effectively means that the more stringent provisions in paragraph 60 would apply.
[194] See e.g., *Public Health Act*, RSA 2000, c P-37, s.59, 60.
[195] See e.g., *Public Health Act*, RSA 2000, c P-37, s.62.
[196] *Pelletier v. Northwestern Health Unit*, 205 O.A.C. 391, 262 D.L.R. (4th) 688.
[197] *Ibid.*

hazard, or with the issuance of orders in relation to second hand smoke, but rather with the nature of the orders and their role in part of a larger health unit-wide ban which infringed on the legislative jurisdiction of the municipality. The reason the medical officer of health's orders were found to go beyond the statutory authority conferred by the Act were because they were (1) not remotely similar in kind to the illustrative list,[198] and (2) that the nature of the orders issued were not case- or site-specific as contemplated by the Act, but general in nature amounting to a ban applicable across the entire health unit, which prohibited, absolutely and indefinitely, an otherwise lawful activity.[199]

Notwithstanding the results in this case, powers of inspection and enforcement are generally drafted broadly enough to include hazards to health in indoor air, and public health agencies have the discretion to enforce the federal Radon Guideline when assessing air quality complaints. There is a clear avenue for enforcement of the Radon Guideline in jurisdictions that have adopted the Guideline's recommended reference level into provincial/territorial legislation. However, to date, there is no incorporation of the federal Radon Guideline into provincial/territorial legislation, with the exception of Ontario's Building Code (as discussed in Section 4.1 above). Even without incorporation into provincial/territorial legislation, the federal Radon Guideline can be relied on for enforcement of public health legislation. This ability to rely on the federal Radon Guideline is because, in general, public health inspectors require a rationale in order to issue an order[200] and solid scientific evidence links radon exposure in indoor air to cancer risk. Moreover, radon is a health hazard even at levels lower than the current federal Radon Guideline reference level of 200 Bq/m^3.[201] For example, the radon burden of illness study conducted by public health officials in Ontario suggests that the current action level of 200 Bq/m^3 is not low enough, predicting that the lower level of 100 Bq/m^3 (the level also recommended by the World Health Organization[202]) could more than double the prevention of radon-attributable lung cancer deaths (from 91 to 233 deaths) annually.[203]

While there must be grounds for a public health official to make a finding that a health hazard exists, an inspector's expertise is given a lot of weight in coming to that decision.[204] Note that health hazards need not be limited to situations of *immediate* adverse effects on the health of any person,[205] and public health legislation does not generally require damages as a precondition to a

[198] *Ibid* at 39. The list was included under s. 13 of the Act.
[199] *Pelletier v. Northwestern Health Unit*, 205 O.A.C. 391, 262 D.L.R. (4th) 688 at paras 30, 39.
[200] For example, in Ontario, the standard of proof to be applied in determining that a health hazard exists is neither the criminal standard (i.e., beyond a reasonable doubt) nor the civil standard (i.e., balance of probabilities). Instead, it must be, based upon the evidence, that there are 'reasonable and probable grounds' to conclude that a health hazard exists, and that the requirements of the order are necessary to decrease the effect of or eliminate the health hazard. See: *Westend Development Corp. v. Peel Regional Health Unit*, 1994 Carswell Ont 5688, paras 34-35.
[201] Personal communication with Emily Petersen, Public Health Ontario, April 3, 2014.
[202] World Health Organization, 2009. *Supra* note 37.
[203] See: Peterson et al., 2013, *Supra* note 46.
[204] See for example, *Westend Development Corp. v. Peel Regional Health Unit*, 1994 CarswellOnt 5688. In *Westend*, in assessing whether pooling sewage in the basement of a residential rental unit amounted to a health hazard, the Board accepted the Public Health Inspector's opinion as expert evidence.
[205] This is the case, for example, under Ontario's public health legislation. For a case addressing this issue see: *Hou v. Toronto (City) Public Health*, 2006 Carswell Ont 9250 where the Ontario Health Services Appeal and Review Board denied an appeal of the Public Health Inspector's order, issued under s. 13 of the HPPA, requiring a building owner to assess and remediate mould contamination. The Board held that there were 'reasonable and probable

health hazard order or charge. Likewise, the lack of actual damage is not a defence to a charge, nor a ground to resist, an order. It is generally sufficient that non-compliance with the legislation, or regulations, *could* cause damage.[206] For example, in an appeal of an order with respect to mould in indoor air, the Ontario Health Services Appeal and Review Board assessed the standard of proof required by s.13 of the HPPA to issue an order, finding that "the proof of a health hazard need not be actual; no one need have died or have become infected before the public health inspector is authorized to act. It is sufficient if the public health inspector establishes that his or her concern for a health hazard is informed by scientific literature and exercised fairly and suitably under the circumstances."[207] Additionally, public health legislation generally includes provisions noting that the Act is binding on the Crown, and may provide immunity for the Crown from civil liability for damages, e.g., if a property owner objects to an inspector's order.

In addition to powers with respect to health hazards, public health legislation can also set minimum standards with respect to building maintenance and repair requirements, which may include requirements that owners/occupiers maintain buildings in a safe condition.[208] The limits on such a maintenance requirement depends largely on the wording of each provincial/territorial law and the related regulation-making powers, but generally minimum standards for buildings can be understood to be *intra vires* (within the power of) such legislation insofar as non-compliance would pose a threat to public health.[209] While public health legislation cannot

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grounds' that a health hazard existed and the Order was necessary to decrease the effect of or eliminate the health hazard. After an inspection, and in coming to the conclusion that the mould was a health hazard, the Public Health Inspector issued a mould order requiring the building owner to take "all necessary remediation work to eliminate mould contamination within the building." The Board found that "the proof of a health hazard need not be actual; no one need have died or have become infected before the public health inspector is authorized to act under s. 13. It is sufficient if the public health inspector establishes that his or her concern for a health hazard is informed by scientific literature and exercised fairly and suitably under the circumstances" (para 36). In coming to its conclusion that mould growth may be a health hazard, the Board noted that 'health hazard' under the HPPA is not limited to situations of *immediate* adverse effects on the health of any person. The Board also noted that a Toronto Public Health Policy and Procedure document does not provide guidelines respecting what amount, location or type of mould becomes a public health hazard, but rather that a designation of mould as a public health hazard should be based on the onsite, case by case, situation.

[206] See for example: *R. v. Princeton Capital Credit Inc,* (2012 ABPC 234) in which the property owners/managers were required to remediate mould caused by a marijuana grow operation run by tenants in a rental unit.

[207] *Hou v. Toronto (City) Public Health*, 2006 CarswellOnt 9250.

[208] For example, Alberta's *Public Health Act* imposes a positive duty on owners to ensure that housing premises are in a safe condition (s. 3(1)(a)(ii)) and maintained in good repair, and in compliance with the *Minimum Housing and Health Standards* (s. 4). In *BPCL Holdings v. Alberta*, an Alberta court concluded that Alberta's *Public Health Act* does not does not grant a power to make regulations "setting minimum housing standards for rental accommodation" as such (*BPCL Holdings v. Alberta,* 2006 ABQB 757, at para 37). In coming to its decision, the court compared public health legislation to building codes, noting that the latter is not retroactive, but applies only at the date of construction, and often incorporates the concept of the "pre-existing, non-conforming use, and insofar as a building is constructed to standard, the owner is usually not required to alter the building even if the applicable code changes. On the other hand, public health legislation which sets building standards applies universally, such that unhealthy conditions are not allowed to remain in place just because they met the prevailing standard when they were first implemented. (See: para 35 citing *Edmonton (City) v. Allarco Developments Ltd.* (1982), 41 A.R. 84, 141 D.L.R. (3d) 174, 20 M.P.L.R. 72 (Alta. C.A.).

[209]Note that in *BPCL Holdings*, building owners sought a declaration that certain enactments related to minimum housing standards under the province's *Public Health Act*, were *ultra vires*, (i.e., beyond the power of the statute), have nothing to do with "public health". The Court in *BPCL Holdings* dismissed the application, finding the regulations and standards in question were not *ultra vires*. Under the Alberta *Public Health Act*, the Lieutenant Governor in Council has the power under the Act to declare any code, standard, guideline, or body of rules 'in force'

attempt to establish construction standards as such (and overlap with the legislative framework of building codes), courts have held that legislated powers under public health legislation to abate health hazards does not allow previously compliant (but now dangerous) conditions to be exempted from regulation.[210] There is a distinction between 'maintenance' and 'construction' of buildings, and public health legislation has been found to have jurisdiction over the former only.[211] However, it is less clear whether the legislation can extend to regulating the structural soundness of a building; whether this can be rightly termed "maintenance" and within the ambit of public health legislative authority depends on whether or not the premises were originally sound.[212] However, as described above, public health authorities have the authority to inspect and issue orders with respect to health hazards. Regardless of its original condition, if a building poses a health hazard, then public health authorities can generally require compliance even if it was originally lawfully constructed, and has not deteriorated or fallen into a state of disrepair.[213]

4.7.1 Opportunities/Barriers under Public Health Legislation

Public health agencies likely have the jurisdiction to conduct inspections in response to complaints about indoor radon, and order remediation when test results are higher than the federal Radon Guideline reference level of 200 Bq/m^3. However, this authority has yet to be exercised as inspections are initiated by complaints, and few (if any) complaints about indoor radon are received by health units.[214]

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and has done so with the *Minimum Housing and Health Standards.* The Court found that public health officers do not have authority to issue orders that have nothing to do with public health, but distinguished between validity of regulations and orders made under the regulations. The court clarified that the fact that orders unauthorized by legislation might be issued by public health officers with an erroneous opinion about the extent of their jurisdiction does not render the regulation or standard which has a 'real and meaningful' connection to public health invalid. Thus, where a regulation is valid, a public health officer cannot use that regulation for matters unrelated to public health issues, even if the action of the officer is literally within the regulation" (paras 29-30). The Court held that public health legislation does not does not grant a power to make regulations "setting minimum housing standards for rental accommodation" as such, but that provisions in regulations relating to housing standards, under public health legislation, must be read as "if it contained the proviso "and that non-repair has an effect on public health" (para 31). See: *BPCL Holdings v. Alberta (BPCL Holdings v. Alberta,* 2006 ABQB 757

[210] *BPCL Holdings v. Alberta (BPCL Holdings v. Alberta,* 2006 ABQB 757, at paras 35-36.

[211] *Ibid*, at paras 38, 39, 41. Note that the Court found that public health authorities are limited in issuing orders with respect to building structure, maintenance and repair to requiring restoration to original condition, and preventing dangers to health (*BPCL Holdings* at para 41). In distinguishing between "maintenance" and "construction" of buildings and concluding that there is no "principled way to include construction standards in the 'maintenance' power under the Public Health Act," (*BPCL Holdings* at para 38) and in deciding on the limits of the term 'maintenance' under the public health legislation, the Court found the term "denotes keeping something in its original condition", and "maintaining in good repair", and "restoring a worn building to its original condition" in contrast to restoring a building to some enhanced condition or "upgrading" or "changing" a building that has not deteriorated over time (*BPCL Holdings* at para 39).

[212] *Ibid*, at para 40. If a building was originally sound, but has since deteriorated, then restoration to the original condition may be rightly considered "maintenance". However, if a building was not 'sound' to begin with, then public health authorities may not require the alterations of the building to meet new structural standards under the guise of "maintenance".

[213] *Ibid*, at para 41.

[214] Personal communication with provincial and territorial Ministries of Health and local public health units indicated that very few radon-related complaints are received by government health agencies from the general public.

Many public health agencies address indoor air quality issues on a regular basis, including hazards such as carbon monoxide, mould, asbestos, etc. A key barrier to addressing radon in indoor air for public health officials is that radon cannot be identified without testing. To date, there have been few to no instances of public health agencies taking enforcement action (i.e., conducting inspections or issuing orders) with respect to radon in indoor air. This is likely attributable to the nature of radon gas being unidentifiable by the senses, the fact that inspections are normally triggered by a complaint by a member of the public, and that to undertake an inspection or form an opinion on the existence of a health hazard, a public health official must have received a complaint backed by a rationale, or supporting evidence on inspection.[215] Furthermore, many public health agencies neither test for radon specifically nor indoor air quality generally. Some public health units provide free testing, some provide test kits available for a fee, and many offer neither.

A progressive example is in Thunder Bay, Ontario where the Health Unit has given out free test kits and is paying for the analysis. In October of 2014 the Thunder Bay District Health Unit sought volunteers from the public to take 500 radon test kits for a city-wide program. With the Health Unit analyzing the results, they will obtain a good survey of radon levels in the community and will provide advice on remediation where levels exceed the federal Radon Guideline reference level of 200 Bq/m^3.[216]

For complaint-based inspections, a difficulty faced by local public health inspectors is that radon tests, to be reliable, must be activated over 3 – 6 months,[217] and it is not possible to conduct a radon test in the course of a single inspection. While a long term (3-6 month) radon test could likely be activated and left on site under the powers of a public health inspector's order, there is a lack of clarity with respect to whether provincial/territorial public health departments would view undertaking a long term radon test of a building as part of their inspection powers; the primary concern being that complaints by the public need to have a rationale sufficient to require an inspection. The power of inspection under public health legislation generally does not explicitly include placement of a long-term radon test, and public health departments may not be willing to undertake an inspection based on the rationale that there are no 'radon free' areas, and any building *may* test high for radon.[218] Complaints arising within regions that have been identified as 'radon high' may not need any additional support for their request for inspection. If complaints by the public are based on high radon test results, public health officials possess the jurisdiction to identify the presence of a 'health hazard,' and issue order(s) for remediation.

In issuing an order for remediation, public health agencies may rely on the federal Radon Guideline, along with supporting scientific evidence of the human health risks from exposure to radon in indoor air. Note that although public health inspectors have the authority to issue health hazard orders against owner-occupied homes, complaints with respect to indoor radon would

[215] Personal communication with Saskatchewan Ministry of Health, April 4, 2014.
[216] The Thunder Bay Radon Project: http://www.tbdhu.com/Highlights/Survey.htm.
[217] According to Health Canada, three months is the very minimum duration for a reliable radon test, with recommendations being "three months or longer." The Health Canada "Guide for Radon Measurements in Residential Dwellings (Homes)" indicates a long term test ranges between 3 - 12 months, with 3 months being the minimum and 12 months optimal. See Part 2 (Radon Measurement Duration: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_homes-maisons/index-eng.php)
[218] Personal communication with public health officials undertaken in the preparation of the present report.

likely only arise where a person occupies a building but is not in a position of control or authority over the building's maintenance and repair (such as in public or tenanted buildings).

At present, what amounts to a health hazard and the appropriate remedial action varies within (due to variances across health units) and across provinces/territories.[219] The governance for public health is often combined with that for other health services, including issues ranging across air and water pollution, food safety and inspections, disease outbreaks and emergency response, and environmental hazards. Boards of health often also have duties and responsibilities under other provincial/territorial laws, including provincial building codes, and environmental, employment, occupational health and safety, municipal, and education legislation. The structure of the board of health may have implications for how it interacts with municipalities on a health issue, such as a building code intervention.[220]

Likewise, the role of medical officers of health varies from province to province depending on the relevant public health framework. Although the delegation of responsibility for health issues to boards of health is intended to provide regionally appropriate responses, as with other areas of health, government roles and responsibilities in relation to radon protection are complex, and there is a lack of clarity on the scope of responsibility and authority within the health sector for radon in indoor air. An upshot to this governance structure is that public health authorities are also well positioned to influence municipal matters. For example, Public Health Unit opinion on what constitutes a 'health hazard' may be relied on by a municipality in taking action under powers conferred under provincial/territorial municipal legislation. The power of municipalities to pass by-laws in respect of health and general welfare has been upheld in cases dealing with municipal prohibitions on pesticides use.[221] In Toronto, the Health Unit's opinion with respect to the effect of pesticide exposure on health was instrumental in developing the municipal by-law restricting the use of pesticides. Following a Supreme Court of Canada decision on the same subject matter, the Toronto by-law was upheld by both the trial court[222] and the Ontario Court of Appeal.[223]

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[219] Personal communication with Public Health Ontario, April 3 2014.
[220] Government of Ontario, "Ontario Public Health Standards" (rev'd May 2014), online: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/ophs_2008.pdf
[221] *114957 Canada Ltée (Spraytech, Société d'arrosage) v. Hudson (Town)*, [2001] 2 SCR 241, online: http://canlii.ca/t/51zx; *Croplife Canada v. Toronto (City)*, 2005 CanLII 15709 (ON CA), online: http://canlii.ca/t/1kg3. Note that in *Hudson* the Quebec municipality's pesticide by-law was challenged. On appeal, the Supreme Court of Canada affirmed the legal power of the municipality to pass pesticide by-laws. The Court found that the subject matter of the by-law - concerning the use and protection of the local environment within the community - was within the ambit of normal local government activities. See also *Croplife Canada v. Toronto (City)*, 2005 CanLII 15709 (ON CA), online: http://canlii.ca/t/1kg3l. In *Croplife*, a municipal by-law's limitation on the application of pesticides within the city of Toronto was challenged. The Ontario Court of Appeal, following the Supreme Court of Canada decision in *SprayTech v. Hudson*, affirmed the municipality's jurisdiction under the *Municipal Act, 2001* to regulate pesticide use. The Court of Appeal adopted a broad and purposive approach allowing for a generous interpretation of municipal powers with a view to showing deference to the decision of locally elected officials. The Court of Appeal held that the municipal purpose – aimed at the matters of health, safety and well-being of the inhabitants of the municipality – fell squarely within the authority granted under the province's municipal legislation. The Court considered whether there was a specific by-law making power that should have been used instead and found that there was not. Since the by-law requirements did not conflict with or frustrate the purpose of any other provincial or federal legislation, it was not found to be inoperative.
[222] *Croplife Canada v. Toronto (City)*, 2003 CanLII 24713 (ON SC), online: http://canlii.ca/t/1g1rs
[223] *Croplife Canada v. Toronto (City)*, 2005 CanLII 15709 (ON CA), online: http://canlii.ca/t/1kg3l

Additionally, several Health Ministries have taken action to offer voluntary pilot, and in some cases mandatory, testing of public buildings. For example in Quebec, the ministère de la Santé et des Services sociaux (MSSS) has taken various public health measures, including establishing an intersectoral committee representing various ministries and partner organizations. Together, they have put in place a number of measures to reduce the risk of lung cancer from exposure to radon in the home. These measures include a 2010 program to test radon levels in public schools.[224] Similarly, a medical officer of health in an interior health region in British Columbia has issued an educational pilot project for the testing of radon in indoor air in daycares. In that health region public health has jurisdiction over environmental health in daycares. The extent to which such jurisdiction is transferrable to other provinces/territories depends on the statutory duties imposed, as well as each health region's interpretation of its powers under the governing legislation.

Overall, there is an inconsistent level of activity on radon across health units, which has impeded radon protection being approached in a strategic and consistent manner.[225] While public health legislation applies to indoor environments, and associated health hazards, there remains ambiguity in many provinces/territories with respect to the limits of public health officials' powers, especially in relation to regulating indoor air quality. Unlike other sources of indoor air pollution that can be attributed to a building's defective construction or design, such as the presence of mould or asbestos, public health authorities have, to date, taken little action in terms of enforcement of indoor radon.

Appendix 3 to this report considers two case studies of hypothetical situations where public health officials may want to know their legal responsibilities. Case Study #2 notes, among other issues, differences in responsibility (to disclose radon testing and test results) that can exist for private versus public buildings. For private buildings, including those that might house a school or child care centre, or long term care facility, owners can independently decide to participate in a radon testing program and the conditions of testing, remediation, and disclosure of results can be negotiated. For public buildings, or government service providers, there is no legislation in Canada explicitly requiring these entities to engage in periodic radon testing or disclose radon test results. In contrast, some US states have passed legislation which makes the testing for radon in licensed child care facilities mandatory, and requires the posting of public notices to inform building users of radon test results. [226] As well, some US states have developed legislation and supplementary guidelines requiring radon test results be reported to the government, as well as

[224] The results from the initial pilot project are available online through the website of the Institut National de Santé Publique (INSPQ): http://www.inspq.qc.ca/radon.

[225] For a discussion of the roles and responsibilities of government with respect to air quality in British Columbia, including a discussion on the role of the BC Ministry of Health relative to provincial health authorities and municipalities, see for example, "Core Public Health Functions for BC: Model Core Program Paper: Air Quality" (2006), BC Health Authorities and BC Ministry of Health, online: https://www.vch.ca/media/Model_Paper_Air_Quality.pdf

[226] See: for example, New Jersey Department of Environmental Protection, Radon Program, "Testing for Radon in Child Care Centres" DEP Guidance Document", online: http://www.njradon.org/school/scldown/dc_guide.pdf

mandatory testing and notification requirements in tenanted buildings, and public schools.[227] Such explicit provisions are not provided in any piece of public health (or other) legislation in Canada.

4.8 Tenanted Properties

Health Canada states that there is no requirement for the landlord to test for radon in rental properties.[228] Provincial/territorial legislation governs the relationship between landlords and tenants, and each province has its own legislative language with respect to the landlord's responsibility to keep the rental property maintained and in a good state of repair. In many provinces/territories, tenants do not have explicit protection against high radon levels. Tenants can request that their landlord test for radon, and if the landlord refuses, the tenant can conduct the test independently. If the radon level is high, the tenant can request that the landlord remediate. Most provincial/territorial legislation requires that property owners keep rental properties in a state that is "habitable" - safe and fit for people to live in. For example, the Ontario *Residential Tenancies Act*[229] requires, under section 20, that the landlord maintain the rental units in a good state of repair, fit for habitation, and in compliance with applicable health, safety, housing and maintenance standards.[230] Thus, provincial/territorial legislation (depending on the provisions within each piece of legislation) may have language requiring the landlord to keep rental properties maintained and in a state of good repair, and depending on the legislation, and the related case law, such provisions may be sufficient to capture the need for remediation if radon levels test high. Such legislation generally governs residential landlord/tenant relations. The government, in its role as land owner and lessor is often landlord or tenant of commercial property and, as such, legislation governing residential properties would not apply. As well, provincial/territorial legislation may not be binding on the Crown as lessor. For instance, the courts have found that the *Ontario Residential Tenancies Act* does not bind the Crown.[231]

Legislation governing the relationship between landlords and tenants may also impose other minimum building requirements on landlords. For example, Alberta's *Residential Tenancies Act* includes a requirement that landlords ensure that rental premises "meet at least the minimum standards prescribed by housing premises under the *Public Health Act* and regulations."[232]

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[227] Environmental Law Institute, Environmental Law Institute Database of State Indoor Air Quality Laws – Database excerpt: Radon Laws (February 2014), online: http://www.eli.org/sites/default/files/eli-pubs/2014-radon-database.pdf

[228] Health Canada website, Environmental and Workplace Health – Radon: Frequently Asked Questions": http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/faq_fq-eng.php#reaction.

[229] *Residential Tenancies Act*, S.O. 2006, C. 17. Note that the Ontario legislation is only applicable to properties used or intended for use as residential premises (s. 3 (1)).

[230] *Ibid*, at s. 20.

[231] *Copeland & Soucie v. H.M.Q.*, 2014 ONSC 620 (CanLII), online: http://canlii.ca/t/g2vk5; *Wheeler v. Ontario* (Ministry of Natural Resources), 2005 CanLII 13039 (ON SCDC), online: http://canlii.ca/t/1k79j

[232] *Residential Tenancies Act*, SA 2004, c R-17.1, s. 16 (c), online: http://canlii.ca/t/lfms. See also: Nickie Vlavianos, "Minimum Housing Standards For Residential Tenancies Upheld" (May, 2008), University of Calgary Faculty of Law Blog on Development in Alberta Law, online: http://ablawg.ca/2008/05/16/minimum-housing-standards-for-residential-tenancies-upheld/

Public health legislation also often offers protections with respect to tenanted buildings. Generally, orders with respect to health hazards can be issued against property owners or occupiers, the person in charge of the health hazard, or a person engaged in or administering a an enterprise or activity on the premises. As such, orders can be issued against both tenants and landlords. The determination of who is issued an order in the context of a landlord-tenant relationship depends on the lease agreement, and in the absence of a lease agreement, consideration of past practice in the landlord/tenant relationship. In cases of major repairs, orders are often issued against the property owner, though, in Ontario, the medical officer of health has been held to possess the discretion to assess the circumstances to determine who is issued an order and this discretion to consider the circumstances cannot be fettered by health unit policy. In *Westend Development Corp. v. Peel Regional Health Unit*, sewage pooling in the basement of a residential rental unit posed a bacteria and mould health hazard to upstairs tenants, and the Board confirmed the inspector's order requiring the landlord to remediate.[233] In *Jorgensen v. Halton (Regional Municipality*), a commercial tenant running a childcare facility was required to close the premises due to the presence of mould posing a health hazard.[234]

Attempts to challenge public health powers based on a distinction between private health and public health have not been largely successful in the courts, and factual distinctions between public and private spaces and public and individual health do not remove the regulation of

[233] Note that in *Westend*, a Health Inspector issued an order against a property owner and landlord requiring remediation of pooling sewage in the basement of a rental home. Of concern was mould, bacterial growth, and the attraction of pests, rodents and vermon as vectors for transmission of harmful pathogens from the basement to the people living upstairs. In assessing whether the pooling sewage amounted to a health hazard, the Board accepted the Public Health Inspector's testimony as expert evidence. Section 13(5) of the HPPA provides that an issue can be directed to a property owner, property occupier, person in charge of the health hazard, or a person in engaged or administering a an enterprise or activity on the premises. The Health Inspector issued the order against the owner of the property, rather than the tenant occupiers as the source of the health hazard was a major structural deficiency in the building, and it is the policy of the health unit to treat major structural deficiencies as the responsibility of landlords rather than tenants. The Board held that the PHI or MOH has an obligation to consider the relevant circumstances of individual situations to determine whether a given policy is properly applied or whether there are grounds for making some exception to the application of the policy. Having considered these circumstances, however, the PHI or MOH is then in a position to exercise his or her discretion to issue the order against the person he or she deems appropriate. The Board concluded the order had been issued to the correct party – the landlord – based on the fact that the necessary repair was a major repair, and that the nature of the landlord-tenant relationship had to date left minor repairs only to the tenants to repair. The Board confirmed the Public Health Inspector's order, finding that there were reasonable and probable grounds upon which to conclude that the flow of sewage into the building's basement constituted a health hazard as defined by the HPPA. The Board added an amendment, requiring the tenants to allow the landlords access to the premises for the purposes of complying with the Order. See: *Westend Development Corp. v. Peel Regional Health Unit*, 1994 CarswellOnt 5688.

[234] *Jorgensen v. Halton (Regional Municipality*), 2000 CarswellOnt 8510. In *Jorgensen v. Halton (Regional Municipality)*, the tenant operator of a childcare centre appealed an order issued by the Public Health Inspector. After a complaint was made the centre was inspected, finding odour, water staining and mould. Consequently, the regional public health inspectors undertook an invasive mould inspection focusing on air quality issues, and a mould problem was confirmed. The Order issued to the operator of the childcare centre placed restrictions on the use of certain parts of the building, and provided a timeline for remedial work. After re-inspection by the Ministry, the public health inspectors determined the centre posed a danger to the children, and ordered it be closed until all remedial requirements from past two inspections be completed, issuing a Community Health Protection Order under s. 13 of the HPPA. The Board confirmed that a health hazard existed and that the requirements specified in the order were necessary to eliminate the health hazard. The Board noted that although the fact that the appellant is a tenant (as opposed to an owner) of the premises in question may complicate efforts to comply with the Order, it is not relevant to the issues under consideration in the present appeal.

tenanted spaces from the jurisdiction of public health authorities.[235] That logistical barriers may exist in a landlord/tenant relationship (in terms of undertaking remediation) has been considered by the courts irrelevant as to whether a Public Health order should stand. A property owner is responsible for deficiencies, even if caused by tenants unless the owner can prove he/she exercised due diligence.[236]

Some public health statutes go further, and also explicitly include minimum standards for rental housing units. Under such legislation, landlords are required to maintain their rental property and must engage in a reasonably frequent diligent system of inspection/maintenance carried out by qualified people.[237] That a property owner is under financial constraints is not a viable defence to statutory obligations to maintain a building as per provincial standards under public health

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[235]For example, in *BPCL Holdings*, an application challenging minimum building standards required under provincial public health legislation, an Alberta court was asked to consider the distinction between private health and public health, and private spaces and public spaces. The Applicants argued that some of the challenged provisions relate to private health only, and not public health. This argument has the most resonance with respect to regulations directed at the suppression of "nuisances", as they are specifically defined as conditions that may endanger the "public health". The Court found that the *Act* recognizes no clear distinction between public health and private health. The court found that "[a]t some level all issues of public health come down to the health of individuals." (*BPCL Holdings*, paras 20-22). That individual tenants might be the ones primarily at risk when a health hazard exists does not take the regulation outside the scope of "public" health. Many pieces of public health legislation consider rental units 'public space'. Moreover, public health legislation generally applies to health hazards in private places as well, insofar as health risks extend to public health. See for example *BPCL Holdings v. Alberta (BPCL Holdings*, para 41.) See: *BPCL Holdings v. Alberta (BPCL Holdings v. Alberta*, 2006 ABQB 757.

[236] See for example: *R. v. Princeton Capital Credit Inc*, (2012 ABPC 234). In *R. v. Princeton Capital Credit Inc*, the accused were charged with offences under the *Public Health Act*. On inspection of a residential rental unit being used as a marijuana grow operation, a public health inspector issued orders requiring the building be vacated, and the conditions corrected, and sent notice of the orders to the owners of the property. A notice of health hazard was registered against the title of the property. The landlord was required to comply with the Minimum Housing and Health Standards of the Housing Regulation under the *Public Health Act*, compliance with which is also required under the province's *Residential Tenancies Act*. The orders were based on concern with the probability of mould growth and the presence of chemical residue which are associated with such operations. The property owner engaged a contractor to inspect the unit, and did a visual inspection or mould. The health inspector responded that an air quality test was required. Without conducting an air quality test, or otherwise complying with the conditions for re-occupancy set out in the orders, the property owners listed the unit for rent and entered a 'rent to own' lease agreement with two tenants. On a follow up inspection the unit was found inhabited and the property owner was contacted, and informed that there remained an 'unfit order' on the building; an order which could not be rescinded until it passed inspection by Alberta Health. The managers and owners had a positive duty to effect repairs before they let the property and did nothing. The public health inspector informed the tenants that they were required to vacate the premises. The Act makes both owners and managers responsible for the property and liable for failing to meet the minimum standards.

[237] For example, in *R. v. Viveiros*, (2007 ABPC 184) the indoor air quality of a residential rental unit was impaired to due to the landlords failure to maintain the premises. In this case the tenants suffered carbon monoxide poisoning due to a part of the furnace having fallen into a state of disrepair. The court convicted the building owner with (1) failing to maintain housing premises and (2) with creating or maintaining condition that was or might become injurious or dangerous to public health. As a piece of public welfare legislation, intended to protect the public who are required to come into daily contact with the regulated activity, the Court found that such legislation places the responsibility for compliance upon the people who voluntarily choose to engage in the activity. The Court held that the test for a due diligence defence is whether reasonable steps were taken. Strict liability for failure to maintain a building would require the defendant to show that all reasonable steps were taken to *prevent* the premises from deteriorating into that condition, showing that they engaged a reasonably frequent diligent system of inspection/maintenance carried out by qualified people (See also *R. v. Princeton Capital Credit Inc*, 2012 ABPC 234, at para 58).

legislation, and adequate staff must be employed to correct all deficiencies in a reasonable timeframe.[238] For example, Manitoba's Health Protection Unit's Safe Housing Program addresses tenant concerns, and provides public health inspectors the power of inspecting rental units in order to ensure they are free of health hazards, and to ensure that rental housing units provide safe and healthy living environments, including safe indoor air.[239] Such tenant protection is explicitly provided under public health legislation in: Alberta,[240] Manitoba,[241] Prince Edward Island[242], and implicitly understood to apply in Saskatchewan.[243] For additional details on tenant protections provided by provincial/territorial legislation please refer to Appendix 1.

Radon protection for tenanted buildings may also be available where municipalities have enacted property standard by-laws, or by-laws specific to acceptable standards for rental properties. For more information on the role of municipalities see Section 5.0 below.

[238] 2007 ABPC 184, para 35. See *R. v. Goebel*.

[239] Government of Manitoba website, "Health Protection: Safe Housing": http://www.gov.mb.ca/health/publichealth/environmentalhealth/protection/housing.html. See also the Dwelling and Buildings Regulation, (Man Reg 322/88 R) under *The Public Health Act* (RSM 1987, c P210).

[240] Alberta's Housing Regulation, under the *Public Health Act*, puts the obligation on the property owner to ensure that rental units are maintained in a structurally sounds, safe condition, and in good repair. See Alberta's Housing Regulation (Alta Reg 173/1999), under the *Public Health Act* (RSA 2000, c P-37), and corresponding Minimum Housing and Health Standards (online: http://www.health.alberta.ca/documents/Standards-Housing-Minimum.pdf). Note that the application of public health standards for tenant housing was challenged unsuccessfully in *BPCL Holdings Inc. v. Alberta* (2008 ABCA 153), whereby the appellants claimed the provisions were *ultra vires*. See: Nickie Vlavianos, "Minimum Housing Standards For Residential Tenancies Upheld" (May, 2008), University of Calgary Faculty of Law Blog on Development in Alberta Law, online: http://ablawg.ca/2008/05/16/minimum-housing-standards-for-residential-tenancies-upheld/

[241] Dwellings and Buildings Regulation, Man Reg 322/88 R, ss. 14-15, online: http://canlii.ca/t/kf7t

[242] Prince Edward Island's Rental Accommodation Regulations (PEI Reg EC142/70), enacted under the province's *Public Health Act* (RSPEI 1988, c P-30.1), requires that property owners carry out repairs necessary to make rental units sound and safe; and also provides the medical health officer the right to enter and inspect any rental dwellings at reasonable times.

[243] Although there is no explicit reference to tenant protection in Saskatchewan's *Public Health Act* (SS 1994, c P-37.1), nor any regulation relating to minimum standards for rental housing in Saskatchewan, Public health regions accept the application of the Act to rental housing, and inspectors investigate substandard rental unit conditions on a complaint basis. As with all buildings, under authority of the Act, Public Health Inspectors may order a property owner or landlord to remedy any condition that creates or has the potential to create a health hazard or condemn the building until the health hazard is addressed. See, for example: http://www.hrha.sk.ca/documents/SafeHousingandAccommodationPage.pdf

5.0 Municipal Role in Radon Protection

Municipalities are generally provided, through the delegation of powers under provincial/territorial law, jurisdiction to govern local development.[244] Their powers to do so generally include creating the central planning documents, and passing zoning by-laws. Generally, land use planning documents set out the overall goals and policies that will be used to guide future land use, and zoning by-laws are created to implement the goals and policies, laying out the specific rules and regulations that control development as it occurs. Municipalities are also responsible for interpreting and enforcing provincial/territorial building codes. Via municipal enabling legislation, municipalities are responsible for issuing and enforcing building permits, subject to provincial standards. Municipalities may also establish their own building and maintenance by-laws. Provincial/territorial legislation can stipulate that the NBC, 2010 is adopted in municipal building by-laws. Radon protection has been incorporated into some municipal by-laws, including in Elliot Lake, ON, and three municipalities in Quebec,[245] imposing radon protective municipal building standards.

Each municipality has its own approvals process (including building and construction related by-laws and permitting processes). Numerous municipal approvals may be required during development,[246] and municipalities can issue approvals subject to conditions, including requirements that the applicant developer address soil gases. For example, in a development application in Fergus, Ontario, a developer appealed the municipal council's decision to refuse (or neglect to enact) a proposed amendment to a municipal zoning by-law in order to rezone lands to permit the development of a residential development. The Ontario Municipal Board allowed the appeal and ordered the by-law be amended, including several conditions including the following: "THAT the developer shall submit a report prepared by a Professional Engineer to the satisfaction of the Chief Building Official providing an opinion on the presence of soil gases (radon and methane) in the plan of subdivision in accordance with applicable provisions contained in the Ontario Building Code." [247]

Municipal inspections are usually required in the course of issuing and overseeing building permits. Building legislation generally stipulates inspection and enforcement powers, and specifies what defects inspectors are expected to detect upon inspection. Some municipalities have developed programs specific to radon protection. For example, Saskatoon's 'Plan Review

[244] Provincial policies and interests may need to be considered and in some cases conformed with when municipal planning decisions are made. This is specific to each province/territory and each depends on the legislation which delegates powers for municipal planning. For example, under Ontario's land use planning framework, the *Planning Act (*R.S.O. 1990, c. P.13*)*, states that municipalities "shall have regard to" provincial interests (section 2) and states that municipalities' decisions "shall be consistent with" provincial policy statements and "shall conform with" provincial plans. See: "Land Use Planning in Ontario", Environmental Commissioner of Ontario (March 2012): http://www.eco.on.ca/uploads/Reports-Staff%20Reports-and-Publications/Land-Use-Planning-in-Ontario.pdf

[245] Including: Oka, St-André d'Argenteuil, Mont Saint-Hilaire.

[246] These could include, e.g.,: official plan amendments, zoning by-law amendments, minor variances, development approvals, site plan control approvals, plans of subdivision/condominium, consent for severance, part lot control exemption applications. See the "Planning Act Approval Authority Chart", Ministry of Municipal Affairs and Housing (January 2011) online: http://www.mah.gov.on.ca/Page1298.aspx

[247] *Bonaire Highlands Ltd. v. Fergus (Town)* (2008 CarswellOnt 874).

and Building Inspection Program'[248] applies to the review and inspection of residential building permits, and outlines mandatory inspections, including the requirement that radon gas/soil gas control be reviewed during the Plan Review stage, and "Floor on Ground" as included as an item to be inspected for radon protection.[249]

Municipal building inspectors can be held liable for failing to detect upon inspection defects in building design and construction.[250] While the decision to conduct an inspection is discretionary, once a municipality has made the decision to do so, it must conduct the inspection properly. In *Ingles v. Tutkaluk Construction Ltd.*,[251] the Supreme Court of Canada found that once the decision was made to conduct an inspection, and the city exercised its power to enter to inspect the construction site, the city owed a duty of care to all who might be reasonably injured by the negligent exercise of its inspection powers. The court found that the inspection must be reasonable in light of the circumstances, and to meet this standard a municipality must show that its inspectors exercised the standard of care that would be expected of an ordinary, reasonable and prudent inspector in the same circumstances. What constitutes a reasonable inspection depends on the circumstances of each case. Factors to be considered include the likelihood of a known or foreseeable harm, the gravity of that harm, and the burden or cost which would be incurred to prevent the injury. Further, the negligent conduct of an owner-builder does not absolve a municipality of this duty of care. Rather, depending on the circumstances, a builder-owner's negligence may be cause to conduct a more thorough inspection. That said, municipalities are not held to the standards of insurers of the work, and are not expected to discover every latent defect.[252]

Some cities have attempted to pass building by-laws more restrictive than the provincial/territorial legislation. Others are incorporating standards, such as Leadership in Energy and Environmental Design (LEED), for the building design of public buildings, including requirements for indoor air quality. For example, the City of Calgary has a "Sustainable Building Policy"[253] which endorses both LEED and BuiltGreen and it includes specific reference to indoor air quality. However, because provincial approval may be required to develop building standards at the municipal level, the goal of uniformity in building code standards across the province/territory may impede efforts to develop stronger radon gas protections at the municipal level.

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[248] City of Saskatoon, "Plan Review and Building Inspection Program", Saskatoon Policy C09-029, online: http://www.saskatoon.ca/DEPARTMENTS/City%20Clerks%20Office/Civic%20Policies/Documents/C09-029.pdf

[249] *Ibid*. See: Sections 2.4, Appendices A, and C.

[250] *The Queen in Right of Canada v. Saskatchewan Wheat Pool*, (1983), 143 D-LR (3d) 9 (S.C.C.)

[251] *Ingles v. Tutkaluk Construction Ltd*., 2000 SCC 12. See also: *Bisoukis v. Brampton* (City), [1997] O.J. No. 3206 (Q.L.), Just v. British Columbia, 1989 CanLII 16 (SCC), [1989] 2 S.C.R. 1228 and *Swinamer v. Nova Scotia* (Attorney General), 1994 CanLII 122 (SCC), [1994] 1 S.C.R. 445 as examples of decisions involving inadequate inspection systems.

[252] See also: *Nielsen v. Kamloops (City*) 1984 CarswellBC 476. The city of Kamloops chose to regulate construction by bylaw and imposed upon its building inspectors the duty to enforce the provisions of that bylaw. Consequently, the city owed a duty of care not to injure persons it ought reasonably to have had in its contemplation as likely to be injured by a breach of its duty. The Supreme Court of Canada found that, despite negligence on the part of the contractor, the municipality was also at fault in breaching its duty to protect the plaintiff. In the face of this duty on the city, the distinction between misfeasance and non-feasance was irrelevant.

[253] City of Calgary, "Annual Report: Building a Great City - Sustainable Building Policy (AMCW005) online: https://www.calgary.ca/CS/IIS/Documents/About-land-information/2009-SBP-Annual-Report.pdf?noredirect=1

Municipalities may also create minimum property standards, or by-laws specific to acceptable standards for tenanted properties. Many municipalities enact property standards by-laws which set minimum standards and which serve to protect the health and safety of occupants as well as the general public. Similarly, public health legislation generally provides municipalities with powers to create bylaws relating to the public health matters (provincial approval may be required).[254]

Local governments may pass radon protective by-laws and develop related policies. To the extent that a local government and province/territory or federal government attempt to regulate the same subject matter, the local government's by-law will not be found to be inoperative unless it conflicts with, or frustrates the purposes of, legislation enacted by a more senior level of government.[255]

6.0 Common Law and Contract Law Theories of Liability

6.1 Introduction

Thus far, this report has surveyed radon testing and remediation guidance or legal requirements across Canada focusing on government roles and responsibilities. It has described unenforceable guidance and diverse pieces of legislation, the latter mainly at the provincial/territorial level, and

[254] See for example: Saskatchewan Ministry of Government Relations, "Mandatory and Optional Municipal Services/Functions in Legislation" online: http://municipal.gov.sk.ca/Administration/MandatoryOptionalMunicipalServices-PDF

[255] *114957 Canada Ltée (Spraytech, Société d'arrosage) v. Hudson (Town)*, [2001] 2 SCR 241, online: http://canlii.ca/t/51zx; *Croplife Canada v. Toronto (City)*, 2005 CanLII 15709 (ON CA), online: http://canlii.ca/t/1kg3. See: *114957 Canada Ltée (Spraytech, Société d'arrosage) v. Hudson (Town)*, [2001] 2 SCR 241, online: http://canlii.ca/t/51zx. Note that in *Hudson* the Quebec municipality's pesticide by-law was challenged. On appeal, the Supreme Court of Canada affirmed the legal power of the municipality to pass pesticide by-laws. The Court found that the subject matter of the by-law - concerning the use and protection of the local environment within the community - was within the ambit of normal local government activities. See also *Croplife Canada v. Toronto (City)*, 2005 CanLII 15709 (ON CA), online: http://canlii.ca/t/1kg3 in which the Court found (at para 62) that "different levels of government may legislate in related or overlapping fields" and qualifying that the "only restrictions on this co-operative view of federalism are that the legislative provisions may not expressly conflict, and the legislation of the lower levels of government may not frustrate the legislative purpose of the more senior level of government." In *Croplife*, a municipal by-law's limitation on the application of pesticides within the city of Toronto was challenged. The Ontario Court of Appeal, following the Supreme Court of Canada decision in *SprayTech v. Hudson*, affirmed the municipality's jurisdiction under the *Municipal Act, 2001* to regulate pesticide use. The Court of Appeal adopted a broad and purposive approach allowing for a generous interpretation of municipal powers with a view to showing deference to the decision of locally elected officials. The Court of Appeal held that the municipal purpose – aimed at the matters of health, safety and well-being of the inhabitants of the municipality – fell squarely within the authority granted under the province's municipal legislation. The Court considered whether there was a specific by-law making power that should have been used instead and found that there was not. Since the by-law requirements did not conflict with or frustrate the purpose of any other provincial or federal legislation, and was not found to be inoperative.

described the limited case law that exists under these statutes that is, or may be, relevant to radon.

This section provides an overview of common law[256] theories of liability[257] (i.e., possible civil remedies or "causes of action"[258]) available to plaintiffs seeking redress for harm resulting from exposure to radon in indoor air. Liability under the common law may arise either in tort law[259] or contract law.[260] In what follows, an overview is provided of possible avenues when using civil litigation[261] as a remedy (i.e., avenues of redress which may be available to private individuals seeking to resolve private disputes through the courts). The focus of what follows continues to be on public buildings, and the governments' roles in relation to them. Note that where the government owns or has control over property, and where buildings have a public use and/or house government employees, the government has a direct relationship to their employees and to those members of the public making use of their services.

As a naturally occurring gas radon stands apart conceptually from most other indoor air quality problems that arise in the course of building design/construction (such as the presence of and known hazards associated with asbestos). Following the discovery of the presence of radon in indoor air and the associated health risks, legal commentators in Canada and the US predicted an onslaught of radon-related litigation.[262] Other commentators[263] doubted that plaintiffs would have success in court for what was essentially an 'act of nature'. The predicted wave of litigation did not materialize in either Canada or the US. However, this is not likely due to the courts reluctance to hold defendants liable. After all, it has become clear that, while the existence of radon gas is not the fault of anyone, the accumulation of it inside buildings at levels dangerous to human health can be avoided easily by adherence to best practices in building design, construction and renovation. The lack of litigation is more likely related to the fact that the public, despite government education campaigns, has remained relatively unaware, and under-concerned, about the health risks associated with exposure to radon in indoor air.

Public buildings pose a particular problem. Unlike in the case of private homes, where homeowners (through choosing their homes) voluntarily, if unknowingly, expose themselves to radon, the public does not have an opportunity to choose the location, design or construction methods of buildings where government services are provided, or where they may be employed, whether in a public building or otherwise. Nor does the public have any direct say in whether

[256] The 'common law' refers to the interpretation and application of the law through judicial decisions, whereby decisions by higher courts become precedent, and are binding on lower courts dealing with similar cases.
[257] A 'theory of liability' is the common law theory on which a plaintiff's case, or 'cause of action' is based.
[258] A 'cause of action' refers to the pleading (or complaint) that initiates a civil action (law suit).
[259] Tort law is the area of law dealing with torts (or civil wrongs). A tort is a civil wrong committed by one party against another. Tort law is applied in civil proceedings (i.e., law suits).
[260] Contract law is the area of law dealing with contracts. A contract is a legally enforceable promise, or agreement, that imposes obligations on the parties to the contract.
[261] 'Civil litigation' refers to a civil action (or lawsuit) relating to a dispute between private parties whereby one (or more) plaintiff(s) seek money damages or specific performance from a defendant (or defendants) as compensation for injury. This kind of court proceeding deals with civil wrongs and stands in contrast to criminal proceedings.
[262] David Dearing, "Radon Litigation: An Overview of Homeowners' Potential Causes of Action", 20 Cumb. L. Rev. 825 1989-1990, p. 829.
[263] Robert D. King, "The Legal Implications of Residential Radon Contamination: The First Decade", 18 Wm. & Mary Envtl. L. & Pol'y Rev. 107 (1993), p. 112-113.

those public buildings are tested (or remediated) for radon gas. The following section will examine common law theories of liability with a focus on opportunities relating to public buildings.

While civil litigation may be an effective method of bringing attention to the problem of radon in indoor air, it is important to note that civil litigation addresses private losses, and relies on individuals (depending on private, and limited, resources) to pursue redress. Health Canada's survey of radon in homes[264] indicates that the presence of radon in indoor air is pervasive across the country. As such, it is likely that the most effective way to address the problem of indoor radon is to ensure preventative and consistent protection through law reform. Nevertheless, the following discussion provides an overview of theories of liability that may be available to private individuals seeking redress for harm caused by exposure to radon in indoor air.

6.2 Common Law Theories of Liability

The common law offers several theories of liability of relevance to plaintiffs seeking redress for harm resulting from exposure to radon in indoor air. Liability under the common law may arise either in tort law or contract law. An important distinction between the two is that under tort law, a building with high levels of indoor radon may be considered 'defective' where harm results or a danger is posed, while under contract law, privity[265] of contract exists only between parties to a contract, and the contract determines what the parties are entitled to expect.

Under tort law, there are three possible theories of liability potentially applicable to situations where a plaintiff is seeking redress for 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; that is, the assumed assurance of the buyer (or lessee) that the seller or lessor of a property is promising that the property is suitable for its intended purposes.

Potential plaintiffs in the above mentioned common law theories of liability may include homeowners, tenants, and employees, and users of public services or public buildings. Potential defendants include the land owner or occupier, those involved in new construction and renovations (architects, contractors, engineers), and those involved in the sale of property (real estate agents, brokers, home inspectors).

The discussion that follows is organized according to the potential defendant(s), with Section 6.3 addressing theories of liability applicable under contract law. Section 6.4 discusses theories of liability in tort law generally (including against those involved in the design, construction or sale

[264] Health Canada, 2012. *Supra* note 4.
[265] 'Privity of contract' refers to a common law doctrine that a contract cannot confer rights or impose obligations on anyone other than those people party to the contract. Only parties to a contract can commence legal action to enforce their rights or claim damages for harm arising from a breach of the contract.

of property), followed by a discussion of situations where the government is the owner of land, or provider of services to the public.

6.3 Contract Theories of Liability

A contract is a legally enforceable agreement that imposes obligations on the parties to the contract. Liability under contract law arises out of the breach of an agreement between two parties. Express warranties are assurances that have been stated or written as part of the contract, whereas implied warranties are not explicit provisions within a contact, but presumed, and form a part of the contract.

6.3.1 Implied Warranty of Habitability

The implied warranty of habitability involves parties to real estate transactions (i.e., vendors and purchasers of buildings).[266] Today, many jurisdictions have adopted this theory, [267] and in Canada several provinces and territories (including Alberta,[268] British Columbia,[269] Manitoba,[270] Ontario,[271] Quebec,[272]) 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.

Under either the common law or statute law theory of implied warranty of habitability, a buyer could argue that the building purchased was not habitable because of the health risks attributable to high levels of radon being present. However, for a warranty of habitability to be implied into the contract in relation to radon, the seller must have possessed *actual* knowledge of the presence of radon in indoor air in excess of the federal Radon Guideline reference level. Sellers in real estate transactions may use disclaimer clauses to avoid the imposition of an implied warranty. While a defendant can also attempt to avoid liability by establishing that the building is habitable and the health risks exist due to forces beyond the buyer's control, such a defense is not likely to be successful in the case of radon, where indoor radon concentrations are largely a result of physical characteristics of the home (including design and construction factors such as foundation qualities, air barriers, ventilation, etc.).

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[266] The origin of implied housing warranties can be traced to two English cases decided in the 1930s, *Miller v. Cannon Hill Estates, Ltd., and Perry v. Sharon Development Co.* Both cases held that landowners and buyers may recover for substandard construction by builders.
[267] Dearing, 1989-1990. *Supra* note 262 at p. 842-43.
[268] *New Home Buyer Protection Act*, SA 2012, c N-3.2, online: http://canlii.ca/t/525bd; New Home Buyer Protection (General) Regulation, Alta Reg 211/2013, online: http://canlii.ca/t/524nb. See also: Home Warranty Insurance Regulation, Alta Reg 225/2013, online: http://canlii.ca/t/524xn
[269] *Homeowner Protection Act*, SBC 1998, c 31, online: http://canlii.ca/t/51vmp
[270] *The New Home Warranty Act*, SM 2013, c 23, [not yet in force], online: http://canlii.ca/t/5253t.
[271] *Ontario New Home Warranties Plan Act*, RSO 1990, c O.31, online: http://canlii.ca/t/kqb6.
[272] The Civil Code of Quebec provides a five-year warranty (after building completion) against hidden defects. See:

6.4 Tort Law

6.4.1 Fraud and Misrepresentation

Fraudulent misrepresentation

Fraudulent misrepresentation is an intentionally false statement, uttered with the intent that the person to whom it is made will act on it to his/her detriment. The misrepresentation must be 'material' in nature, not incidental, and a determining ground of the transaction.

Misrepresentations which, if true, increase the apparent value of real property are 'material' in this sense.[273] If the falsity of the representation is not known by the person making the statement, damages may nonetheless be recoverable. However, establishing that the seller had knowledge of the danger may be difficult, and recovery under negligent misrepresentation may be preferable.

Negligent misrepresentation

The difference between intentional and negligent misrepresentation is that the latter does not require a finding that the defendant made the representation with the intent to deceive or the knowledge of its falsity. For a duty of care to be found it must be established that a "special relationship" existed between the representor and the representee,[274] "such that the defendant was under a duty to the plaintiff to exercise reasonable care in providing the information, and reliance on the information is reasonably to be expected." [275] Note that even where a representation is made with an honest belief of its truthfulness, it may be deemed negligent.[276]

6.4.2 Products Liability and Duty to Warn

In Canada, the concept of products liability requires manufacturers of products to use reasonable care in production, and includes a duty to warn of dangers associated with product usage. In anticipation of a flood of litigation relating to radon in indoor air, some US authors suggested in the 1990's that courts would not likely extend products liability to cover 'acts of nature'. This has proved not to be the case, as advances in science and technology have confirmed the role that building design and construction practices play in the prevention of soil gas ingress.[277]

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[273] *Hinchey v. Gonda*, [1955] O.W.N. 125 (H.C.); C. R. F. *Holdings Ltd. v. Fundy Chemical International Limited*, 1981 CanLII 488 (BC CA). In *C.R.F. Holdings Ltd. v. Fundy Chemical International Ltd*. the court upheld the trial court's finding that the contract for the sale of industrial property was induced by "deceit and fraudulent misrepresentation". In CRF Holdings, the seller of property communicated to the buyer that slag on the property made 'good fill', and did not inform the buyer that the material was radioactive, some of which had been buried on the property, and that it's movement or disposal required permits by the Atomic Energy Control Board.

[274] *Queen v. Cognos Inc.*, 1993 CanLII 146 (SCC), [1993] 1 S.C.R. 87.

[275]There has been much more discussion around liability in the course of real estate transactions in the US as compared to Canada, with the majority being published shortly after the initial recognition of indoor radon as a health concern. See, for example: David Dearing, "Radon Litigation: An Overview of Homeowners' Potential Causes of Action", 20 Cumb. L. Rev. 825 1989-1990.

[276] For a discussion on this duty in the context of indoor air quality litigation possibilities, see: Pollution Probe, 2000, *Supra* note 20.

[277] For example, the US case *Brafford v. Susquehanna Corp.*, was a case where the original land owner knowingly created the danger before the plaintiff's house was constructed (on top of mill tailings from a nearby uranium mine operated by the defendant). Discussed in: David Dearing, "Radon Litigation: An Overview of Homeowners' Potential Causes of Action", 20 Cumb. L. Rev. 825 1989-1990, p. 833-34.

To be successful under the theory of products liability a plaintiff must prove that the defendant failed to use reasonable care in design and/or construction, and that the breach of the standard of care caused or contributed to the concentration of radon exposure (through site selection, choice of building materials, or defective design). [278] The Supreme Court of Canada has found those responsible for the defective design and construction of a building owe a duty in tort that extends to the subsequent purchasers *if* it is foreseeable that failures to take reasonable care would result in defects those pose a substantial danger to health and safety of the occupants.[279]

6.4.3 Negligence

Negligence is a breach of a duty of care that causes harm. To be successful under the under the law of negligence a plaintiff must establish that:

i) the defendant owed the plaintiff a duty of care;
ii) the defendant breached the duty of care; and
iii) the plaintiff was injured as a proximate result of the breach of the duty of care by the defendant.[280]

Whether or not a duty of care exists is based on the relationship between the plaintiff and defendant. A duty of care to guard against reasonably foreseeable harm is established only in relationships that are 'proximate' (close and direct).[281] This is determined if the 'reasonable person' would have, in a similar situation, foreseen the possibility of harm to the plaintiff. If a duty of care is found to exist, then the plaintiff must show that the defendant breached that duty of care.[282]

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[278] Pollution Probe, 2000. *Supra* note 20. See also: Dearing, 1989-1990. *Supra* note 262.

[279] *Winnipeg Conominium Corp. v. Bird* [1995] 1 S.C.R. 85. Note that *Winnipeg Condominium* addressed the question of whether a general contractor, responsible for the construction of a building, could be held liable in negligence to a subsequent purchaser. The Supreme Court of Canada held the contractor was liable to subsequent purchasers for the cost of repairing defects in the building arising out of the negligent construction. Lowers courts have followed this ruling. For example, in *Roy v. Thiessen* (2005 SKCA 45) the Court of Appeal of Saskatchewan held that "[w]here negligence is established and such defects manifest themselves before any damage to persons or property occurs, they should … be liable for the reasonable cost of repairing the defects and putting the building back into a non-dangerous state." *Roy v. Thiessen* was a case about structural defects (resulting in condensation and moisture) discovered after purchase. The Court of Appeal upheld the trial judge's decision that those engaged in the negligent construction of a home were liable to subsequent purchasers. Note the Court of Appeal overturned the trial finding that the owner (not involved in construction) was also liable. For a summary of the applicability of this theory of liability to indoor air quality generally see: Pollution Probe, 2000. *Supra* note 20.

[280] *Anns v. Merton London Borough Council* (1977), [1978] A.C. 728, [1977] 2 W.L.R. 1024. A succinct statement of the two stages of the *Anns* test is found in para 176 of the decision in *Edwards v. Law Society of Upper Canada* [2001] 3 SCR 562, 2001 SCC 80, online: http://canlii.ca/t/51xf.

[281] *Donoghue v. Stevenson*, [1932] A.C. 562 at 580-81; *Cooper v. Hobart*, 2001 SCC 79 (CanLII), [2001] 3 S.C.R. 537 at para. 21-22. Note that in *Cooper* (para 24) the Court followed *Anns*, and explained that to find a duty of care, the relationship between the plaintiff and the defendant would be of such a nature that the defendant would have been under an obligation to be mindful of the plaintiff's legitimate interests in conducting his/her affairs, and that defining a proximate relationship may require taking into account expectations, representations, reliance, and the property or other interests involved (paras 33-34).

[282] See: *Cooper v. Hobart*, 2001 SCC 79 (CanLII), [2001] 3 S.C.R. 537 at paras 30-31. Note there are three requirements that must be met to establish a duty of care exists: (1) reasonable foreseeability; (2) sufficient proximity, and (3) the absence of overriding policy considerations which negate a *prima facie* duty established by foreseeability and proximity. See: *Odhavji Estate v. Woodhouse*, 2003 SCC 69 (CanLII), [2003] 3 S.C.R. 263 (at

The plaintiff must also have suffered an injury, and must prove that the defendant's breach of the duty of care *caused* the injury to the plaintiff. Establishing the causal relationship has been a barrier for many toxic tort cases claiming damages for injury to human health from environmental exposures. The reason for this failure is that the basic rule of recovery for negligence under Canadian tort law requires the plaintiff to establish, on a balance of probabilities, that the defendant caused the plaintiff's injury on the "but for" test; that is, that the injury to the plaintiff would not have happened "but for" the negligent act(s) of the defendant(s). Note that in cases of harm resulting from radon exposure, as with toxic tort cases generally it can be difficult to prove causation due to the degree of exposure, the duration of exposure, the latency of health effects, and multiple exposures.[283]

In rare cases (where it is impossible to determine which of a number of negligent acts by multiple actors in fact caused the injury, but it is established that one or more of them did in fact cause it), the material contribution to risk test is used. It may be applicable in a case of radon in indoor air where there are multiple potential defendants responsible for the design, construction, inspection, and maintenance of a building. Note however that it is not intended for situations where causation cannot be proven due to lacking scientific knowledge, as is often the case in toxic torts cases.[284]

A defendant could be held liable if he/she knew (or should have known) that the ingress of soil gases, including radon, was a foreseeable result of the construction design adopted. As radon gas is undetectable to the senses, establishing this may require reference to industry standards. However, note that a defendant may be found liable under the law of negligence even where current industry standards do not require radon protective measures. Note also that the breach of a statute, such as building code, is not a wrong in itself, but is evidence of negligence.

6.4.4 Crown Liability under the Law of Negligence

Governments are generally subject to the same rules under the law of negligence as private persons. This is provided for under section 3 of the *Crown Liability and Proceeding Act*,[285] which provides that "[t]he Crown is liable for the damages for which, if it were a person, it would be liable

> (*a*) in the Province of Quebec, in respect of
>
> > (i) the damage caused by the fault of a servant of the Crown, or
> >
> > (ii) the damage resulting from the act of a thing in the custody of or owned by the Crown or by the fault of the Crown as custodian or owner; and

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para. 52); *Anns v. Merton*, [1978] A.C. 728 at 751 – 752. In *Kamloops v. Neilson*, ([1984] 2 S.C.R. 2), follwing the *Anns* test, the Supreme Court of Canada held that a municipality was liable in negligence for failing to prevent the construction of a house that it knew had a defective foundation.

[283] For a discussion of this obstacle in radon litigation, see: David Dearing, "Radon Litigation: An Overview of Homeowners' Potential Causes of Action", 20 Cumb. L. Rev. 825 1989-1990, p. 837-38.

[284] The Supreme Court of Canada precludes application of the material contribution to risk test to toxic torts with a single tortfeasor where limited scientific data makes meeting the 'but for' test of causation impossible. However the court specifically notes that they reserve a decision on the test's applicability to a mass toxic tort case. *Clements v. Clements*, 2012 SCC 32 (CanLII), [2012] 2 SCR 181, at paras. 38, 42, 44 online: http://canlii.ca/t/frvld.

[285] *Crown Liability and Proceedings Act*, RSC 1985, c C-50, <http://canlii.ca/t/527q4

(*b*) in any other province, in respect of

(i) a tort committed by a servant of the Crown, or

(ii) a breach of duty attaching to the ownership, occupation, possession or control of property."[286]

The main hurdle in a negligence action against the Crown is to establish the existence of a *prima facie* duty of care. The courts willingness to impose liability on the government varies depending on the extent to which the limits of liability are discernable (for instance where there is a single injured plaintiff injured by a particular act of government negligence versus where a large segment of the population could allege the same injury). A particular difficulty in establishing a duty of care in negligence actions against a public authority is the requirement that the analysis of proximity be grounded in the legislative intent of the governing statute. This has been emphasized by the Supreme Court in both *Cooper*[287] and *Edwards*,[288] and in a number of other cases since. What must be found in the statute is not an intent to create civil liability *per se* (which would rarely be found) but rather an intent "to benefit a particular class of individuals through the provision of protective services." It is not enough that the statute create duties in favour of the public; it must go further and create a private law duty of care in favour of the persons in the position of the plaintiffs, although it may also contain duties owed only to the public.[289]

6.4.5 Statutory Duties

In applying the law of negligence to the Crown, a breach of a statutory duty, while not a tort in itself, may act as evidence of negligence once a duty of care has been established.[290] With statutory bodies, in determining whether there is a duty of care, proximity must be established, and the analysis starts with the statute, which specifies the statutory duties.[291] For most provinces/territories, statutory duties relevant to radon in indoor air in public buildings are imposed under occupational health and safety legislation.[292] Duties may also be imposed under various statutes on landlords requiring that they maintain residential properties habitable and in a good state of repair; and on principals of schools to ensure the safety of students and school property. Similarly, some provinces have enacted home warranty legislation to provide basic protection to the purchasers of new homes. For further detail on the statutory duties imposed by the provinces/territories please refer to Appendix 1.

6.4.6 Misfeasance versus Nonfeasance

Public authorities may also be found liable in negligence where harmful conduct is approved or where the government agency or official fails to take preventative steps where they knew or

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[286] *Ibid*, at *s. 3.*

[287] *Cooper v. Hobart*, [2001] 3 SCR 537, 2001 SCC 79, online: http://canlii.ca/t/51xc

[288] *Edwards v. Law Society of Upper Canada*, [2001] 3 SCR 562, 2001 SCC 80, online: http://canlii.ca/t/51xf

[289] For a discussion of the application of the law of negligence to novel environmental cases involving and Crown liability see also: Jane Matthews Glenn, "Government Wrongs: Civil Liability for GMO Regulation in Canada" (2008) 18 J. Env. L. & Prac. 169.

[290] *The Queen in Right of Canada v. Saskatchewan Wheat Pool*, (1983), 143 D-LR (3d) 9 (S.C.C.).

[291] See: *Cooper v. Hobart* at para. 43; *Edwards v. Law Society of Upper Canada*, at para. 9.

[292] *R. v. Wyssen* (1992), [1992] O.J. No. 193, 1992 CarswellOnt 688 (Ont. C.A.). The Supreme Court of Ontario has suggested that an owner may be liable under the Ontario *Occupational Health and Safety Act*, even if the negligent act originates with the contractor or subcontractor.

ought to have known harm would result. For example, *Heighington,*[293] is a case where the government was found liable to the owners of houses for negligently failing to prevent residential development on top of land contaminated by radioactive waste. The contamination was known to provincial government officials, and the houses were built and sold by the province under a plan to assist low-income buyers. The court found the province negligent in not taking steps to ensure, after the initial contamination, that the site was safe for a housing development.[294]

The law of negligence in Canada distinguishes between acts and omissions (misfeasance and nonfeasance). Specifically, where the alleged negligent conduct constitutes a *failure to act*, foreseeability alone may be insufficient to establish a duty of care. A "positive duty of care may exist if foreseeability of harm is present *and* if other aspects of the relationship between the plaintiff and the defendant establish a special link or proximity."[295] The nature of the relationship between plaintiff and defendant must therefore be examined to determine whether there is a *nexus* between the parties. The common law does not, as a general rule, impose positive duties on otherwise legal strangers.[296] Three situations have been identified in which the Courts will find a duty of care in cases of nonfeasance, which "function not as strict legal categories, but rather to elucidate factors that can lead to positive duties to act". Common to each of these three situations is (a) the defendant's creation, or control of, a risk to which others have been invited, as well as (b) the theme of reasonable reliance whereby the plaintiff had a reasonable expectation that the defendant would take reasonable precautions to reduce risk to them. These situations are:

1. Where a defendant intentionally attracts and invites third parties to an inherent and obvious risk that he or she has created or controls.[297] Such cases turn on the steps taken to invite others to subject themselves to a risk under the defendant's control, or the *causal* relationship to the *origin* of the risk of injury faced by the plaintiff. Failure to act where a defendant has caused a risky situation and invited others into it cannot serve to immunize a defendant from the consequences of such nonfeasance. The Supreme Court of Canada in *Childs v. Desormeaux* found that a duty in such a case is comparable to the positive and *continuing* duty of manufacturers or transferors of goods to warn of inherently dangerous products or dangerous uses of safe products.[298]
2. Where there exists a paternalistic relationship of supervision and control, such as those of parent-child or teacher-student. The Court in *Childs v. Desormeaux* found that the duty in

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[293] *Heighington et al. v. The Queen in Right of Ontario et al.*; *Alejandria et al. v. The Queen in right of Ontario et al.*, 1987 CanLII 4425 (ON SC), <http://canlii.ca/t/g122l

[294] *Heighington et al. v. The Queen in Right of Ontario et al.*; *Alejandria et al. v. The Queen in right of Ontario et al.*, 1987 CanLII 4425 (ON SC), <http://canlii.ca/t/g122l Note, with respect to the claim under contract law, the Court held that there had been no breach of contract (no implied warranty of fitness, and no concealment as it was not known when the houses were sold that the soil was contaminated). See also: *Just v. B.C.*, [1989] 2 S.C.R. 1228

[295] *Childs v. Desormeaux*, 2006 SCC 18 (CanLII), [2006] 1 S.C.R. 643.

[296] *Ibid.*

[297] *Ibid*. The Court in *Childs v. Desormeaux* references*: Hendricks v. The Queen*, 1969 CanLII 134 (SCC), [1970] S.C.R. 237; *Horsley v. MacLaren*, 1971 CanLII 24 (SCC), [1972] S.C.R. 441; *Arnold v. Teno*, 1978 CanLII 2 (SCC), [1978] 2 S.C.R. 287; and *Crocker v. Sundance Northwest Resorts Ltd.*, 1988 CanLII 45 (SCC), [1988] 1 S.C.R. 1186.

[298] *Childs v. Desormeaux*, 2006 SCC 18 (CanLII), [2006] 1 S.C.R. 643, at para 35. The Court in *Childs v. Desormeaux references the following cases: Lambert v. Lastoplex Chemicals Co.*, 1971 CanLII 27 (SCC), [1972] S.C.R. 569; *Hollis v. Dow Corning Corp.*, 1995 CanLII 55 (SCC), [1995] 4 S.C.R. 634.

these cases rested on the "special vulnerability of the plaintiffs and the formal position of power of the defendants".[299]

3. Where defendants either exercise a public function or engage in a commercial enterprise that includes implied responsibilities to the public at large. The Court in *Childs v. Desormeaux* relied on cases where the defendants offered a service to the general public that included an attendant responsibility to act with special care to reduce risk. The court held that special duties attach to defendants that assume a public role, or whom benefit from offering a service to the public at large.[300]

In possessing public interest statutory powers and functions on which the public rely for the protection of their safety, statutory bodies stand in a special relation to the public and are not analogous to private individuals.[301] Note, that, as discussed above, a public authority is not liable where conduct that results in harm is a policy decision. Liability in negligence may result if the conduct that results in harm arises from the *operation* of the policy, such as an inadequate system of testing or inspection implemented pursuant to a policy.[302] In *Lewis (Guardian ad litem of) v. British Columbia,* discussed above, the Court found that the statutory discretion over maintenance and repairs to highways became applicable *once* the Ministry made the policy decision to undertake the maintenance work on the highways.[303]

Courts have been reluctant to hold government responsible for harm caused by something that occurred naturally. Although health legislation imposes statutory duties on public authorities to safeguard the public, a general public law duty does not necessarily give rise to a private law duty sufficient to ground an action in negligence for harm caused by the spread of disease.[304]

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[299] *Ibid*, at para 36.

[300] See: *Dunn v. Dominion Atlantic Railway Co.* 1920 CanLII 67 (SCC), (1920), 60 S.C.R. 310; *Jordan House Ltd. v. Menow*, 1973 CanLII 16 (SCC), [1974] S.C.R. 239; *Doe v. Metropolitan Toronto (Municipality) Commissioners of Police*1998 CanLII 14826 (ON SC), (1998), 39 O.R. (3d) 487 (Gen. Div.). *Childs v. Desormeaux*, 2006 SCC 18 (CanLII), [2006] 1 S.C.R. 643 at para 37. .

[301]Jane Matthews Glenn, "Government Wrongs: Civil Liability for GMO Regulation in Canada" (2008) 18 J. Env. L. & Prac. 169.

[302] *Cooper v. Hobart*, 2001 SCC 79 (CanLII), [2001] 3 SCR 537, online: http://canlii.ca/t/51xc. See also: Pollution Probe, 2000. *Supra* note 20.

[303] *Lewis (Guardian ad litem of) v. British Columbia*, 1997 CanLII 304 (SCC), [1997] 3 SCR 1145, online: http://canlii.ca/t/1fqw7. See also: *Mochinski v. Trendline Industries Ltd*., in which the Supreme Court of Canada followed the decision in *Lewis* finding that the government must remain liable for its contractor's negligence. In this case the Court considered the applicable statutory provisions, policy considerations and the reasonable expectations of highway users to come to its holding that the provincial ministry cannot escape liability for negligence in maintaining and repairing the roads by delegating that work to an independent contractor. *Mochinski v. Trendline Industries Ltd*., 1997 CanLII 305 (SCC), [1997] 3 SCR 1176, online: http://canlii.ca/t/1fqw9

[304] *Eliopoulos v. Ontario* involved a claim by the estate of a man who had died as a result of complications from treatment of West Nile Virus. In considering whether proximity could be made out on the basis of a statutory duty on the province to safeguard the health of its residents, the Ontario Court of Appeal referred to the governing legislation, the *Health Protection and Promotion Act*, and held no private law duty of care was triggered in connection with the implementation or failed implementation of a plan to prevent the spread of a virus. The Court relied on the statute, finding that the powers it establishes are discretionary in nature and not capable of creating a private law duty, but rather discretionary powers to be used, if at all, in the general public interest. The Court explained "a general public law duty of that nature does not give rise to a private law duty sufficient to ground an action in negligence." (para 17.) In its reasons, the court considered the fact that the risk (of contracting a disease) was one faced by the public at large, as well as the nexus (or relationship) between a member of the public and the Ministry (para 26). See: *Eliopoulos v. Ontario*, CanLII 37121 (ON CA), (2006), 82 O.R. (3d) 321 (C.A.), leave to

The courts have also declined to find a duty of care where federal bodies engaged in promoting safe building construction failed to pass on information, or failed in their duty to warn, about geographic-specificity of certain building designs (i.e., building envelope failure due to construction methods that trapped moisture within the building envelope, causing structural damage and health hazards (mould).[305] In *McMillan v. Canada Mortgage and Housing Corporation*, an action was brought against the Canada Mortgage & Housing Corp. for alleged negligence in failing to warn, and stop construction, of residential dwellings in BC that it knew had a fundamental design flaw. The court held no duty of care was owed by the federal body CMHC to a private homeowner. The plaintiff's case hinged on the fact that the CMHC knew that the design of buildings like the plaintiffs' would be defective under certain geographic/climatic conditions. The plaintiffs argued that the CMHC had a duty to pass that information on to them and all prospective purchasers, and to take reasonable steps to ensure such a design was not used in design/construction (in such geographic/climatic regions). The Court held that there was no statutory obligation (i.e., nothing in the *CMHC Act* or the *Housing Act*) to suggest a duty of the federal body to protect against poor design choices, or to prevent construction of residences. The court found the plaintiffs' action was based upon the defendant's failure to act, and that the statutes do not suggest that the defendant has a special relationship to the plaintiffs or a material role in the creation or management of the risk in question. The court also discussed the layers of possible responsibility separating the home buyers from federal body, including (1) those with professional responsibility for adequate design and construction (architects, builders); (2) those with responsibility for approval of plans and inspection of compliance with building by-laws (municipalities); and (3) the province, which has adopted a *Building Code*. [306]

Kimpton v. Canada[307] was a case where the plaintiffs alleged that a federal body (the National Research Council of Canada) was negligent and failed in its duty to warn when it drafted and published the National Building Code (NBC), advocating for the construction method in question, and that the provincial government was negligent in its adoption of the NBC provisions. The British Columbia Court of Appeal held that the National Research Council is a statutory body created by Parliament to provide an advisory function to a legislative body, with regard to the NBC. As such, the plaintiff could only have relied on the provincial government, whose legislature authorized the legislation and regulation in question (adopting the NBC). As the creation and establishment of the BC Building Code was an act of lawmaking, it was, as such, an act for which the government is immune under law of tort.

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appeal refused, [2006] S.C.C.A. No. 514) Note the court in *Eliopoulos* distinguished the case from the decision in *Doe v. Metropolitan Toronto*, where a subset of persons were in imminent danger). For analysis on the government's duties to the public, in relation to that which occurs naturally, see also: *Cooper*, *Edwards*

[305] Jane Matthews Glenn, "Government Wrongs: Civil Liability for GMO Regulation in Canada" (2008) 18 J. Env. L. & Prac. 169.

[306] *McMillan v. Canada Mortgage and Housing Corporation*, 2007 BCSC 1475 (CanLII), online: http://canlii.ca/t/1t33q

[307] *Kimpton v. Canada* (Attorney General), 2002 BCSC 1645 (CanLII), online: http://canlii.ca/t/5fvb

The courts have been more willing to impose a duty of care where the government defendant had responsibility for the creation of the risk, such as the release into the environment of something that did not occur naturally.[308]

[308] For an analysis of the courts' treatment of such cases, see: Jane Matthews Glenn, "Government Wrongs": Civil Liability for GMO Regulation in Canada" (2008) 18 J. Env. L. & Prac. 169.

7.0 Conclusions and Recommendations

The federal government has provided important leadership in addressing radon risks under the National Radon Program including revising the "reference level" in the federal Radon Guideline, (previously set at 800 Bq/m^3), to 200 Bq/m^3 and conducting extensive radon testing, research into mitigation techniques, updating radon provisions in the National Building Code and establishing a Canadian certification program for radon mitigation professionals.

Education and awareness programs, sponsored and often funded by the federal government, repeatedly advise Canadians that all homes should be tested for radon although public uptake of this message is so far quite limited. Greater public awareness is needed about radon as a public health risk and not solely a problem for private home owners. To do so, outreach materials should ensure consistency in messaging and reintroduce language such as 'radioactivity' and 'radiation' in order to convey radon risks using more commonly recognized terminology. Moreover, the issue of radon risk is largely unrecognized during the delivery and uptake of more widespread programs promoting energy efficiency measures. These programs need to test for, and if necessary mitigate, elevated radon levels that are known to result from tightening the building envelope.

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.

Health Canada's cross-Canada survey of indoor radon levels indicates 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. Data sharing of the results of radon testing is inconsistent and not compiled centrally. Radon testing has been undertaken at the federal, provincial/territorial, regional and municipal level, but it is not always known to whom test results were disclosed, and whether building users were made aware of the radon test results. Radon test data acquired by various levels and departments of government is not consolidated and made publicly available although several provinces/territories have provided access on-line to radon risk maps for their own jurisdiction. These survey results generally do not include radon tests conducted in private homes.

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 require 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.

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 and public registries of this information, requests under provincial/territorial freedom of information law could be made to determine what testing has been done, and what follow-up occurred.

If the approximately 7% of homes in Canada with radon levels above the federal Radon Guideline reference level of 200 Bq/m^3 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 Health Canada's Radon Guideline reference level were lowered to 100 Bq/m^3, the level recommended by the World Health Organization.

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

Following on the federal government's leadership on radon, particularly the certification of radon mitigation professionals and public outreach urging that all homes be tested, 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.

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^3.

A Federal-Provincial-Territorial Radiation Protection Committee has contributed to much of the recent reforms that address radon in multiple federal guidance documents but 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."

Rather, this review of law and policy finds that there is divided and overlapping jurisdiction related to radon across Canada. There is no lead agency responsible for addressing indoor air or for radon specifically, and a high degree of fragmentation and inconsistency exists across each province/territory and across Canada. Alongside recently updated guidance documents produced by the federal government there are numerous pieces of relevant, or potentially relevant, legislation administered under the purview of several government ministries, departments, and

agencies at all three levels of government in Canada with provincial/territorial governments being the most important arena where radon protection can be encoded in law.

Where explicit radon protection is encoded in law, it is generally captured by provincial building codes and, at the federal level, in the *Canada Labour Code* (thus, applicable only to federal government workplaces). Given this predominant role of provincial/territorial governments, requirements tend to differ across the country.

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 disclosure of test results, in certain locations where soil gas presents a danger. As well, the federal Radon Guideline reference level of 200 Bq/m^3 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^3, 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^3contained under the general duty clause in the Canada Occupational Health and Safety Regulations (passed under the *Canada Labour Code*).

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 revisions to the National Building Code enacted in 2010 (and further revisions to NBC, 2010 that took effect during 2012) including many revisions related to radon.

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 should also specifically include the federal Radon Guideline reference level (currently set at 200 Bq/m^3) 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.

In addition to Building Codes, several additional areas of provincial/territorial legislation are potentially relevant to radon protection. These include those governing occupational health and safety, occupier's liability, real estate transactions, education, the environment, health, and tenanted properties. The focus in this review was mainly, but not exclusively, on whether radon protection existed, or potentially existed in these laws with respect to public buildings.

Overall, it is important to note that, aside from evolving provisions in Building Codes and the *Canada Labour Code* regulations discussed above, none of these provincial laws were specifically drafted to regulate radon in indoor air. Nor have they been considered, or 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 these provincial 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 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.

The following bulleted points summarize the findings in each of these other areas of law (with a series of recommendations following this bulleted list):

- 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.

- Provincial/territorial 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 officials receive few to no complaints about indoor radon and subsequently take little to no enforcement action. Opinions are variable within and across provinces and territories among 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. Given 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 or 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, the federal Radon Guideline does not have the force of law but it can be referenced by health authorities when assessing complaints, and could be enforced at the discretion of a Public Health Inspector.

- Provincial/territorial education legislation in the provinces and territories 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.

- 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.

- 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, several provinces and territories (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.

- In terms of landlord duties, most provincial/territorial legislation requires that property owners keep 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.

- 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 permits and inspections, and other areas where they are empowered to issues orders necessary to direct compliance with applicable provincial/territorial laws.

Recommendation 8: All provincial/territorial governments should ensure that the NORM Guidelines are clearly applied to workplaces within their jurisdictions, including workplaces not engaged in activities itemized in the NORM Guidelines (i.e., including *all* 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, 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 the Radon Guideline reference level of 200 Bq/m^3.

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.

Finally, this review has found that, beyond statutory requirements, 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. 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 a real estate transaction. These may be either express, or implied. Of particular relevance to the case of radon in indoor air is the implied warranty of habitability.

APPENDIX 1: Tables of Federal and Provincial Guidance and Law Relating to Radon Protection[1]

	Table 1: FEDERAL GUIDANCE AND LAW RELATING TO RADON PROTECTION
Canada	***Canada Radon Guideline for 'Dwellings"*** The reference level for radon in indoor air in "dwellings", set by the Government of Canada Radon Guideline is 200 Becquerels per cubic metre (Bq/m^3). "Dwellings" refers to homes or public buildings (the latter including such buildings as: schools, hospitals, long term care facilities and correctional facilities). The Guideline is advisory (non-regulatory) in nature, and provides recommendations to the public on when remedial action should be taken to reduce indoor radon levels.
Canada	***National Building Code of Canada*** Radon protection provisions appear is Parts 5, 6 and 9 of the National Building Code of Canada (NBC, 2010). Part 5 addresses soil gas control, sets targets for the control of air leakage, and details air barrier system requirements to minimize the ingress of airborne radon from the ground with an aim to maintain the indoor radon concentration at an acceptable level. Sentences 5.4.1.1. (2) and (3) requires (except where uncontrolled air leakage will have adverse effects, including on the health of building users) the installation of an air barrier system in components and assemblies in contact with the ground to control the ingress of radon. The associated Appendix Note indicates that an air barrier system can offer protection from pollutants associated with health or safety hazards, and references the new Health Canada guideline of 200 Bq/m^3 for indoor radon concentration, stating that "[m]easures may be necessary to reduce the radon concentration to a level below the Health Canada guideline." [2] Part 6, Article 6.2.1.1. (Good Engineering Practice) requires heating, ventilating and air-conditioning systems to be designed, constructed and installed in conformance with good engineering practice. Included in a list of examples of good engineering practice is EPA/625/R-92/016, "Radon Prevention in the Design and Construction of Schools and Other Large Buildings." The associated Appendix Note includes a section on radon control which references the Health Canada Radon Guideline. It states: "[m]easures may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada and provides resources for further information on reducing the indoor concentration of."[3] The majority of radon protection provisions appear in Part 9 (Housing and Small Buildings). Section 9.13 addresses measures for resisting the ingress of soil gases; Section 9.14 addresses the provision of control joints to reduce cracking of foundation walls and airtight covers for sump pits to reduce radon ingress; and Sections 9.18 and 9.25 include requirements for air and soil gas barriers in assemblies in contact with ground (and crawl spaces). Sentence 9.13.4.2. (1) requires the installation of an air barrier system and addresses protection from all soil gases. The rest of Article 9.13.4.2., along with Article 9.13.4.3., which requires the provision of the means to depressurize the space between the air barrier and the ground, target the future mitigation of high radon concentrations. The requirements provided in Article 9.13.4.3 are explained in associated Appendix Note A, which indicates that installation of a subfloor depressurization system may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada.[4] Subsection 9.25.3 addresses radon gas infiltration subsection

	Table 1: FEDERAL GUIDANCE AND LAW RELATING TO RADON PROTECTION
	9.25.3.1. requires an air barrier system that is "continuous" and sufficient to prevent air leakage to conditioned spaces from unconditioned space or from the ground. The Appendix to Sentences 9.25.3.6 (2) and (3) also notes that "[f]loors-on-ground separating conditioned space from the ground must be constructed to reduce the potential for the entry of air, radon or other soil gases".[5] The Appendix to Part 9 notes that various sections require the application of certain radon exclusion measures in all dwellings and that these measures are • low in cost, • difficult to retrofit, and • desirable for other benefits they provide.[6] For more specific detail on provisions within the NBC, 2010 please see Appendix II.
Canada	***Employment Settings*** *Canada Labour Code* The federal Occupational Health and Safety Regulations, enacted under the Canada Labour Code,[7] sets the reference level for federal government employees at 800 Bq/m^3, the former federal Radon Guideline reference level. This level applies to federal employees. While there is no legal requirement for employers to test for radon, the only way for an employer to know if they are compliant with the Canada Labour Code is to test. *NORM Guidelines* The Canadian Naturally Occurring Radioactive Materials Guidelines (NORM Guidelines)[8] are intended to apply to all occupational exposures, including those "incidentally exposed"[9] to background radiation in through the infiltration of soil gas into indoor air. To become law, the NORM Guidelines must be adopted by a provincial/territorial government. The NORM Guidelines recommend that: - all workplaces be tested for potential elevated levels of radon gas in indoor air;[10] - steps be taken to reduce radon levels when radon levels are above 200 Bq/m^3;[11] - workplaces expected to have radon levels above 200 Bq/m^3 be periodically reviewed post-remediation to ensure conditions have not changed; [12]and - workplaces implement radiation protection programs appropriate to the level of radon concentration.[13] The NORM Guidelines include recommendations to reduce the presence of radon progeny in indoor air in work environments by way of respirator programs and inhalation control measures. The NORM Guidelines note that engineering controls of the source of airborne radioactive material is the preferred management method, including controls that capture ventilation at the source, and room ventilation rate increase. [14]

	Table 2: PROVINCIAL LAW RELATING TO RADON PROTECTION
Alberta	**Regulation of Construction** Alberta has a Building Code[15] that is based on the NBC, with some changes and modifications.[16] Alberta's Building Code Regulation,[17] enacted under the *Safety Codes Act*,[18] declares in force the *Alberta Building Code 2006*, as established by the Safety Codes Council. The Alberta Building Code includes revisions and errata approved to June 2009, but does not include any of the 2012 radon-related additions to the NBC, 2010. Unlike the NBC 2010, the Alberta Building Code does not include explicit reference to soil gas control, or radon protection, but does include relevant Functional Statements and Objectives to provide clarity on what is required to satisfy Building Code provisions. [19] Note however that these Functional statements and Objectives are not legally binding but advisory in nature.[20] For additional detail on requirements under the Alberta Building Code please refer to Appendix II.
Alberta	**Public Health Legislation** Alberta's *Public Health Act*[21] uses the term 'nuisance', which is defined to mean "a condition that is or that might become injurious or dangerous to the public health, or that might hinder in any manner the prevention or suppression of disease." Alberta's *Public Health Act* includes provisions for inspection and enforcement with respect to hazards to public health, and imposes a positive duty on owners to ensure that housing premises are in a safe condition and maintained in good repair, and in compliance with the *Minimum Housing and Health Standards.*[22] For the purposes of enforcement of the Act, an executive officer may inspect any public place for the purpose of determining the presence of a nuisance or determining whether there is compliance with the Act and its regulations. With respect to private buildings, an executive officer must have reasonable and probable grounds that a nuisance exists or that there is a contravention of the Act and the consent of the building owner to enter, inspect and make tests on the premises.[23] If after an inspection, there are reasonable and probable grounds to believe that a nuisance exists or that there has been a contravention of the Act and its regulations, the executive officer may issue an order, including: requiring the building be vacated; declaring the building unfit for human habitation; requiring the closure of the building; requiring the doing of work specified in the order in, and requiring the removal from the place or the vicinity of the place of anything that the order states causes a nuisance.[24] If such an order is issued, the regional health authority may "cause to be filed with the Registrar of Land Titles a notice of the health hazard against the registration of any person as transferee or owner of, or of any instrument affecting, the land that is the subject of the order, unless the instrument or certificate of title is expressed to be subject to that notice."[25] Note that Alberta's public health legislation also provides tenant protections. Alberta's Housing Regulation, under the *Public Health Act*, puts the obligation on the property owner to ensure that rental units are maintained in a structurally sounds, safe condition, and in good repair. Section 5(2) of the Regulation prohibits any person from causing or permitting "any condition in housing premises that is or may become injurious or dangerous to the public health, including any condition that may hinder in any way the prevention or suppression of disease". The Regulation requires that owner s maintain rental housing premises in compliance with the *Minimum Housing and Health Standards.* The standards require that housing premises be structurally sounds, and maintained in a waterproof, windproof and weatherproof condition, and

	Table 2: PROVINCIAL LAW RELATING TO RADON PROTECTION
	includes minimum standards for ventilation. The Standards govern the conditions and maintenance, the supplied utilities, and the use and occupancy of housing. Enforcement is through a complaint basis, whereby inspections of housing premises are undertaken by Public Health Inspectors/Executive Officers of Regional Health Authorities.[26]
Alberta	**Education Legislation** The primary legislation governing school board property and infrastructure is Alberta's *School Act.*[27] Under Part 7, section 195 creates a positive duty for school boards to "provide and maintain adequate real and personal property for its administrative and educational purposes." While it is clear that a positive duty is created under this section, there remains ambiguity with respect to what constitutes adequacy, and by whom it is defined and funded. [28] Alberta's *School Act* also requires that school boards "maintain, repair, furnish and keep in good order all its real and personal property"[29] and provides school boards with the discretion to temporarily close a school building "if the health or safety of the students is endangered". If a school board elects to close a school building it is required to 'forthwith remedy the situation causing the closure and reopen the school building."[30] Note that the *School Act* is silent on the issue of funding, and Alberta's annual funding (for operating and infrastructure of schools) has been criticized for the lack of adequacy and predictability.[31] Despite the creation in the Act of positive duties with respect to school property and infrastructure, limitations in planning, funding and regulatory mechanisms have been criticized as impeding Alberta school boards from adequately providing functional and safe school buildings, including maintaining existing schools.[32]
Alberta	**Occupational Health and Safety Legislation** The *Occupational Health and Safety Act*, [33] Regulation[34] and Code[35] set out the minimum requirements for health and safety in workplaces in Alberta.[36] The Act provides that employers are responsible for ensuring the health and safety of their workers, as far as it is reasonably practicable for the employer to do so.[37] A stop work order can be issued if "work is being carried out in a manner that is unhealthy or unsafe to the workers engaged in the work or present where the work is being carried out." [38] Similarly, when an officer is "of the opinion that a danger to the health or safety of a worker exists in respect of that worker's employment, the officer may at any time enter into or on any work site and issue a stop work order, order any worker or other person present to leave the work site forthwith, or order the employer to take specified measures related to removing the source of the danger or to protect any person from the danger.[39] Employees are entitled to refuse work where an "imminent danger" to health and safety exists which is not normal for the occupation in question, or which is such that a worker in that occupation would not normally carry out the person's work.[40]

	Table 2: PROVINCIAL LAW RELATING TO RADON PROTECTION
	The Occupational Health and Safety Code[41] provides specific protections for exposure to asbestos, lead and mould in the workplace. Exposure limits and airborne concentrations are laid out in the Code for harmful substances. Radon gas is not included in the list of harmful substances included in Schedule 1, Table 2 of the Code. Part 20 of the Code deals with radiation exposure protection and prevention, and requires employers (whose employees may be exposed to ionizing radiation at work) to develop and implement a safe work practices and procedures for when workers deal with or approach the radiation source, and to inform workers of potential radiation hazards/sources.[42] The Code defines "hazard" as a situation, condition or thing that may be dangerous to the health of safety of workers. While radon protection is not explicitly included in the Code, it may be that the treatment of exposure to radon gas would receive the same as mould. The Code specifies that: "[w]here mould exists or may exist, an employer must ensure that a worker's exposure to the mould is controlled in accordance with section 9". Section 9 provides that if a hazard is identified, the employer is required to take measures to eliminate the hazard, or control the hazard if elimination is not practicable. [43] The Code requires that employers undertake a hazard assessment to "identify existing and potential hazards before work begins at the work site or prior to the construction of a new work site" and provides that employers must prepare a report on the methods used to control or eliminate the hazard. The employer must repeat the hazard assessment at reasonably practicable intervals to prevent the development of unsafe and unhealthy working conditions; when a work process is newly introduced or changes; and before the construction of significant additions/alternations to a worksite.[44] Part 26 of the Code addresses Ventilation Systems, and provides design and safety requirements. This Part applies to worksites where a mechanical ventilation system controls worker exposures, but would not apply to radon in indoor air as limits exposures to gases that are hazardous and given off by a process or which are flammable, among others prescribed by the Code.[45] Other than air quality requirements relating to prescribed substances, and ventilation requirements for confined spaces,[46] mines,[47] and fire and explosion hazards,[48] workplace indoor air is not addressed in the *Occupational Health and Safety Act*, Regulation or Code. The Occupational Health and Safety Branch is responsible for enforcing Alberta's *Occupational Health and Safety Act*, Regulation and Code through inspections,[49] investigations, the issuance of orders to employers, and prosecutions. Administrative penalties and ticketing came into effect, on October 1, 2013 and January 1, 2014 respectively, requiring the payment of cash fines by employers and workers who put health and safety at risk.[50] While not legally binding, Worksafe Alberta has produced an "Indoor Air Quality Toolkit."[51] The toolkit is designed for non-industrial settings and is intended to provide information and advice about recognizing and controlling indoor air quality problems. The toolkit includes a section on indoor radon and references the former Health Canada Radon Guideline of 800 Bq/m^3.[52]
Alberta	**Real Estate and Home Warranty Legislation**

	Table 2: PROVINCIAL LAW RELATING TO RADON PROTECTION
	Although Alberta used a property disclosure statement in real estate transaction as of 1998, this form has since been withdrawn.[53] Alberta's *New Home Buyer Protection Act*[54]which came into force February 1, 2014, and its regulations,[55] make home warranties mandatory. The Act mandates and regulates new home warranties in the province, with the government tracking warranties on new homes; establishing a public warranty registry; providing municipalities with tools to ensure warranty coverage is in place before new construction permits are issued; and enforcing penalties against builders, warranty providers and others not complying with the Act.[56] New homes to which the Act applies cannot be built or sold without a home warranty insurance contract that complies with the Act.[57] The Act applies to new homes, and includes: single detached family homes, duplexes, multi-family homes, condominiums, and recreational properties. Builders are deemed to have agreed with the prospective owner, and subsequent owners, of a new home that as of the date the home is first occupied, it is free from: defects in materials and labour, in materials and labour related to delivery and distribution systems, in the building envelope, and from structural defects.[58] The current owner of the homes is the only person entitled to recover damages for a breach of a warranty.[59] Warranties include, at a minimum, a one year warranty for labour and materials, and a five year warranty for building envelope protection, and a ten year warranty for major structural components (including the building's frame and foundation). Under the Act, home builder's partner with warranty providers, and are responsible for ensuring necessary permits are obtained and Building Code standards met.[60]
Alberta	**Occupier's Liability Legislation** Alberta's *Occupiers' Liability Act* defines occupiers as: "those (i) …in physical possession of premises, or those with (ii) ...responsibility for, and control over, the condition of premises, the activities conducted on those premises and the persons allowed to enter those premises…" Section 5 states that "[a]n occupier of premises owes a duty to every visitor on the occupier's premises to take such care as in all the circumstances of the case is reasonable to see that the visitor will be reasonably safe in using the premises for the purposes for which the visitor is invited or permitted by the occupier to be there or is permitted by law to be there." Section 6 applies the duty to " to (a) the condition of the premises, (b) activities on the premises, and (c) the conduct of third parties on the premises. [61]
Alberta	**Regulation of Residential Tenancies** Alberta's *Residential Tenancies Act p*rovides a framework for landlord and tenant relations in Alberta, setting minimum standards of conduct for both landlords and tenants.[62] The Act includes a requirement that landlords ensure that rental premises "meet at least the minimum standards prescribed by housing premises under the *Public Health Act* and regulations." [63]

	Table 2: PROVINCIAL LAW RELATING TO RADON PROTECTION
	Alberta's Housing Regulation, under the *Public Health Act*, puts the obligation on the property owner to ensure that rental units are maintained in a structurally sounds, safe condition, and in good repair. Section 5(2) of the Regulation prohibits any person from causing or permitting "any condition in housing premises that is or may become injurious or dangerous to the public health, including any condition that may hinder in any way the prevention or suppression of disease". The Regulation requires that owner s maintain rental housing premises in compliance with the *Minimum Housing and Health Standards.* The standards require that housing premises be structurally sounds, and maintained in a waterproof, windproof and weatherproof condition, and includes minimum standards for ventilation. The Standards govern the conditions and maintenance, the supplied utilities, and the use and occupancy of housing. Enforcement is through a complaint basis, whereby inspections of housing premises are undertaken by Public Health Inspectors/Executive Officers of Regional Health Authorities.[64]
British Columbia	**Regulation of Construction** British Columbia has a Building Code[65] that is based on the NBC, with some changes and modifications. The BC Building Code,[66] a regulation of the *Local Government Act*[67] for new construction and building alterations, is substantially the same as the NBC 2010.[68] The BC Building Code adopts the radon protective provisions of the NBC 2010, but has relaxed the requirement relating to future mitigation (including provisions for a rough-in for a radon extraction system) by limiting the application of Sentence 9.13.4.2 (2) and (3) by adding an exemption, not included in the NBC 2010, for building in locations classified as Radon Area 2. [69] The BC Building Code has established two zones – Radon Area 1 and Radon Area 2 which correspond to level of risk and is based on geography, with the high radon areas being mainly inland, and east of the coastal mountains. The Code applies throughout the province, except for some Federal lands and the City of Vancouver. The BC Building Code does not apply retroactively to existing building unless triggered by a renovation or addition.[70] Radon gas is currently an active issue in British Columbia. A Public Review of the BC Building Code has been undertaken to evaluate different options with respect to modifying the Code. At present no commitment has been made with respect to Code changes or timelines.[71] In April 2013, BC adopted the 2012 National Model Building Code amendments for energy efficiency in housing and small buildings. These amendments will come into force in December 2014, along with additional ventilation requirements for residential occupancies and dwelling units.[72] For additional detail on requirements under the British Columbia Building Code please refer to Appendix II.
British Columbia	**Public Health Legislation** British Columbia's *Public Health Act*[73] includes provisions for inspection and enforcement with respect to hazards to public health. The Act defines 'health hazard' as a) a condition, a thing or an activity that (i) endangers, or is likely to endanger, public health, or (ii) interferes, or is likely to interfere,

	Table 2: PROVINCIAL LAW RELATING TO RADON PROTECTION
	with the suppression of infectious agents or hazardous agents, or b) a prescribed condition, thing or activity, including a prescribed condition, thing or activity that (i) is associated with injury or illness, or (ii) fails to meet a prescribed standard in relation to health, injury or illness. The Act provides for inspection powers for the purposes of determining whether a health hazard exists or likely exists in or on the vehicle or place, or in relation to the activities of the person,[74] and require information or documents be provided, may bring to the inspection an expert, may take samples and conduct tests.[75] For public buildings, a health inspector can enter at any reasonable time providing reasonable steps have been taken to notify the owner or occupier of the place. Notification is not required if doing so is reasonably possible or practical in the circumstances, or in the case of a regulated activity, providing notice would frustrate the purposes of the inspection. For private dwellings consent or a warrant must be obtained in order to enter.[76] A medical health officer may issue an order only if the health officer reasonably believes that (a) a health hazard exists, (b) a condition, a thing or an activity presents a significant risk of causing a health hazard, (c) a person has contravened a provision of the Act or a regulation made under it, or (d) a person has contravened a term or condition of a licence or permit held by the person under this Act.[77] The health officer may order a person to do anything that the medical health officer reasonably believes is necessary in order to determine whether a health hazard exists; prevent or stop a health hazard, or mitigate the harm or prevent further harm from a health hazard; or to bring the person into compliance with the Act (and its regulations) or with a term or condition of a licence or permit.[78] Orders may be issued against the person whose act or omission has caused the health hazard, a person who has custody or control of a thing, or control of a condition, that is a health hazard or is causing the health hazard, and owners and occupiers of the property where the health hazard is located.[79] Orders can require that a person to specified work on a place, cease operation of the premises, or an action prescribed by the health officer.[80] A health officer who makes an order in respect of land affected by a health hazard may file in the land title office a written notice.[81] Note that although provided with the regulation-making power to establish minimum health and safety standards in rental housing under the *Public health Act,*[82] British Columbia has not done so, but rather includes minimal standards which equate to health hazards in rental housing (including the provision of a water supply system, specified airspace per tenant, and windows that open).[83]
British Columbia	**Education Legislation** In British Columbia, education and safety in schools is governed by the province's *School Act.*[84] In British Columbia, the Minister of Education has "charge of the maintenance and management of all Provincial schools" under the *School Act.*[85] The British Columbia Ministry of Education does not have a policy or program with respect to radon in indoor air in BC schools and public school Boards are responsible for radon remediation in BC schools. Under the BC *School Act*, school boards are responsible for management of schools and property. The Act states that school boards are responsible for the management of schools, as well as "the custody, maintenance and safekeeping of all property owned or leased by the board" and must ensure that principals, vice-principals or directors of instruction are "responsible for each school" within the school boards district.[86] School Boards are also provided, by the Act, the discretion to temporarily close a school building if the health or safety of the

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	students is endangered.[87] Each school Board in British Columbia is encouraged to develop a long-term maintenance plan including maintaining and improving site and facility conditions. Some BC school Boards have developed health and safety policies which cover 'safe physical environments' and organize maintenance staff, some of which include duties relating to indoor air quality. BC school Boards are provided by the Ministry an Annual Facility Grant for the purpose of maintaining school facilities and prevent premature deterioration. Grant amounts depend on age of school facilities, number of students enrolled, geographic location, etc. There are twelve categories of eligible expenditures, two of which are potentially relevant: 'Mechanical System Upgrades' (including improvements, replacements, or provision of ventilation); 'Facility Upgrades' (including repairs to the building envelope); 'Site Upgrades' (including repairs, site improvements, and contaminated soil remediation); and 'Health and Safety Upgrades' (which includes improvements related to indoor air quality).[88] The *School Act* provides that a School Medical Officer must be designated for each school district, who must cause an inspection to be made of school buildings and surroundings, and must report to the board and the minister of health. The School Medical Officer can require a board to close a school when the school medical officer considers that the health or safety of students is at risk,[89] as can School Boards, under the *School Act*, if the health or safety of the students is endangered.[90]
British Columbia	**Occupational Health and Safety Legislation** The Province of British Columbia does not have legislation or regulations in place to regulate non-radiation worker exposures to radon in indoor air. In BC, air quality issues related to places of employment are addressed by WorksafeBC. WorksafeBC is an independent agency, created by *Workers' Compensation Act,*[91] and governed by a Board appointed by government.[92] Employer and employee rights and duties are laid out in the province's *Workers' Compensation Act.*[93] Part 4 of the Act details employer duties and provides that every employer must ensure the health and safety of all workers, specifying that this duty includes remedying any workplace conditions that are hazardous to the health or safety of the employer's workers, and making employees aware of all known or reasonably foreseeable health or safety hazards to which they are likely to be exposed by their work.[94] Part 7, Division 3 of the Occupational Health and Safety Regulation, enacted under the *Worker's Compensation Act*, deals with exposure to radiation and prescribes exposure limits and action levels, but specifically excludes application to natural background radiation except as specified by the Board.[95] It is not clear whether radon and radon progeny is considered natural background radiation by the Board, and the Board has not specified either way as to whether naturally occurring radon should be considered as natural background radiation or to the applicability of this Division of the Regulation to the ingress of radon gas into a place of employment.[96] Part 3 of the Regulation contains legal requirements that must be met by all workplaces, and includes the requirement that employers "ensure

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	that regular inspections are made of all workplaces, including buildings, structures, grounds … at intervals that will prevent the development of unsafe working conditions."[97] The regulation also requires that "[u]nsafe or harmful conditions found in the course of an inspection … be remedied "without delay".[98] The Regulation imposes duties on the employer to ensure that there is a ventilation system for the supply and distribution of air and removal of indoor air contaminants and that this system is in accordance with *ASHRAE Standard 62-1989, Ventilation for Acceptable Indoor Air Quality*.[99] The Regulation also requires the establishment of effective preventive maintenance program for the ventilation system,[100] and the Regulation requires employers to investigate indoor air quality complaints and to take samples of airborne contaminants.[101]
	Real Estate and Home Warranty Legislation There is no mandated property disclosure statement required in real estate transaction in British Columbia. BC was likely the first Canadian province/territory to make use of a property disclosure statement, with its introduction by the BC Real Estate Board in 1991, but its use is optional. If a seller agrees to complete a property disclosure form, it can be legally incorporated into the Contract for Purchase and Sale. British Columbia's *Homeowner Protection Act*,[102] and the Homeowner Protection Act Regulation,[103] provide that the provision of new home warranties is mandatory. The Act provides that a "person must not build a new home unless the new home is registered for coverage by home warranty insurance provided by a warranty provider."[104] Builders and vendors of new homes are deemed to have agreed with the owner of the new home that the new home (a) is free from defects in materials and labour; (b) is free from defects in the building envelope, including defects resulting in water penetration; and (c) is free from structural defects. [105] Under the Act, a home cannot be sold within ten years from its construction without home warranty insurance. [106] Home warranty insurance must Home warranty insurance "must provide coverage for (a) defects in materials and labour for a period of at least 2 years after the date on which the warranty begins, (b) defects in the building envelope, including defects resulting in water penetration, for a period of at least 5 years after the date on which the warranty begins, and (c) structural defects for a period of at least 10 years after the date on which the warranty begins." [107] Likewise, renovations must not be undertaken, or a renovated home sold, unless covered by home warranty insurance.[108] Part 9.1 of the Act deals with enforcement, and includes the issuance of compliance orders, and monetary penalties for non-compliance. [109]
British Columbia	**Occupier's Liability Legislation** Under British Columbia's *Occupiers Liability Act*, 'occupier' is defined as: "a person who (a) is in physical possession of premises, or (b) has responsibility for and control over, the condition of premises, the activities conducted on those premises and the persons allowed to enter those premises."

	Table 2: PROVINCIAL LAW RELATING TO RADON PROTECTION
	Subsection 3(1) provides that an occupier of premises owes a duty to take that care that in all the circumstances of the case is reasonable to see that a person... "will be reasonably safe in using the premises." Subsection 3(2) establishes the duty of care applies to the: (a) condition of the premises, (b) activities on the premises, or (c) conduct of third parties on the premises. Section 8 provides that the Act binds the Crown (except where the Crown is occupier of specified roads and highways).[110]
British Columbia	**Regulation of Residential Tenancies** British Columbia's *Residential Tenancy Act* applies to tenancy agreements, rental units, and residential properties.[111] In the case of residential tenancies, section 32 (1) of the Act requires that the landlord "provide and maintain [the] residential property in a state of decoration and repair that: (a) complies with the health, safety and housing standards required by law, and (b) having regard to the age, character and location of the rental unit, makes it suitable for occupation by a tenant.[112] Note also that although provided with the power to enact regulations relating to minimum health and safety standards that must be met by landlords of rental housing under the *Public Health Act*,[113] British Columbia has not done so. Instead, the province includes minimal standards which equate to health hazards in rental housing (including the provision of a water supply system, specified airspace per tenant, and windows that open).[114]
Manitoba	**Regulation of Construction** Manitoba has a Building Code[115] that is based on the NBC, with some changes and modifications. The Manitoba's Building Code[116] is a regulation enacted under the *Buildings and Mobile Homes Act*[117] which has been in force since April 1, 2011.[118] The main differences between the Manitoba Building Code and the NBC 2010 are additions which have been made to the Manitoba Code. The Manitoba Code incorporates all of the NBC 2010 radon protective provisions (including any amendments, revisions or errata up to December 1, 2012). [119] For additional detail on requirements under the Manitoba Building Code please refer to Appendix II.

Manitoba	**Public Health Legislation** Manitoba's *The Public Health Act*[120] includes provisions for inspection and enforcement with respect to hazards to public health. The Act defines 'health hazard' as (a) a condition of a place or premises; (b) a plant, animal or other organism; (c) a substance or thing; (d) a solid, liquid or gas, or any combination of them; or (e) an activity, condition or process; that presents or might present a threat to public. The Act empowers the Minister with "the authority to protect and promote the health and well-being of Manitobans," and provides the Minister with powers, including the power to establish public health goals; monitor the provision of public health services and issue standards and guidelines; inquire into the causes of diseases, ill health, injuries and death and determine steps to reduce them; and advise the government about public health issues. [121] A health hazard order can be issued requiring a person to do or cause anything to be done, or refrain from doing anything, that the person making the order reasonably considers necessary to prevent, eliminate, remedy, reduce or otherwise deal with the health hazard, including investigating and carrying out tests; remove the solid, liquid or gas that is the health hazard; construct, excavate, install, modify, replace, remove, reconstruct or do any other work in relation to a place or premises; and require that a place or premises be vacated, closed or restricted.[122] Such an order can be directed to an owner or occupant or a person who appears to be in charge of the premises; to a person who owns or is in charge of, or appears to be in charge of the health hazard (including gas); or a person who is engaged in or carries out a business, activity or process on the premises. [123] Note that an order cannot be made requiring an occupier to vacate a dwelling place, unless there is an emergency health hazard. [124] Persons prescribed by the regulations are required to promptly report health hazards to a medical officer of health or inspector if they reasonably believe a health hazard exists.[125] Under the Act, enforcement provisions allow medical officers to enter and inspect any place or premises at a reasonable time[126] and bring testing equipment onto the premises and conduct tests and analyses considered necessary. [127] Dwelling places require a warrant or consent to enter, unless there is a public health emergency.[128] Note also that the Dwellings and Buildings Regulation,[129] enacted under the *Public Health Act*, provides minimum housing standards including requirements for the repair and maintenance of tenanted units.[130]
Manitoba	**Education Legislation** In Manitoba, education is governed by two pieces of legislation: the *Public Schools Act,*[131] and *The Education Administration Act,*[132] as well as regulations enacted under both. The responsibilities of the Minister of Education, school boards, principals and teachers are set out in the legislation. Manitoba's public schools operate directly under the Minister of Education and are governed by locally elected school divisions or school boards. The *Public Schools Act* places duties on schools board as custodians of school property, and specifies that they are to hold school property "in their possession, custody, and safekeeping" and "regulate the use of all public school property, real or personal, acquired or received and hold or apply it according to the terms on which it was acquired or received."[133] The Act makes school boards responsible for repairs to school buildings, requiring that "school buildings, contents and premises" be kept in "proper repair,"[134] and places a duty on school boards to "build, repair, furnish, keep in order and regulate the use of the school buildings, lands, enclosures and movable property."[135]

Manitoba	**Occupational Health and Safety Legislation** *The Workplace Safety and Health Act*[136] and its associated regulations provide the legislative framework for the health and safety of workers in Manitoba. The Act came into force on April 1, 2014. Under the Act, employers are required to "ensure, as is reasonably practicable, the safety, health, and welfare at work of all ... workers,"[137] and provide a workplace that is "safe and without risks to health, so far as is reasonably practicable;" to provide workers with "information ... to ensure, so far as is reasonably practicable, the safety, health, and welfare" of workers; and to ensure that all "workers, and particularly ... supervisors, ... are acquainted with any safety or health hazards."[138] The Act also establishes duties of owners, providing that "[e]very owner of a workplace shall "ensure, so far as is reasonably practicable, that the land or premises used as a workplace that is under his or her control is provided and maintained in a manner that does not create a risk to the safety or health of any person..."[139] Furthermore, every owner of a workplace is required by the Act to provide, so far as is reasonably practicable, all "required information" that [the owner] may reasonably be expected to know. This information must be conveyed to every employer who employs someone at the workplace, and to every self-employed person who works at the workplace.[140] Air quality and ventilation requirements are laid out in the Workplace Safety and Health Regulation.[141] The regulation places an obligation on employers to, "as much as is reasonably practicable, ensure that (a) a workplace has appropriate air quality and is adequately ventilated; and (b) contaminants and impurities are prevented from accumulating in the air at a workplace."[142] If mechanical ventilation is used, an employer is required to ensure that it is designed and installed in accordance with the Manitoba Building Code and any applicable municipal code, standard, or by-law; and that is provides sufficient amounts of air to replace air it exhausts from the workplace. [143]
Manitoba	**Real Estate and Home Warranty Legislation** Manitoba legislation does not require a Property Disclosure Statement by the seller. In Manitoba, the seller has the right not to provide information beyond what is required by the common law. There is no implied warranty by the seller attached to real estate sales, and a defect which may be detected by the buyer on a reasonable inspection is not one which requires disclosure by the seller.[144] The Real Estate Brokers Regulation,[145] under the *Real Estate Brokers Act*,[146] includes a Property Disclosure Statement[147] which is optional. The property disclosure statement appears under clause 7 of the offer to purchase form,[148] and provides standard clauses if the parties want to attach the statement to the offer. It includes disclosure requirements relating to seller's actual knowledge of radon gas. The Regulation provides that the seller's disclosure does not constitute warranties as to the actual condition of the property." [149] The *Manitoba's New Home Warranty Act*,[150] although not yet in force at the time of the writing of the present report, provides that home builders must be registered and obtain home warranty[151] and cannot be issued building or related permits unless a home warranty provider has committed to provide a home warranty for the home. [152] Section 9(2) of the Act lists the defects that must be covered by a home warranty. [153]

	If a new home is not covered by a home warranty, the Act provides that the home builder warrants to the owner (a deemed contract with the owner) that the home is free from the defects and violations referred to in clauses 9(2)(a) to (d) of the Act. [154] A warranty (or deemed contract) under the Act can also be enforced and damages recovered by the subsequent purchaser *if* ownership changes while the home is covered by a home warranty. [155] The Act will come into force upon proclamation.
Manitoba	**Occupier's Liability Legislation** Manitoba's *Occupiers' Liability Act* adopts the common law definition of 'occupier' (i.e., a person who is in physical possession of the premises or who has person who has responsibility for, and control over, the condition of premises). Note that Manitoba, under section 2, expressly abolishes the application of the common law of occupiers' liability in Manitoba. Section 3 provides that an occupier "owes a duty to persons entering on the premises ... "to take such care as, in all circumstances of the case, is reasonable to see that the person or property, as the case may be, will be reasonably safe while on the premises." The duty of care under Subsection 3(2) is applied to: (a) the condition of the premises; (b) activities on the premises; and (c) the conduct of third parties on the premises. Section 9 exempts municipalities from the duty of care in relation to specified roads, highways, sidewalks and trails.[156]
Manitoba	**Regulation of Residential Tenancies** Under *The Residential Tenancies Act* in Manitoba, the Manitoba Residential Tenancies Branch investigates, mediates and makes decisions on disputes between landlords and tenants including, among other things, repairs and the terms and conditions of a tenancy agreement.[157] Under the Act, landlords have an obligation to provide and maintain rental unit "in a good state of repair, fit for habitation and in a state that complies with health, building and maintenance and occupancy standards required by law",[158] as well as maintain the appearance of a rental unit in "proper and suitable condition for occupancy."[159] Additionally, Manitoba's Dwellings and Buildings Regulation,[160] enacted under the *Public Health Act*, provides minimum housing standards which impose requirements on owners of rental property to ensure the repair and maintenance of tenanted units.[161]
New Brunswick	**Regulation of Construction** New Brunswick does not have a provincial building code, nor province-wide adoption of the NBC. New Brunswick regulates building construction at the municipal level, and has provincial legislation in place requiring that municipal building by-laws, if passed, adopt relevant NBC provisions.[162] A proposed regulatory amendment,[163] under the *Metric Conversion Act*[164] designates the NBC 2010 (and any amendments made to it) as the code referred to in any reference to the NBC in any municipal building by-law enacted under the *Community Planning Act* (except for Section 3.8 of the NBC 2010 which is replaced in New Brunswick.[165] At present, the version of the NBC referred to is the NBC 2005.[166] Examples of cities which have building by-laws adopting the NBC include: Saint John, Moncton, Fredericton, and Bathurst. For municipalities which have not enacted a building by-law, the Provincial Building Regulation 81-126,[167] enacted under the *Community*

	Planning Act,[168] applies. The Counties in which the regulation is effective are specified under Section 3(1) of the Act. Provincial Building Regulation 2002-45, enacted under the *Community Planning Act*, applies in unincorporated areas of the Province and in rural communities which haven't enacted a building by-law. Section 5 of the Provincial Building Regulation 2002-45,[169] provides that "[t]he National Building Code of Canada 2005 is adopted by reference for the purposes of prescribing standards for the building locating or relocating, demolishing, altering, structurally altering, repairing or replacing of a building or structure." [170] Note that although the *New Brunswick Building Code Act,*[171] was assented to on June 19, 2009, it is not yet in force. When it comes into force, the NBC will be adopted by reference in the regulations, and sections 4 (1) (a) and (b) will require that no construction and demolition work be carried out unless necessary permits are obtained, and the work conforms with the NBC, the standards prescribed by by-law or regulation, and with the terms/conditions of any permits issued. For additional detail on the regulation of construction in New Brunswick please refer to Appendix II.
New Brunswick	**Public Health Legislation** New Brunswick's *Public Health Act*[1] includes provisions for inspection and enforcement with respect to hazards to public health. The Act defines 'health hazard as *(a)* a condition of a premises, *(b)*a substance, thing or plant or animal other than man, *(c)*a solid, liquid, gas or combination of any of them, or *(d)*a noise, vibration or radiation that has or is likely to have an adverse effect on the health of a person.
New Brunswick	**Education Legislation** In New Brunswick, education and safety in schools is governed by the province's *Education Act.*[172] Responsibility for education is divided between the provincial government (Minister of Education) and school boards (called District Education Councils (DECs)). The Ministry does not have any specific policy or program with respect to radon in indoor air in schools. All school property is vested in the Minister, and the Ministry is responsible for educational facilities,[173] and for capital infrastructure including major building and renovations. [174] The Minister is required to determine the sites of schools, and determine the physical standards for a safe and healthy school facility.[175] The Minister may arrange for an investigation of, among other things, the "safety... condition relating to any matter connected with the management, administration or operation of a [DEC], a school district or a school."[176] The Minister may also request corrective action be taken if, in the opinion of the Minister "the health, safety or educational welfare of pupils is endangered."[177] DECs have management, care and control of all school property in the school district,[178] are responsible for the operation of schools, [179] and have responsibility for minor repairs on school property.[180] DEC duties are enumerated in the *Education Act* and Regulation 2001-48, and include determining capital project priorities and school closures. The superintendent, which is Chief Executive Officer of the school district and accountable to the DEC, has responsibilities relating to operational/administrative decision-making; and managing the budget.[181] Principals of schools have the duty to ensure that "reasonable steps are taken to create and maintain a safe, positive and effective learning environment."[182]

New Brunswick	**Occupational Health and Safety Legislation** The Province of New Brunswick currently does not have legislation or regulations in place to regulate worker exposures to radon in indoor air (except for radon found in an underground mine).[183] WorkSafeNB is charged with enforcement and claims management in the province. WorksafeNB recommends that Health Canada's Radon Guideline be adhered to in workplaces where non-radiation workers conduct work.[184] While it is the practice of the Province of New Brunswick to apply Health Canada's Radon Guideline in workplaces operated by the province that are also 'dwellings', such as: schools, health care facilities, etc., [185] this is not a legal requirement and public and private employment settings may not apply the Radon Guideline. Testing for radon in public buildings, as is the case with all places of employment in the province, is not obligatory. Only regulated substances require testing, and radon is not a specifically regulated substance. [186] The NORM Guidelines are not applied in New Brunswick.[187] Employer and employee rights and duties are laid out in four pieces of provincial legislation and their respective regulations, all of which are administered by WorkSafeNB: the *Workplace Health, Safety and Compensation Commission Act,*[188] the *Workers' Compensation Act,*[189] the *Occupational Health and Safety Act,*[190] and the *Firefighters' Compensation Act.*[191] *The Occupational Health and Safety Act* contains provisions relating to employer duties to maintain a safe work environment, and sections 19, 20 and 24 of the General Regulation[192] enacted under the Act include air quality and ventilation requirements, and address worker protection from air contaminants. *Occupational Health and Safety Act* Under the Occupational Health and Safety Act, section 9(1) requires employers to "[t]ake every reasonable precaution to ensure the health and safety of his employees".[193] Part III of the General Regulation,[194] enacted under the *Occupational Health and Safety Act,*[195] explicitly addresses employers' duties with respect to indoor air quality, and the regulation defines "air contaminant" to include "any gas, fume, smoke, vapour, dust or other airborne concentration of a substance that may be hazardous to the health or safety of a person".[196] Under the regulation, employers are required to ensure that workplaces are well ventilated;[197] that worker exposures to air contaminants fall within threshold limits; and that air contaminants are kept at a level of concentration that does not constitute a hazard to the health or safety of an employee. [198] Section 24(3) of the General Regulation requires employers to remove air contaminants at their source 'where practical'.[199] *Enforcement by WorksafeNB* While WorksafeNB does not receive complaints with respect to radon in indoor air, they have the authority to follow up if a complaint was received. If testing was done by an employer, and employees had knowledge of the testing but the test results were not disclosed, WorksafeNB would have the authority to require an employer to turn over records. [200] WorksafeNB has the authority to take enforcement action and issue remedial orders, though this has not been done in the case of indoor radon, as complaints have not been received. Enforcement action in response to complaints about radon in indoor air are not likely, save for exceptions where the radon level is extremely high (approximating the threshold limits permitted in radiation work settings and underground mines). The only legal requirements relevant to radon in indoor air in NB are those specific to underground mines; as well as the air quality provisions and

	general duty clause in the *Occupational Health and Safety Act* and regulations (noted above). The nature of any enforcement action taken by WorksafeNB in response to a complaint about indoor radon would be case-specific and depend on the circumstances, including: the level of radon, the duration of exposure employees are subjected to, the location of the highest radon levels, etc. [201]
New Brunswick	**Real Estate and Home Warranty Legislation** New Brunswick legislation does not require a Property Disclosure Statement by the seller. New Brunswick does not have home buyer protection legislation. Consumer protection in place in New Brunswick include the *Sale of Goods Act*[202] and the *Consumer Product Warranty and Liability Act*. [203] The *Sale of Goods Act* creates various rights and remedies for buyers and sellers of goods on the commercial market. Buyers are provided, under the Act, the right to expect that goods supplied will be reasonably fit for the buyer's intended purpose (where such use is made known to the seller in advance), and that the goods conveyed are of merchantable quality.[204] Note however that the definition of 'goods' in the Act does not extend to real property but applies to "all chattels personal other than things in action or money … things attached to or forming part of the land …"[205] New Brunswick's *Consumer Product Warranty and Liability Act*, applies to the sale of all consumer products, both new and used, except those specifically exempted. "Consumer products," as defined in the Act, do not include real property, but refer to "any tangible personal property, new or used, of a kind that is commonly used for personal, family or household purposes." The Act defines express warranties (those given verbally or in writing to the purchaser or the public)[206] as any statement or promise made by the seller that the consumer relies on in making the purchase and is reasonable in doing so. The Act defines implied warranties consumer rights, regardless of whether or not the seller makes any promise or statement.[207] Implied warranties are laid out in the Act, and include the implied warranty that the seller has the right to sell the product, that the product is free of any interest, lien or encumbrance, that the product is in such condition, and as fit for the purpose(s) for which products of that kind are normally used, and that the product will be durable for a reasonable period of time.[208] Note that the implied warranties are inoperative if the buyer has actual knowledge that they do not apply to the product. The Act includes remedies for the breach of a warranty, and also includes a part on product liability which imposes liability on the supplier of a consumer product that is "unreasonably dangerous to person or property because of a defect in design, materials or workmanship."[209]
New Brunswick	**Occupier's Liability Legislation** New Brunswick does not have occupier's liability legislation.
New Brunswick	**Regulation of Residential Tenancies** The *Residential Tenancies Act*[210] establishes the rights and obligations of landlords and tenants in New Brunswick. The Act applies, except where otherwise specifically noted, the Act applies to tenancies of residential premises and tenancy agreements respecting such premises, but not to co-op housing, public housing and vacation homes. [211] Under the Act, landlords are required to maintain rental premises "in a good state

	of repair and fit for habitation," and is required to "comply with all health, safety, housing and building standards and any other legal requirement respecting the premises."[212] Rental residential properties are also regulated by the Residential Properties Maintenance and Occupancy Code, [213] enacted under section 93 of the *Municipalities Act.*[214] The Code sets standards "governing the condition, occupancy and maintenance of residential property and providing safeguards for the safety, health and welfare of the general public and of occupants and users of residential property."[215] The Code that is annexed in the Schedule to the Residential Property Maintenance and Occupancy Code and is available for adoption by municipalities within New Brunswick. The Code only applies in municipalities that have adopted in by way of a municipal by-law. Several provisions in the Residential Property Maintenance and Occupancy Code,[216] addresses landlord responsibilities. These are drafted specific to the type of maintenance issue, with provisions providing examples of the type of maintenance included. While focusing on structural safety, and prevention of pests, many of these provisions would also likely assist in preventing the entry of radon gas. These include provisions providing for the maintenance of foundation walls, including the grouting of masonry cracks;[217] that every interior wall and ceiling in a dwelling be free of large holes and cracks noting that necessary maintenance may include repairing or filling holes and cracks;[218] as well as requirements relating to loose floor boards and a note on necessary repairs to be undertaken.[219] Also, some minimal ventilation requirements are provided under section 30, including the requirement that every habitable room have adequate ventilation, and that mechanical ventilation systems be maintained in good working order.[220]
Newfoundland	**Regulation of Construction** Newfoundland and Labrador does not have a provincial building code, nor province-wide adoption of the NBC. Municipalities have the jurisdiction and discretion to pass regulations relating to building design and construction, and are provided with regulation-making power under the provincial *Municipalities Act.*[221] If a municipal council passes regulations relating to building design and construction, the Province requires that they adopt the NBC. For additional detail on the regulation of construction in Newfoundland and Labrador please refer to Appendix II.
Newfoundland	**Public Health Legislation** The *Health and Community Services Act*[222] provides several regulation making powers. To date, there have been no regulations passed relating to the regulation and control of health hazards, or enabling the inspection or enforcement powers mentioned below. Under section 11 of the Act, the Minister may make regulations in respect of inspections of nursing homes, maternity homes, convalescent homes, private hospitals, homes for children, homes for aged and infirm persons and homes for physically and mentally handicapped persons;[223] colleges, schools, hotels, licensed or unlicensed, all lodging houses, boarding houses;[224] hospitals, jails, orphanages, reformatories and all other buildings, both public and private.[225] The Minister may also pass regulations with respect to providing for the prevention or removal or both of all matters, things and conditions on

	public or private property which, in the opinion of the minister, constitute or are likely to constitute a menace to public health.[226]
Newfoundland	**Education Legislation** The Ministry of Education does not have a policy or program with respect to radon in indoor air in schools. The Ministry provides funds for the operation and maintenance of schools. In Newfoundland and Labrador, education and safety in schools is governed by the *Schools Act.*[227] Under the *Schools Act,*[228] it is the duty of school boards to "establish priorities for school construction, maintenance and repair and make recommendations to the minister."[229]
Newfoundland	**Occupational Health and Safety Legislation** Workplace safety is governed by the *Occupational Health and Safety Act*[230] and its regulations. The Act imposes minimum conditions on all workplaces that ensures that workers are provided with an environment that neither impairs their health nor imperils their safety.[231] Under the Act, employers are required to "ensure, where it is reasonably practicable, the health, safety and welfare of … workers"[232] and providing and maintaining "a workplace and the necessary equipment, systems and tools that are safe and without risk to the health of … workers;" providing information necessary to ensure the "health, safety and welfare" of workers; and making sure that employees are made familiar with health and safety hazards in the workplace.[233] The Act also provides powers of investigation,[234] the authority to issue stop work orders, [235] and workers with the right to refuse work believed to be dangerous to health and safety. [236] Air quality requirements in underground workings[237] and mines[238] are laid out in the Occupational Health and Safety Regulations, enacted under the *Occupational Health and Safety Act*. Also**,** under section 11 of the *Health and Community Services Act*[239] the Minister may make regulations with respect to the inspection of industrial or commercial establishments, workshops, factories, mines or other places of employment for the purpose of investigating potential or apparent health hazards and advising on and enforcing the means of their prevention.[240] The province's *Radiation Health and Safety Act,*[241] applies to radiation workers, and not exposures in indoor air from the ingress of soil gases.
Newfoundland	**Real Estate and Home Warranty Legislation** Newfoundland and Labrador does not require the use of a property disclosure form during real estate transactions. Under the *Condominium Act*[242] vendor is required to include, where possible, a property disclosure statement along with the agreement of purchase and sale (or as soon as the disclosure statement is available and, at the latest within 5 days of its receipt by the vendor).[243] Newfoundland and Labrador does not have home buyer protection legislation. The *Consumer Protection and Business Practices Act*[244] provides consumer protection in Newfoundland and Labrador, but "goods," as defined in the Act, do not include real property but refer to "personal property or a right or interest in personal property that is used or ordinarily used

	primarily for personal, family or household"
Newfoundland	**Occupier's Liability Legislation** Newfoundland and Labrador does not have occupier's liability legislation.
Newfoundland	**Regulation of Residential Tenancies** The *Residential Tenancies Act*[245] governs landlord-tenant relationships in respect of residential premises.[246] The Act requires landlords to "maintain the premises in a good state of repair and fit for habitation during the tenancy and shall comply with a law respecting health, safety or housing."[247] Residential property is also governed by the Occupancy and Maintenance Regulations,[248] enacted under *Urban and Rural Planning Act,*[249] and provides standards relating to maintenance and occupancy for municipalities (or municipal planning areas) listed in the Schedule to the regulations. The maintenance requirements apply to all properties including land, buildings, structures, dwellings, fences, sheds, garages, parking lots, driveways, landscaping and all appurtenances. Properties are required to be maintained in a state of good condition and repair and particulars are provided in the regulations. Radon prevention is not discussed, but sections which may be relevant to radon prevention include: Structural soundness (free from deterioration, loose jointing, sagging, bulging and excessive deflection) (s. 6); basement habitable rooms (including requirements re ventilation and insulation) (s. 11); floors (re construction and maintenance standards re defective or work, deteriorated, cracked or torn finishes) (s. 18); interior walls (requirement that they are maintained free from holes, loose or deteriorated coverings or other defects which may increase the spread of fire) (s. 19); lighting and ventilation of habitable rooms (requirement that every habitable room in a dwelling have at least one operable window) (s. 26).
Nova Scotia	**Regulation of Construction** Nova Scotia has a Building Code[250] that adopts the NBC in its entirety. The NBC has been adopted into provincial law in Nova Scotia, by the *Nova Scotia Building Code Act,*[251] which was amended in 2005 (and came into effect July 1, 2006). The Nova Scotia Building Code Regulations[252] adopt the NBC 2010 in its entirety, including all revisions and errata made on or before December 31, 2013. [253] For additional detail on requirements under the Nova Scotia *Building Code Act* please refer to Appendix II.
Nova Scotia	**Public Health Legislation** Nova Scotia's *Health Protection Act*[254] includes provisions for inspection and enforcement with respect to hazards to public health hazards. The Act defines 'health hazard' to mean (i) a condition of premises, (ii) a substance, thing, plant, animal or organism other than a human, (iii) a solid, liquid or gas, (iv) radiation, noise, vibration or heat, or (v) an activity, or combination of any of them, that presents or may present a threat to the public health

Nova Scotia	**Education Legislation** In Nova Scotia, education and safety in schools is governed by the *Education Act.*[255] Under the Act, school boards,[256] superintendents[257] and principals[258] and support staff[259] have the duty to ensure a safe learning environment. The Ministry of Education does not have a policy or program with respect to radon in indoor air in schools. The Minister of Education has the power to cause an investigation of any school board matter relating to, among other things, the health, safety or educational welfare of the students of a school.[260] The *Education Act* creates school boards, which are responsible for the control and management of public schools,[261] and required to "manage, maintain, repair and keep safe all real and personal property owned, leased or used by the board."[262] With respect to property and finances, school boards are empowered under the Act to spend resources to "improve, renovate, alter, add to, repair, extend, provide service, furnish and equip buildings for public school purposes..." for the purpose of establishing, maintaining and operating public schools.[263] Superintendents, employed by and accountable to the school board, have responsibility for the operation of public schools in the school district and are required to maintain a safe, orderly and supportive learning environment in all schools.[264]
Nova Scotia	**Occupational Health and Safety Legislation** *Occupational Health and Safety Act* The Province of Nova Scotia does not have legislation or regulations in place to regulate non-radiation worker exposures to radon in indoor air. Employer and employee rights and duties are laid out in Nova Scotia's *Occupational Health and Safety Act.*[265] The Act requires employers to "take every precaution that is reasonable in the circumstances to ensure the health and safety of persons at or near the workplace."[266] Under Part 4 of the General Regulations,[267] employers are required to "provide for a supply of fresh air into, and the remove of air from, a workplace ... so far as is reasonably practicable, and sufficient to ...render harmless all gases, vapours, dust or other impurities that are likely to endanger the health or safety of any person".[268] Radon exposure is also covered in the Occupational Health section of the *Workplace Health and Safety Regulations,*[269] which applies to all workplaces to which the *Occupational Health and Safety Act* applies, and sets the workplace exposure limit for radon as that specified in the guidelines of the American Conference of Governmental Industrial Hygienists on threshold limit values and biological exposure indices (referred to as *"TLVs and BEIs")*, which is currently 4 WLM (working level months).[270] Section 2.3 of the Regulation requires employers to "comply with, and ensure compliance with, the threshold limit values for exposure to all of the following, as listed in the *TLVs and BEIs"*, and specifically lists gases, and vapours.[271]
Nova Scotia	**Occupier's Liability Legislation** Nova Scotia's *Occupiers' Liability Act* adopts the common law definition of 'occupier' (including persons with physical possession of the premises and persons with responsibility for, and control over, the condition of premises).

	Section 3 provides that the Act replaces the common law doctrine of occupiers' liability and replaces the test of when a duty of care on an occupier is established. Section 4 details the duties of occupiers in Nova Scotia, providing that: an occupier owes a duty "to take such care as in all the circumstances of the case is reasonable to see that each person entering on the premises and the property brought on the premises by that person are reasonably safe while on the premises". Subsection 3(2) provides that the duty of care applies in respect of: (a) the condition of the premises; (b) activities on the premises; and (c) the conduct of third parties on the premises. Subsection 3(3) provides a list, to which consideration must be given in the determination of whether the standard of care has been met. These are: (a) the knowledge that the occupier has or ought to have of the likelihood of persons or property being on the premises; (b) the circumstances of the entry into the premises; (c) the age of the person entering the premises; (d) the ability of the person entering the premises to appreciate the danger; (e) the effort made by the occupier to give warning of the danger concerned or to discourage persons from incurring the risk; and (f) whether the risk is one against which, in all the circumstances of the case, the occupier may reasonably be expected to offer some protection. Section 11 explicitly provides for the Acts application to the Crown, but exempts applicability to Crown as occupier of specified roads, highways, drainage works, and watercourses.[272]
Nova Scotia	**Real Estate and Home Warranty Legislation** Property Disclosure Statements have been in use in Nova Scotia since the mid-1990's. The offer to purchase form, under clause 3, contains a standard clause to request a copy of the Property Disclosure Form and specifies that when received by the buyer, it will form part of contract. The Form includes a question to the Seller regarding awareness of the presence of radon gas. [273] Nova Scotia does not have home warranty legislation.
Nova Scotia	**Regulation of Residential Tenancies** The *Residential Tenancies Act* includes as a statutory condition the requirement that landlords keep rental premises "in a good state of repair and fit for habitation during the tenancy and shall comply with any statutory enactment or law respecting standards of health, safety or housing."[274]
Northwest Territories	**Regulation of Construction** The Northwest Territories adopted the NBC, 2010 in its entirety. Subsection 2(1) of the Fire Prevention Regulations, enacted under the *Fire Protection Act,*[275] adopts the NBC 2010, as amended from time to time.[276] For additional detail on the regulation of construction in the Yukon please refer to Appendix II.

Northwest Territories	**Public Health Legislation** Northwest Territories' *Public Health Act*[277] includes provisions for inspection and enforcement with respect to hazards to public health. The Act defines 'health hazard' as (a) a condition of premises, (b) a substance, agent, thing, plant, animal or organism other than a human, (c) a solid, liquid or gas, or (d) a combination of any of the factors referred to in paragraphs (a), (b), and (c), that is or may become harmful or dangerous to health, that hinders the suppression of disease or the prevention of injury, or that otherwise presents a risk to the public health
Northwest Territories	**Education Legislation** In the Northwest Territories, education and safety in schools is governed by the *Education Act.*[278] The Ministry of Education does not have a policy or program with respect to radon in indoor air in schools. Responsibility for education is shared among the Department of Education, Culture and Employment and education councils. The Minister and the Department of Education, Culture and Employment have the mandate of providing educational programs and services within the territory. The Minister has the discretion to provide, by grant or contribution or a combination of both, operation and maintenance funds.[279] Schools Boards (call Education Councils) are responsible for the operation and administration of schools within their division, including initiating proposals for new construction or other major capital expenditures. School boards (education councils and authorities) have the duty to "have custody and safekeeping of all the education facilities that are used for the education program and maintain the education facilities in good condition."[280] Principals, in turn, are required, to the best of their ability, to ensure the safety of students and school staff. [281]
Northwest Territories	**Occupational Health and Safety Legislation** The legislation governing workplace safety is the *Safety Act*.[282] Under the Act employers are required to "maintain his or her establishment in such a manner that the health and safety of persons in the establishment are not likely to be endangered; take all reasonable precautions and adopt and carry out all reasonable techniques and procedures to ensure the health and safety of every person in his or her establishment…"[283] The Act also provides powers of inspection,[284] the authority to issue directions subsequent to an inspection, [285] and provides employees the right to refuse work that poses an 'unusual danger' to the health and safety of the worker. [286] Air quality and ventilation requirements for confined spaces are set out in the General Safety Regulation,[287] under the Act. Radiation hazards are addressed in the Regulation, but are limited to radiation worker exposures to radioactive substances. [288] Although there is neither relevant indoor air nor ventilation requirements in Northwest Territories legislation, nor specific indoor radon protections, existing legislation "all purpose clauses" may be used to write orders for radon or other radioactive substances in the workplace.[289]

Northwest Territories	**Real Estate and Home Warranty Legislation** Northwest Territories does not have home warranty legislation.[290] Northwest Territories does not have legislation requiring a Property Disclosure Statement and does not offer it as an optional form in its Real Estate legislation.[291]
Northwest Territories	**Occupier's Liability Legislation** The Northwest Territories does not have occupier's liability legislation.
Northwest Territories	**Regulation of Residential Tenancies** Under the *Residential Tenancies Act*[292] landlords are obligated to deliver and maintain the rental premises in a good state of repair and fit for habitation, and are required to comply with all health, safety, housing and building standards, and any other legal requirements respecting the rental premises.[293]
Nunavut	**Regulation of Construction** Nunavut does not have territory-wide adoption of the NBC. Nunavut's *Building Code Act,*[294] although not yet in force, provides that the Commissioner in Executive Council may make regulations adopting by reference, in whole or in part, and with such modifications as may be considered necessary or advisable, a prescribed edition of the National Building Code of Canada. [295] Regulations under the Act have not yet been made. Municipal Councils may adopt the NBC under section 105 of the *Cities, Towns and Villages Act,*[296] or under the *Planning Act*, by way of municipal zoning by-law.[297] For additional detail on the regulation of construction in Nunavut please refer to Appendix II.
Nunavut	**Public Health Legislation** The *Public Health Act,*[298] establishes the office of the Chief Medical Officer of Health, and health districts. The Act focuses on the prevention of communicable disease, rather than environmental health. The Act does not include provisions for inspection and enforcement with respect to hazards to public health. The Act provides the Minister with regulation making powers, such as the power to make regulations relating to the location, construction, ventilation, and sanitary inspection and control of residences, child day care facilities, schools, hospitals, nursing homes, and jails.[299] None of the regulations passed, at the time of the writing of this report, are relevant to the control of radon gas in indoor air in public buildings.

Nunavut	**Education Legislation** In Nunavut, education and safety in schools is governed by the *Education Act*.[300] The Ministry of Education does not have a policy or program with respect to radon in indoor air in schools. The Minister of Education is responsible for the administration of the *Education Act*, including ensuring that school boards (called District Education Authorities (DEAs)) and schools have the resources necessary to carry out their responsibilities under the Act. School boards (DEAs) make decisions on education issues in their district, and are required to maintain and insure its property. [301] The operating budget provided to DEAs is not intended to cover repairs to school facilities.[302] DEAs are provided the discretion to temporarily close a school for health or safety reasons.[303] Principals are required to "ensure the safety of students, staff and others on school premises."[304]
Nunavut	**Occupational Health and Safety Legislation** The legislation governing workplace safety in Nunavut is based on the *Safety Act*[305] of the Northwest Territories (NWT). Like in NWT, under Nunavut's *Safety Act*[306] employers are required to "maintain his or her establishment in such a manner that the health and safety of persons in the establishment are not likely to be endangered; take all reasonable precautions and adopt and carry out all reasonable techniques and procedures to ensure the health and safety of every person in his or her establishment…"[307] The Act also provides powers of inspection,[308] the authority to issue directions subsequent to an inspection, [309] and provides employees the right to refuse work that poses an 'unusual danger' to the health and safety of the worker. [310] Air quality and ventilation requirements for confined spaces are set out in the General Safety Regulation,[311] under the Act. Radiation hazards are addressed in the Regulation, but are limited to radiation worker exposures to radioactive substances. [312] Although there is neither relevant indoor air nor ventilation requirements in Nunavut legislation, nor specific indoor radon protections, existing legislation "all-purpose clauses" may be used to write orders for radon or other radioactive substances in the workplace.[313]
Nunavut	**Real Estate and Home Warranty Legislation** Nunavut does not have home warranty legislation. Nunavut does not have legislation requiring a Property Disclosure Statement and does not offer it as an optional form in its Real Estate legislation.[314]
Nunavut	**Occupier's Liability Legislation**

	Nunavut does not have occupier's liability legislation.
Nunavut	**Regulation of Residential Tenancies** Under the *Residential Tenancies Act*[315] landlords are obligated to deliver and maintain the rental premises in a good state of repair and fit for habitation, and are required to comply with all health, safety, housing and building standards, and any other legal requirements respecting the rental premises.[316]
Nunavut	**Other Policy/Programmatic Efforts**
Ontario	**Regulation of Construction** Ontario does not province-wide adoption of the NBC. The Ontario Building Code[317] is a regulation enacted under Ontario's *Building Code Act.*[318] Unlike several Canadian provinces/territories, Ontario has not adopted the NBC 2010. The Ontario Building Code incorporates Health Canada's Radon Guideline, setting the trigger for radon protection requirements at 200 Bq/m^3 for activities subject to the Building Code regulation within three radon-high regions: the City of Elliot Lake in the Territorial District of Algoma, (2) the Township of Faraday in the County of Hastings, and (3) the geographic Township of Hyman in the Territorial District of Sudbury.[319] Although the 2012 Ontario Building Code has broadened the application of Article 9.25.1.1.(of the NBC) such that requirements relating to heat transfer, air leakage and condensation control are no longer limited to buildings of residential occupancy,[320] and has included provisions within section 9.32.3.8.(3) such that soil gas must be considered when determining the need to provide protection against depressurization, several notable exemptions exist relative to the soil gas control and radon-protection provided within the NBC, 2010.[321] Several of the explicit radon protective provisions that appear in the NBC 2010 do <u>not</u> appear in the Ontario Building Code. For example, the Ontario Building Code Subsection 9.13.4 (Soil Gas Control) is substantially the same as the same subsection in the NBC 2010 except for one important difference: the scope of application of Subsection 9.13.4 in the Ontario Building Code is limited to those areas "[w]here methane or radon gases or known to be a problem." In such areas, the Ontario Building Code requires construction to comply with the requirements for soil gas control in MMAH Supplementary Standard SB-9, "Requirements for Soil Gas Control".[322] Similarly unlike the NBC 2010, the Ontario Building Code requires construction that will "resist the leakage of soil gas" but does not specify that this protection must be done by way of an air barrier system.[323] The Ontario Building Code provides that a *soil* gas barrier is required <u>only</u> where "*soil* gas control is required."[324] Another notable exclusion from the Ontario Building Code is Article 9.25.3.1 (Required Barrier to Air Leakage) which is identical to the NBC 2010 except that the Ontario Building Code fails to include two radon-protective outcomes required of air barrier systems in the NBC 2010, those being to: ii) ensure comfortable conditions for the occupants, and

	iii) minimize the ingress of *soil* gas.[325] The Ontario Building Code also does not provide that dwelling units be provided with a rough-in for a radon extraction system, as does the NBC 2010.[326] Likewise, the provisions of the NBC 2010 on Air Leakage Control in Masonry walls,[327] and Air Barrier Systems in Floors-on-ground (with respect to the ingress of air through floors-on-ground and related best practices)[328] do not appear in the Ontario Building Code. For additional detail on the regulation of construction in Ontario please refer to Appendix II.
Ontario	**Public Health Legislation** *Health Protection and Promotion Act* Ontario's *Health Protection and Promotion Act*[329] is broadly drafted, providing the Ministry of Health, local boards of health, and medical officers of health powers to address issues relating to indoor air. One of the threefold purposes of the Act is to "the promotion and protection of the health of the people of Ontario."[330] The Act includes provisions for inspection and enforcement with respect to hazards to public health. The Act "health hazard" to mean "(a) condition of a premises; (b) a substance, thing, plant, or animal other than man, or (c) a solid, liquid, gas, or combination of any of these, that has or is likely to have an adverse effect on the health of any person. Pursuant to Section 7 of the *Health Protection and Promotion Act*, the Ontario Public Health Standards (OPHS) and Protocols establish the minimum requirements for fundamental public health programs and services to be delivered by Ontario's boards of health. While the ministry establishes priorities, implementation of the Act is subject to regional interpretation. The Act provides the legislative mandate for boards of health in Ontario. Part II of the Act sets out the duties of boards of health with regard to the provision of mandatory health programs and services, and Part III Sets out the duties of public health officials with regard to health hazards (including the issuance of orders and with regard to investigating or mitigating health hazards). Part VI provides that each health unit will have a board of health, and sets out the duties of boards of health and medical officers of health, the latter of which is responsible for public health programs and services and board of health staff are responsible to the medical officer of health if their duties relate to the delivery of public health programs or services. In addition to provision of a minimum level of public health programs and services under Section 5 of the HPPA, Boards of health may deliver additional programs and services in response to local needs identified within their communities.[331] Boards of health also have duties and responsibilities under other Ontario laws, including but not limited to, the *Building Code Act*, the *Day Nurseries Act*, the *Employment Standards Act*, the *Environmental Protection Act*, *Environmental Assessment Act*, the *Occupational Health and Safety Act*, *Education Act*, *Ministry of Government Services Act*, *Municipal Act*, and the *Planning Act.*[332] Under the Act, "health hazard" means "(a) condition of a premises; (b) a substance, thing, plant, or animal other than man, or (c) a solid, liquid, gas, or combination of any of these, that has or is likely to have an adverse effect on the health of any person."[333] The Act requires the establishment of a board of health in each health unit.[334] Boards of health are required, among other things, to superintend, provide or ensure the provision of health programs and services in "health promotion, health protection, and disease and injury prevention, including the prevention and control of cardiovascular disease, cancer, AIDS and other diseases."[335] Medical officers of health have broad powers in relation to health and indoor environments. Medical officers of health are responsible to the

	board of health for the management of public health programs and services. Section V describes the right of entry, powers of inspection, and appeals from orders. The Act provides medical officers of health the power to conduct inspections to prevent, eliminate, and decrease the effects of health hazards in their jurisdiction, and requires that they respond to complaints of health hazards related to occupational or environmental health in their health unit, investigate the complaint to determine whether a health hazard exists, and report the results of the investigation to the complainant. Medical officers of health have powers to investigate complaints about existing health hazards,[336] and also have a duty to inspect so as to prevent, eliminate and decrease the effects of a health hazard.[337] Orders can require that the premises be vacated; closed or placarded to give notice of the order; that the source of the health hazard be removed or destroyed; that specified work be done on the premises; or that the use of the premises be prohibited or regulated.[338] For the purposes of enforcement of the Act, inspectors have the right to enter and have access to, through and over any premises, and make tests at reasonable times. Dwelling places require occupier consent or a warrant.[339] Tenants are expected to allow building owners access to the premises for the purposes of complying with the terms of an order.[340]
Ontario	**Education Legislation** In Ontario, education and safety in schools is governed by the *Education Act.*[341] The Ministry of Education does not have a policy or program with respect to radon in indoor air in schools. Ontario's *Education Act*[342] requires principal's "to give assiduous attention to the health and comfort of the pupils, to the cleanliness, temperature and ventilation of the school, to the care of all teaching materials and other school property, and to the condition and appearance of the school buildings and grounds" [343] Regulations under Ontario's *Education Act* impose additional obligations including the requirement to inspect the school premises at least weekly and report to the school board (1) any repairs to the school that are required and (2) any lack of attention on the part of the building maintenance staff of the school." [344]
Ontario	**Occupational Health and Safety Legislation** Other than legislation specific to employment in mines,[345] the Province of Ontario does not have legislation or regulations in place to regulate non-radiation worker exposures to radon in indoor air. *NORM Guidelines* The Ontario Ministry of Labour interprets the NORM Guidelines as intended for all occupational exposures to radon, including "incidentally exposed workers"[346] through radon in indoor air, and the dose limit for these workers is 1 mSv per year.[347] Under the NORM Guidelines, the derived working limit (DWL) for radon is 200 Bq/m^3. Where the annual average concentration of radon gas is expected to be above 200 Bq/m^3, the NORM Guidelines recommend that measurements be taken to estimate the average annual radon gas concentration. The NORM Guidelines recommend that where the estimated annual average concentration of radon gas in an occupied area is more than 200

	Bq/m^3, but less than 800 Bq/m^3, a NORM Management Program should be implemented and steps to reduce exposure should be taken (including: introduction of public and incidentally exposed worker access controls; changes in work practices; and reducing the radon concentration levels to below 200 Bq/m^3).[348] If the estimated annual average concentration of radon gas is more than 800 Bq/m^3, then a Radiation Protection Management Program should be implemented. Such a program should include the initiation of a dose monitoring program including the introduction of a formal radiation protection program; placement of workers estimated to exceed 5 mSv/a (equivalent to 800 Bq/m^3) in a personal radiation dosimetry program;[349] and the provision of protective equipment, clothing and work procedures. [350] If the measured annual effective dose reported by a personal radiation dosimetry program is greater than 5 mSv/a, then additional steps should be taken, including the use of engineering controls and protective equipment; ensuring that workers do not exceed the five-year average occupational dose limit of 20 mSv/a; and an annual assessment of the work site to periodically measure changes in conditions and to facilitate worker dose calculations.[351] The Program should also include, where possible, steps to reduce the radon concentration to below 200 Bq/m^3 .[352] The NORM Guidelines include recommendations with respect to inhalation control measures and respirator programs to reduce the presence of radon progeny in indoor air in work environments. [353] Note that Annual Limits on Intake (ALI), which are the amount of radioactive material a worker can ingest or inhale each year, including those for "incidentally exposed workers," [354] are provided in Table 4.1 of the Guidelines. [355] *Occupational Health and Safety Act* Employer and employee rights and duties are laid out in the province's *Occupational Health and Safety Act.*[356] The Act applies to almost[357] all employers and employees in the province of Ontario. The Act's main purpose is to protect workers from workplace health and safety hazards, and sets out procedures and enforcement avenues for cases of non-compliance with the Act. The Act imposes both general and specific duties on employers under section 25 of the Act. Section 25(2)(h) establishes the general duty on employers to "take all reasonable precautions for the health and safety of their workers". [358] Similarly, supervisors are required by the Act to" "take every precaution reasonable in the circumstances for the protection of a worker."[359] It is under this section of the Act that the Ontario Ministry of Labour has the power, indirectly, to impose standards provided in the NORM Guidelines on employers for the protection of the health and safety of employees. Under Part V of the Act, which addresses the right to refuse or stop work where health or safety is in danger, provides for investigations in response to complaints that dangerous circumstances exist. [360] Powers of inspectors include conducting or taking tests of any ...thing , material or biological, chemical or physical agent in or about a workplace and for such purposes, take and carry away such samples as may be necessary. An inspector can require an employer to cause any the above mentioned tests to be conducted or taken, at the expense of the employer, by a person possessing such special expert or professional knowledge or qualifications as are specified by the inspector and to provide, at the expense of the employer, a report or assessment by that person.[361] The Act also requires monthly inspections of the workplace.[362] Inspectors can order an inspection be undertaken,[363] that the Act be complied with,[364] or if the health or safety of a worker is endangered an inspector can issue a stop work direction or require that the workplace be cleared and access prevented until the hazard to health/safety is removed.[365] Section 29 of the Act requires that the owner of a workplace ensure that the

	workplace facilities are maintained as prescribed.[366] Employers are required by the Act to appoint a "competent person" as a supervisor, meaning someone (including the employer if the employer appoints self) who "has knowledge of any potential or actual danger to health or safety in the workplace." Employers are required to provide information, instruction and supervision to a worker to protect the health or safety of the worker,[367] and similarly, supervisors are required by the Act to advise a worker of the existence of any potential or actual danger to the health of safety of the worker of which the supervisor is aware.[368] Employers are required to provide the results of any occupational health and safety report joint committee or the health and safety representative and notify workers of the report results.[369] The Act provides employees with the right to refuse work believed by the worker to be unsafe.[370] In the course of a work refusal, the employer is required to investigate the circumstances believed to be hazardous, and depending on the outcome a Ministry of Labour investigator may be required to investigate the work refusal. If the Ministry inspector finds a hazard likely to endanger the worker then, generally, the inspector will order the inspector to remedy the hazard. [371] If a work refusal or a complaint about indoor radon were received, the Ministry of Labour would do an investigation. It is within their powers under the Act to issue an order requiring an employer take and provide measurements of indoor radon levels, or the Ministry could do its own testing.[372] Note that in order to follow up on a complaint, the complaint must have some justification, the concern is justified, and based on the particulars of the case, then the Ministry could issue the requirement for the employer to test. Note this requirement is less than an order, but equivalent save that it does not imply non-compliance, as is rather an investigative tool employed in cases where onus is put on the employer to investigate further.
Ontario	**Real Estate and Home Warranty Legislation** In Ontario, Property Disclosure Statements (referred to in Ontario as a Seller Property Information Statement), although not required by law, are frequently used and real estate brokers are required to inform prospective buyers about their existence.[373] Ontario's *New Home Warranties Plan Act*[374] provides that every seller of a home warranties that the home is constructed in a workmanlike manner and is free from defects in material, is fit for habitation, is constructed in accordance with the Ontario Building Code; and is free of major structural defects as defined by the regulations. [375] *T*here is warranty coverage for excessive radon under the Act.[376] The Act is administered and enforced by Tarion.[377]
Ontario	**Occupier's Liability Legislation** Under Ontario's *Occupiers' Liability Act*, 'occupier' is defined as: person who is in physical possession of premises, or (b) a person who has responsibility for and control over the condition of premises or the activities there carried on, or control over persons allowed to enter the premises. Section 2 of the Act provides that the Act supersedes the common law and provides that an occupier "owes a duty to take such care as in all the circumstances of the case is reasonable to see that persons entering on the premises, and the property brought on the premises by those persons are reasonably safe while on the premises." Section 10 provides that the Act binds the Crown, subject to the *Proceedings Against the Crown Act*, save for public highways or roads.[378]

Ontario	**Regulation of Residential Tenancies** The *Residential Tenancies Act*[379] does not address radon directly. However, it does require that landlords keep residential units safe and in good repair.[380] Under Part III, section 20 (1) the Act states that: "A landlord is responsible for providing and maintaining a residential complex, including the rental units in it, in a good state of repair and fit for habitation and for complying with health, safety, housing and maintenance standards."[381]
Prince Edward Island	**Regulation of Construction** Prince Edward Island (PEI) does not have a provincial building code, nor province-wide adoption of the NBC. In PEI the authority over building and development and the related approvals process rests either with the Province or a municipality. In areas where the Province is not the authority for issuing building/development permits, the jurisdiction to do so lies with the municipality. Some major municipalities in Prince Edward Island have adopted the National Building Code of Canada (these include: Summerside,[382] Charlottetown,[383] and Stratford,[384] all of which adopted the NBC in 2011).[385] Where the authority for building and development falls to the Province, land is governed by a general set of subdivision and development regulations.[386] Although provided with the regulation-making powers to declare the NBC in force under *Provincial Building Code Act*[387] and the *Planning Act*[388], PEI has not done so and the NBC has not been adopted. For additional detail on the regulation of construction in PEI please refer to Appendix II.
Prince Edward Island	**Public Health Legislation** PEI's *Public Health Act*,[389] includes provisions for inspection and enforcement with respect to hazards to public health. The Act defines "health hazard" broadly as a "condition, thing or activity" that endangers or is likely to endanger public health. The Act empowers the Minister to protect the health and well-being of the people in the province "by any means", including setting goals, establishing policies, facilitating public awareness, collecting data, facilitating implementation of programs.[390] If a person has reasonable grounds to believe that a health hazard exists, they are required to immediately report it to a public health official,[391] and if a public health official believes on reasonable and probable grounds that a health hazard may exist at any premises, the public health official is empowered to investigate and report to the Chief Public Health Officer, and may issue a direction (detailing remedial action required)in respect of any health hazard found to exist to the owner/occupier of the premises (or the person responsible for the health hazard or a person who is engaged in or administers an enterprise or activity on the premises).[392] Failure to comply with a direction can result in an order by the Chief Public Health Officer, including an order to vacate, the premises, close the premises, placard the premises to give notice of the closure/restricted access; required specified work; and require the removal from or around the premises anything considered a health hazard, to prohibit or regulate an activity or the use of the premises.[393] An order may require that the recipient of the order communicate the content of the order to other persons or through a public notice.[394] As a matter of enforcement of the Act, a public health official may, among others,: (a) make any inspection, investigation or inquiry that the public official considers necessary;(b) at any reasonable time enter, without a warrant,

	any premises other than an occupied dwelling; (c) conduct any tests, take any samples and make any examinations that the public health official considers necessary.[395] Note, unlike some other Acts, inspections of private dwellings require owner/occupier consent or a warrant[396] unless there is evidence of contravention of the Act or there is a health hazard present that is or might become a hazard to public health and any delay may result in the loss/destruction of evidence or an increase in risk to public health.[397] Owners/occupiers have a duty to "give all reasonable assistance" in the course of inspections.[398] Immunity is provided for anyone who reports information on a potential health hazard.[399] Notwithstanding availability of judicial review, the Act provides immunity to the Minister and officials from any action or proceeding for anything done or not done, or for any neglect (a) in the performance or intended performance of a duty imposed under this Act or the regulations; or (b) in the exercise or intended exercise of a power conferred under this Act or the regulations, unless the person was acting in bad faith.[400] PEI's public health legislation also provides tenant protections under the Rental Accommodation Regulations,[401] enacted under the province's *Public Health Act.*[402]
Prince Edward Island	**Education legislation** The *School Act*[403] *provides that school boards are* "board is responsible for the management of the schools in its system and for the custody, maintenance, repair and safe keeping all real or personal property in use by the school board." [404] Principals are required by the Act to perform the supervisory, management duties.[405] Both principals and teachers are required under the Act to "attend to the health, comfort and safety of students."[406]
Prince Edward Island	**Occupational Health and Safety Legislation** The *Occupational Health and Safety Act*[407] establishes minimum standards for workplace health and safety on Prince Edward Island (PEI) and the general safety principles for Island workplaces. Under the Act, employers are required to ensure that "that every reasonable precaution is taken to protect the occupational health and safety of persons at or near the workplace" and ... "that such information, ...[is] provided as are necessary to ensure the occupational health and safety of the workers" and that "workers and supervisors are familiar with occupational health and safety hazards at the workplace."[408] Duties are also placed on owners of workplaces, such that owners are required to "take every reasonable precaution to provide and maintain the owner's land or premises used as a workplace (i) in a manner that ensures the occupational health and safety of persons at or near the workplace, and (ii) in compliance with this Act and the regulations." Owners are also required by the Act to "give to the employer at the workplace the information that is (i) known to the owner or that the owner could reasonably be expected to know, and (ii) necessary to identify and eliminate or control hazards to the occupational health and safety of persons at the workplace."[409] For the purposes of enforcement, the Act provides powers to undertake investigation and issue orders.[410] The Act provides employees with the right to refuse work believed to "endanger the worker's occupational health or safety."[411]
Prince Edward Island	**Real Estate and Home Warranty Legislation** Prince Edward Island (PEI) does not have home warranty legislation.

	PEI does not have legislation requiring a Property Disclosure Statement and does not offer it as an optional form in its Real Estate legislation.[412]
Prince Edward Island	**Occupier's Liability Legislation** Prince Edward Island's *Occupiers' Liability Act* defines 'occupier' as persons with either physical possession of the premises or the responsibility for and control over the "condition of premises or the activities there carried on, or control over persons allowed to enter the premises..." The Act's provisions apply in place of the common law, and Section 3 provides that the occupiers' duty "is to take such care as in all the circumstances of the case is reasonable to see that persons entering on the premises, and the property brought on the premises by those persons, are reasonably safe while on the premises." The duty of care applies to: "whether the danger is caused by the condition of the premises or by an activity carried on on the premises". Section 9 binds the Crown but exempts application where the Crown is an occupier of a public highway or road.[413]
Prince Edward Island	**Regulation of Residential Tenancies** Rental of residential property are regulated by the *Rental of Residential Property* and the General Regulations.[414] Under the Act, a landlord is required to " keep the premises in a good state of repair and fit for habitation during the tenancy and shall comply with any enactment respecting standards of health, safety or housing notwithstanding any state of non-repair that may have existed at the time the agreement was entered into.[415] PEI's public health legislation also provides tenant protections. The Rental Accommodation Regulations,[416] enacted under the province's *Public Health Act*,[417] requires that property owners "carry out repairs or alterations to such [rental dwelling units] in order to make [them] sound, weatherproof, damp-proof, vermin-proof, safe and sanitary in every respect." [418] The Regulations also provide the medical health officer the right to enter and inspect any rental dwellings at reasonable times.[419] Violations of the regulations can result in an order requiring closure of the premises.[420]
Quebec	**Regulation of Construction** Québec has a Construction Code[421] that is based on the NBC, 2005 with some changes and modifications. Construction and renovations in Québec are subject to requirements laid out in the Quebec *Building Act*, and the Construction Code. Quebec's *Building Act*[422] requires the adoption of two Codes: a Construction Code and a Safety Code.[423] The Construction Code[424] of Quebec, has been developed as a regulation under the *Building Act*, and supplemented by the *Quebec Construction Code, Chapter I – Building and National Building Code 2005*,[425] the latter of which includes, in its entirety, the NBC 2005 with all Quebec modifications incorporated. The *Construction Code, Chapter I* is intended to facilitate the application of the Construction Code regulation. As the version of the NBC adopted in Quebec is the 2005 version, several of the radon protective provisions added to the NBC in 2012 are not mirrored in the Quebec Construction Code.

	Under the Quebec Construction Code, locations where it is recognized that *soil* gas presents a danger, the Code requires wall, roof and floor assemblies in contact with the ground to be constructed to resist the leakage of *soil* gas from the ground into a *building* (except for garages and unenclosed portions of *buildings).* Where soil gas control is required, a soil gas barrier must be installed and protection to prevent leakage shall consist of a membrane that can ensure *soil* gas control, and where the *building* contains a single *dwelling unit* only, a subfloor depressurization system.[426] The Appendix Note specifies that a location may constitute a soil gas hazard "when it is situated in a zone identified by an authority having jurisdiction in a directive or report as a zone potentially having soil gas in concentrations that are likely to exceed the toxicity level prescribed by Health Canada."[427] The Quebec Construction Code also requires that radon testing be conducted during construction, and if radon levels exceed 800 Bq/m^3 [428] a subfloor depressurization system is required. A copy of the radon test results must be submitted to the home owner and the Authority Having Jurisdiction.[429] The Appendix Note states that it is recommended that the building be re-tested for radon after completion of the depressurization system.[430] For additional detail on the regulation of construction in Québec please refer to Appendix II.
Quebec	**Public Health Legislation** Quebec's *Public Health Act*[431] includes provisions for inspection and enforcement with respect to hazards to public health. The Act defines 'threat to health' as the presence within the population of a biological, chemical or physical agent that may cause an epidemic if it is not controlled.
Quebec	**Education Legislation** In Quebec, education and safety in schools is governed by the *Education Act.*[432] School boards are required to ensure that "each of its schools provides a healthy and secure learning environment."[433] School boards are provided the function "to build, repair or maintain its property."[434] Principals of schools are required to inform the school board of requirements of the school as regards to any required improvement, equipment, construction, conversion or repair of the premises.[435]
Quebec	**Occupational Health and Safety Legislation** Quebec's *Act Respecting Occupational Health and Safety*[436] addresses the prevention of work-related accidents and diseases. The Act requires every employer to take the measures necessary to protect the health and ensure the safety and physical well-being" of workers. In particular, employers are required to "see that the establishments under his authority are so equipped and laid out as to ensure the protection of the worker, … supervise the maintenance of the workplace, provide sanitary installations, drinking water, adequate lighting, ventilation and heating …, and use methods and techniques intended for the identification, control and elimination of risks to the safety or health of the worker."[437] The Act also provides for inspections,[438] and employee work refusals.[439]
Quebec	**Real Estate and Home Warranty Legislation**

	Since June 2012, Québec real estate brokers are required to complete a prescribed property disclosure form with the seller, and it becomes an annex to the brokerage contract. While there is no legal obligation requiring the seller to complete the property disclosure statement and the seller can opt not to, but the real estate broker's signing a brokerage contract with the seller is contingent on the seller's completion of the property disclosure statement.[440] A seller is also bound to declare known defects in the property and failing to do so may be found by the courts as an intent to mislead the buyer requiring, under Article 1728 of the Civil Code of Québec (CCQ), the seller to restore the sale price as well as be bound to pay all damages suffered by the buyer. The buyer, in turn, under Paragraph 2 of Article 1726 of the CCQ, must act with prudence and diligence and conduct an inspection prior to purchase. This inspection, and may require an expert inspection. While a buyer cannot force a seller to test for radon, a buyer is able to conduct such a test at his/her own expense and is entitled to make an offer to purchase conditional on the completion radon remediation. The Civil Code of Québec provides a five-year warranty (after building completion) against hidden defects.[441] The Civil Code also provides that if a seller has actual knowledge, or "could not have been unaware" of the latent defect, the Seller is required to restore the price of the property as well as pay damages for any injury suffered by the buyer.[442] In Québec it is recommended that seller's declarations include a reference to radon: D14.9 À votre connaissance, y a-t-il d'autres facteurs dont vous n'avez pas fait état dans les présentes déclarations (ex: projet de développement ou de construction, problèmes environnementaux [par exemple : radon] , bruit anormalement élevé, odeurs nauséabondes, etc.)?[443]
Quebec	**Occupier's Liability Legislation** Québec does not have occupier's liability legislation.
Quebec	**Regulation of Residential Tenancies** Residential tenancies (all principle/permanent residential rental premises) are governed by of the Civil Code of Québec. The Act does not apply to hotels; vacation rentals; rooming/boarding houses; and the lease of a room in a health or social services institution. Under the Code, landlords may not offer for rent a unit that is unfit for habitation,[444] and are "bound to deliver a [rental unit] in good habitable condition" and to "maintain it in that condition throughout the term of the lease." [445] If a landlord fails to make repairs or if the premises become unfit for habitation then the tenant may apply to the Régie du logement to have the lease cancelled.[446] Note that the failure by the landlord to comply with the minimum requirements with respect to the maintenance, habitability, safety and sanitation of a rental unit give rise to the same remedies as failure to perform an obligation under the lease. [447]
Quebec	**Other Policy/Programmatic Efforts** The Québec Ministère de la Santé et des Services sociaux has set up an intersectoral committee including government ministries and partner

	organizations and has in collaboration with these bodies, the put in place a number of measures to reduce the risks associated with radon in indoor air. These measures include a 2010 pilot project on detecting radon in primary schools in the Gaspésie, Laurentides, and Outaouais regions. [448] The province plans to continue to conduct pilot projects on radon measurement in public buildings, particularly in at-risk areas more likely to be exposed to radon gas. [449] Other measures, to be implemented include raising public awareness, encouraging homeowners to test for radon, educating managers of public buildings, and providing training to municipal officials on how to use municipal bylaws to regulate prevention measures under the Québec Construction Code and what information to convey to the public
Saskatchewan	**Regulation of Construction** Saskatchewan adopts the NBC, 2010 in its entirety. The *Uniform Building and Accessibility Standards Act*[450] together with *The Fire Prevention Act, 1992* (the FPA) provide the legislative framework for application of minimum standards for new construction, renovation and the fire safe operation of buildings. The Uniform Building and Accessibility Standards Regulations, enacted under the *Uniform Building and Accessibility Standards Act*[451] adopts the 2010 NBC[452] without modification.[453] These regulations specify that anyone required to comply with the *Uniform Building and Accessibility Standards Act* is required to comply with the NBC 2010, and that building permits are required to conform to the edition of the NBC that is in force on the day the permit issued. The Act delegates administration of minimum building standards to local authorities (municipalities and regional parks). For additional detail on the regulation of construction in Saskatchewan please refer to Appendix II.
Saskatchewan	**Public Health Legislation** Saskatchewan's *Public Health Act*[454] includes provisions for inspection and enforcement with respect to hazards to public health. The Act defines 'health hazard' as (i) a condition of premises; (ii) a solid, liquid or gaseous substance, a combination of substances or a combination of different states of a substance;(iii) a thing;(iv) a plant; (v) an animal other than a human being; or (vi) a condition, state, agent or process; that is or may become harmful or dangerous to health, that hinders in any manner the suppression of disease or the prevention of injury or that is prescribed as a health hazard. The Act requires that notice be given to a local authority by anyone who knows of the existence of a health hazard.[455] Under the Act, Local authorities are able to order that an owner of a building deemed unsanitary or unfit for occupation carry out repairs to make the building (or part of it) fit for occupation prior to permitting the building to be occupied, and may placard the building to provide notice of its condition as unsanitary or unfit for occupation.[456] Owners/occupiers of buildings used by the public can be ordered by a local authority to close a building and prevent public access to it, if there is a health hazard in the building; the building constitutes a health hazard; or there is health hazard to which the building provides access.[457] A local authority can order that a health hazard be removed by the person responsible for the presence of the health hazard, or if that person cannot be found, the owner or occupier of the building where the health hazard is located.[458] A local authority can also apply to the Registrar of Titles to register an interest based on a notice of the health hazard against the affected titles if the local health authority has formed the opinion that the health hazard is so serious that persons who may be interested in the ownership of the lands require notice of the health hazard.[459] For the purposes of enforcement of the Act, a public health officer may enter, inspect and conducts

	tests on any premises at a reasonable time prior to notification. Private dwelling places may not be entered without consent or a warrant.[460] Note that some Public health regions accept the application of the *Public Health Act* to rental housing, and inspectors investigate substandard rental unit conditions on a complaint basis.[461]
Saskatchewan	**Education Legislation** In Saskatchewan, education and safety in schools is governed by the *Education Act*.[462] The Ministry of Education does not have a policy or program with respect to radon in indoor air in schools. Saskatchewan's *Education Act*,[463] places a duty on school boards to "provide and maintain school accommodation, equipment and facilities ...for each of its schools."[464] Boards are required to prescribe maintenance procedures for the purposes of maintaining satisfactory standards of comfort, safety and sanitation for student. [465] Under the Act, a school may make provision for safety patrols for the protection of students.[466] The Act requires, that building specifications conform to all applicable laws, including those respecting: (a) size, location and condition of the building and building site; (b) construction standards and general design; (c) standards required for heating, lighting, ventilation, sanitation, acoustics, fire protection, safety and adequacy of accommodation for the users of the building.[467]
Saskatchewan	**Occupational Health and Safety Legislation** Under the *Saskatchewan Employment Act*[468] employers must "ensure, insofar as is reasonably practicable, the health, safety and welfare at work of all" workers.[469] Owners of any plant are required by the Act to ensure, insofar as is reasonably practicable, that any area of the plant is maintained and does not endanger the health of safety of anyone (contractor, employer, or worker.[470] For the purposes of enforcement, the Act also provides powers to undertake inspections, inquiries and investigations.[471] Divisions 3 and 4 of the Act address radiation worker protections.[472] Saskatchewan recommends that workplaces follow the Naturally Occurring Radioactive Materials (NORM) Guidelines.[473]
Saskatchewan	**Real Estate and Home Warranty Legislation** Saskatchewan does not have legislation requiring a Property Disclosure Statement and does not offer it as an optional form in its Real Estate legislation. The use of Property Disclosure Statements are optional.[474] In Saskatchewan, *The Real Estate Act*[475] and its regulations, govern the purchase and sale of real property. Saskatchewan does not have home warranty legislation.
Saskatche	**Occupier's Liability Legislation**

wan	Saskatchewan does not have occupier's liability legislation.
Saskatchewan	**Regulation of Residential Tenancies** The *Residential Tenancies Act*[476] and Residential Tenancies Regulations[477] apply to tenancy agreements for residential property, but not to hotels, vacation rentals, crisis/emergency shelters and specified health care accommodations. The Act and regulations require landlords to "maintain rental property in a good state of repair and fit for the use and enjoyment of the tenant."[478] Although there is no explicit reference to tenant protection in Saskatchewan's *Public Health Act*, [479] nor any regulation relating to minimum standards for rental housing in Saskatchewan, Public Health Regions accept the application of the Act to rental housing, and inspectors investigate substandard rental unit conditions on a complaint basis. As with all buildings, under authority of the Act, Public Health Inspectors may order a property owner or landlord to remedy any condition that creates or has the potential to create a health hazard or condemn the building until the health hazard is addressed.[480] Note also that while Public health regions accept the application of the *Public Health Act* to rental housing, and inspectors investigate substandard rental unit conditions on a complaint basis. As with all buildings, under authority of the Act, Public Health Inspectors may order a property owner or landlord to remedy any condition that creates or has the potential to create a health hazard or condemn the building until the health hazard is addressed.[481]
Yukon	**Regulation of Construction** The Yukon Territory adopts the most recent version of the NBC (as amended or replaced from time to time)[482] without modifications or additions (except for Section 9.36 which temporarily does not apply).[483] The Yukon adopted regulations in April 2011 under the *Building Standards Act*[484] adopting the NBC, 2010. [485] For projects within the City of Whitehorse, the NBC applies unless municipal by-law requirements are more stringent. [486] For additional detail on the regulation of construction in the Yukon please refer to Appendix II.
Yukon	**Public Health Legislation** *Under the Public Health and Safety Act,*[487] if a medical officer of health "suspects on reasonable grounds that there exists a hazard to public health or safety, the medical officer of health shall notify the prescribed officer of the Department of Health and Social Services, and the mayor or chief administrative officer of the affected municipality."[488] An investigation may be directed determine whether the hazard exists and what course to take in response. If a hazard is found to exist, the medical officer of health may be directed to take steps to eliminate or decrease the hazard or mitigate its effects.[489]
Yukon	**Education Legislation**

	In Yukon Territory, education and safety in schools is governed by the *Education Act.*[490] The Act defines the roles and responsibilities of all partners involved in the education of Yukon students. The Ministry of Education does not have a policy or program with respect to radon in indoor air in schools. School boards are required to "maintain, repair, furnish and keep in good order all of its real and personal property."[491] The Act also requires that teachers report promptly to the principal any conditions or circumstances that may reasonably threaten the health or safety of students or employees of the school. [492] Likewise a principal is required to report to the director or superintendent and medical officer of health any dangerous or unsafe condition in the school.[493]
	Occupational Health and Safety Legislation The Occupational Health Regulations, [494] made under the province's *Occupational Health and Safety Act*[495], set out the occupational health and safety parameters for the Yukon Territory, which includes radon gas. [496] Section 44 of the regulations indicate that employers "shall ensure that airborne concentrations of radon, where workers are exposed, are reduced to levels as low as reasonable practicable." Section 45 requires that "corrective action be taken forthwith" when the "working level exceeds one". Regular radiation monitoring of work areas is required by Section 46(1) with results submitted of the Chief of Mines Safety Officer prior to commencement of operations. Sections 46(2) to (4) require that radiation measurements be made using a method approved by the Chief Mines Safety Officer and that results are submitted to the Chief Mines Safety Officer and posted at the workplace in a location convenient to all workers.

Yukon	**Real Estate and Home Warranty Legislation** Yukon does not have home warranty legislation. Yukon does not have legislation requiring a Property Disclosure Statement and does not offer it as an optional form in its Real Estate legislation.[497]
Yukon	**Occupier's Liability Legislation** The Yukon Territory does not have occupier's liability legislation.
Yukon	**Regulation of Residential Tenancies** Although a new Act, the *Residential Landlord and Tenant Act*, [498] has been passed to govern the landlord-tenant relationship in residential tenancies in Yukon Territory, it was not yet in force at the time of the writing of this report. Until the new legislation takes effect, the *Landlord and Tenant Act*[499] remains the governing legislation. Under the *Landlord and Tenant Act*, a landlord is required to provide and maintain rented premises "in a good, safe, healthy, and tenantable state of repair."[500] The new legislation, *Residential Landlord and Tenant Act*,[501] requires that landlords "provide and maintain residential property in a condition that (a) complies with the health, safety, and housing standards" ... "and having regard to the age, character, and location of the rental unit, makes it suitable for the occupation of the tenant."[502]
Yukon	**Other Policy/Programmatic Efforts** Note that the Yukon Housing Corporation lends radon testing equipment to home owners at no charge. Yukon has also developed an online map which documents the radon testing that has been performed by Yukon homeowners since 1989.[e]eral

[1] This Appendix does not contain a complete statement of the law in the area and changes in the law may occur from time to time. Please note that the legal framework described, and legislation and regulations cited, within this Appendix does not include an analysis of related case law. As such the interpretation given the legislation by the courts is not included. The information contained here is meant for reference only. Anyone needing specific advice on his/her own legal position should contact a lawyer.

[2] National Research Council of Canada: Canadian Commission on Building and Fire Codes, "National Building Code of Canada 2010," 13th ed., Second Printing (including revisions and errata released Dec. 21 2012), ISBN: 0-660-19975-7, Volume 2, A-5.4.1.1, pp. A-59 – A-60.

[3] *Ibid* at Appendix Note, A-6.2.1.1., p. A-64.

[4] *Ibid* at Appendix Note, A-9.13.4.3, p. A-181.
[5] *Ibid* at Appendix Note, A-9.25.3.6 (2) and (3), p. A-204.
[6] *Ibid* at Appendix Note, A-9.13.4, p. A-180.
[7] Canada Labour Code, RSC 1985, c L-2, online <http://canlii.ca/t/522fd> retrieved on 2013-11-22
[8] Health Canada, Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM), Rev'd 2011, online: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/pdf/pubs/contaminants/norm-mrn/norm-mrn-eng.pdf. Note that these guidelines are being harmonized with the Radon Guideline, with revisions presently underway. For employment settings to which the NORM Guidelines apply, until the action level is harmonized, the benchmark provided as a reference/rationale for mitigation measures under the general duty clause in health and safety regulations is significantly higher (currently 800 Bq/m^3) than the Radon Guideline reference level.
[9] *Ibid* at 11. "Incidentally exposed workers" are defined in the Guideline as those "employees whose regular duties do not include exposure to NORM sources of radiation. They are considered as members of the public who work in an occupational exposure environment and, as such, the annual effective dose limit for these workers is 1 mSv."
[10] *Ibid* at p. 19.
[11] *Ibid* at pp. 19, 20.
[12] *Ibid* at pp. 17, 19. Where a Norm Management Classification has been given and a Norm Management Program implemented, the Review is to determine if there have been changes to the system that may affect the radiation dose, to monitor the effectiveness of the NORM program and to determine if modifications are required. Review frequency depends on the circumstances, such as the ability of conditions to change and the NORM program.
[13] *Ibid* at pp. 13-16, 18-20. Where the annual average concentration of radon gas is expected to be above 200 Bq/m^3, the NORM Guidelines recommend that testing be conducted to estimate the annual average concentration. The NORM Guidelines recommend that where the estimated annual average concentration of radon gas in an occupied area is more than 200 Bq/m^3, but less than 800 Bq/m^3, the NORM Classification "NORM Management" be applied, and steps to reduce exposure should be taken, including: introduction of public and incidentally exposed worker access controls; changes in work practices; and reducing the radon concentration levels to below 200 Bq/m^3). Further, the NORM Guidelines indicate that the workplace should be periodically reviewed to ensure conditions have not changed. If the estimated annual average concentration of radon gas is more than 800Bq/m^3, then the NORM Classification is 'Radiation Protection Management,' and the Guidelines provide that a Radiation Protection Management Program be implemented, requiring the initiation of a dose monitoring program which should include, where possible, steps to reduce the radon concentration to below 200 Bq/m^3.
[14] *Ibid* at pp. 18 – 24.
[15] National Research Council of Canada, Alberta Building Code, 2006 (8^{th} Ed., 2^{nd} printing, includes all revisions and errata approved to June 2009), ISBN 0-660-19637-9.
[16] *Ibid* at p. v. See also: Government of Canada website, "National Model Construction Code Documents": http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html
[17] Building Code Regulation, Alta Reg 117/2007, online: http://canlii.ca/t/51xxf. Note that the Regulation also repeals Alta Reg 50/1998 and provides a transition provision whereby AR 50/98 remains in force "for work for which a permit is issued by a safety codes officer or other person designated by an Administrator pursuant to section 44 of the *Safety Codes Act* prior to September 2, 2007, or for work for which a permit application is submitted prior to March 2, 2008 to a safety codes officer or other person designated by an Administrator pursuant to section 44 of the Safety Codes Act who is satisfied that the preparation of the plans and specifications for the project commenced prior to September 2, 2007, until that work has been completed or the permit has expired or been revoked.
[18] *Safety Codes Act*, RSA 2000, c S-1, online: http://canlii.ca/t/51xx9
[19] For the purposes of compliance with the Code, the objectives and functional statements attributed to the acceptable solutions in Part 9 of Division B are those listed in Table 4.2.7.1. See: National Research Council of Canada, Alberta Building Code, 2006 (8^{th} Ed., includes all revisions and errata approved to June 2009), Division A, Article 4.2.7.1., Table 4.2.7.1.

[20] *Supra* Note 15 at pp. viii – ix, and A, A-1.2.1.1.(1)(a).
[21] *Public Health Act*, RSA 2000, c P-37.
[22] *Ibid* at ss. 3(1)(a)(ii), 4.
[23] *Ibid* at s.59, 60.
[24] *Ibid* at s.62.
[25] *Ibid* at s.64.
[26] See Alberta's Housing Regulation (Alta Reg 173/1999), under the *Public Health Act* (RSA 2000, c P-37), and corresponding Minimum Housing and Health Standards (online: http://www.health.alberta.ca/documents/Standards-Housing-Minimum.pdf). Note that the application of public health standards for tenant housing was challenged in *BPCL Holdings Inc. v. Alberta* (2008 ABCA 153), whereby the appellants claimed the provisions were *ultra vires* the scope of regulatory authority given to the Lieutenant Governor in Council. The trial and appeal courts both upheld the provisions, finding that the provisions had a real and meaningful connection to public health as required by the *PHA*, and that the definition of "public place" under the *Act* is broad enough to capture apartment buildings and units. See: *BPCL Holdings Inc. v. Alberta* (2008 ABCA 153) See also: Nickie Vlavianos, "Minimum Housing Standards For Residential Tenancies Upheld" (May, 2008), University of Calgary Faculty of Law Blog on Development in Alberta Law, online: http://ablawg.ca/2008/05/16/minimum-housing-standards-for-residential-tenancies-upheld/
[27] *School Act*, RSA 2000, c S-3, Part 7 and Part 3 (Division 2)) online: http://canlii.ca/t/522nb). Note that Alberta's new *Education Act* (Education Act, SA 2012, c E-0.3, online: http://canlii.ca/t/51xq7) was passed in the Alberta Legislature and received Royal Assent on December 10, 2012. Currently the Act is undergoing a regulatory review, with supporting regulations being developed. At present the Act is not yet in force. For more information on the *Education Act*, see: Government of Alberta, Department of Education, ""Education Act 2013: Minister's Committee to guide *Education Act* Regulatory Review", online: http://www.education.alberta.ca/department/policy/education-act.aspx
[28] The Alberta School Boards Association (ASBA), representing Alberta's public, separate and francophone school boards, holds the position that it is the electorate that determines the 'adequacy' of school facilities, and publicly elected school boards, through their three year capital plans, represent the community's voice on the issue. See: Alberta School Boards Association, Submission: "Alberta's School Act: Creating Our Future" at pp. 21-22, online: https://www.asba.ab.ca/files/pdf/school_act_submission.pdf
[29] *School Act*, RSA 2000, c S-3, s. 60(1), online: http://canlii.ca/t/522nb
[30] *Ibid* at s. 57 (1) an (2).
[31] Alberta School Boards Association, Submission: "Alberta's School Act: Creating Our Future" at p. 5, online: https://www.asba.ab.ca/files/pdf/school_act_submission.pdf
[32] *Ibid* at at pp. 21-22.
[33] *Occupational Health and Safety Act*, RSA 2000, c O-2, online: http://canlii.ca/t/5246j
[34] Occupational Health and Safety Regulation, Alta Reg 62/2003, online: http://canlii.ca/t/5246m
[35] Government of Alberta, "Occupational Health and Safety Code" (2009), online: http://work.alberta.ca/documents/WHS-LEG_ohsc_2009.pdf
[36] Note that although Alberta's health and safety legislation also includes the *Radiation Protection Act* and Regulation, its application does not extend to background radiation in the workplace but is limited to workers who may be exposed to sources of radiation while installing, operating or servicing certain types of radiation equipment. See: Government of Alberta, Ministry of Jobs, Skills, Training and Labour website, "Legislation and Enforcement" http://work.alberta.ca/occupational-health-safety/12615.html
[37] *Occupational Health and Safety Act*, RSA 2000, c O-2, s.2(1), online: http://canlii.ca/t/5246j
[38] *Ibid.*
[39] *Occupational Health and Safety Act*, RSA 2000, c O-2, s.10, online: http://canlii.ca/t/5246j
[40] *Ibid* at s.35.

[41] Government of Alberta, "Occupational Health and Safety Code" (2009), online: http://work.alberta.ca/documents/WHS-LEG_ohsc_2009.pdf
[42] *Ibid* at Part 20, s. 291.
[43]*Ibid* at Part 2, s.9.
[44] *Ibid* at Part 2, s.7.
[45]*Ibid* at Part 26.
[46] *Ibid* at Part 5.
[47] *Ibid* at Part 36.
[48]*Ibid* at Part 10.
[49] *Occupational Health and Safety Act*, RSA 2000, c O-2, s.9, online: http://canlii.ca/t/5246j
[50] *Ibid* at ss. 2, 40-41, See also: Government of Alberta, Ministry of Jobs, Skills, Training and Labour website, "Legislation and Enforcement" http://work.alberta.ca/occupational-health-safety/12615.html
[51] Government of Alberta, Employment and Immigration, Worksafe Alberta, "Indoor Air Quality Toolkit," online: http://work.alberta.ca/documents/WHS-PUB_gh015.pdf
[52] *Ibid* at pp.36-37, online: http://work.alberta.ca/documents/WHS-PUB_gh015.pdf
[53] Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), at 36, online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[54] *New Home Buyer Protection Act*, SA 2012, c N-3.2, online: http://canlii.ca/t/525bd
[55] New Home Buyer Protection (General) Regulation, Alta Reg 211/2013, online: http://canlii.ca/t/524nb; New Home Buyer Protection (Ministerial) Regulation, Alta Reg 220/2013, online: http://canlii.ca/t/524nc
[56] Government of Alberta, Department of Municipal Affairs website, "Home Warranties": http://www.municipalaffairs.alberta.ca/alberta_home_warranties.cfm. See also: Government of Alberta, Department of Alberta Municipal Affairs presentation "Better Warranty Standards. Built for your New Home," online: http://www.homewarranty.alberta.ca/
[57] *Supra* Note 54 at s. 3.
[58] *Ibid* at s. 4.
[59] *Ibid* at s. 4(5).
[60] Government of Alberta, Department of Municipal Affairs website, "Home Warranties": http://www.municipalaffairs.alberta.ca/alberta_home_warranties.cfm. See also: Government of Alberta, Department of Alberta Municipal Affairs presentation "Better Warranty Standards. Built for your New Home," online: http://www.homewarranty.alberta.ca/
[61] *Occupiers' Liability Act*, RSA 2000, c O-4, ss. 5-6, online: http://canlii.ca/t/j95m
[62] Government of Alberta, Service Alberta, "Legislation: Landlords and Tenants," online: http://www.servicealberta.gov.ab.ca/624.cfm
[63] *Residential Tenancies Act*, SA 2004, c R-17.1, s. 16 (c), online: http://canlii.ca/t/lfms. See also: Nickie Vlavianos, "Minimum Housing Standards For Residential Tenancies Upheld" (May, 2008), University of Calgary Faculty of Law Blog on Development in Alberta Law, online: http://ablawg.ca/2008/05/16/minimum-housing-standards-for-residential-tenancies-upheld/
[64] Alberta's Housing Regulation, Alta Reg 173/1999; *Public Health Act*, RSA 2000, c P-37; Minimum Housing and Health Standards (online: http://www.health.alberta.ca/documents/Standards-Housing-Minimum.pdf).
[65] British Columbia Building Code Regulation, BC Reg 264/2012, online: http://canlii.ca/t/5267l
[66] *Ibid.*
[67] *Local Government Act*, RSBC 1996, c 323, online: http://canlii.ca/t/5286j

[68] Government of British Columbia, "British Columbia Codes 2012", online: http://www.bccodes.ca/building-code.aspx?vid=QPLEGALEZE:bccodes_2012_view
[69] BC Building Code, Division A, Part 9, Sentences 9.13.4.2 (1)-(4).
[70] British Columbia Ministry of Energy Mines and Natural Gas, Office of Housing and Construction Standards, "2012 BC Building Code, BC Plumbing Code and BC Fire Code", online: http://www.housing.gov.bc.ca/building/code/ See also FAQs, online: http://www.housing.gov.bc.ca/building/code_questions/index.htm. Information on maintenance responsibilities in rental buildings can be found at http://www.rto.gov.bc.ca/content/rightsResponsibilities/repairs.aspx.
[71] Personal Communication with Building and Safety Standards Branch, Office of Housing and Construction Standards, Government of British Columbia, June 24 2014.
[72] Government of British Columbia, Ministry of Energy, Mines and Natural Gas, Office of Housing and Construction Standards, "Energy Efficiency", online: http://housing.gov.bc.ca/building/green/energy/index.htm
[73] *Public Health Act*, SBC 2008, c 28.
[74]*Ibid* at s. 23.
[75]*Ibid* at s. 24(1)
[76] *Ibid* at s.25
[77] *Ibid* at s. 30 (1).
[78] *Ibid* at s. 31 (1).
[79] *Ibid* at s. 31(2).
[80] *Ibid* at, s.32.
[81] *Ibid* at s. 36.
[82] *Ibid* at s. 123.
[83] Health Hazards Regulation, BC Reg 216/2011, s. 7.
[84] *School Act*, RSBC 1996, c 412, Part 9 — General, online: http://canlii.ca/t/522sd
[85] *Ibid.*
[86]*Ibid* at Part 6, s. 74.
[87] *Ibid* at Part 6, s. 73.
[88] Government of British Columbia website, "Education: Annual Facility Grants", online: http://www2.gov.bc.ca/gov/topic.page?id=478C400B42B14DCBAC27CBA0E659863F
[89] *School Act*, RSBC 1996, c 412, Part 6, s. 90 (1) and (2).
[90] *School Act*, RSBC 1996, c 412, Part 6, s. 73.
[91] *Supra* Note 84 at Part 9.
[92] *Ibid* at s. 74.
[93] *Ibid* at s. 73.
[93] Government of British Columbia website, "Education: Annual Facility Grants", online: http://www2.gov.bc.ca/gov/topic.page?id=478C400B42B14DCBAC27CBA0E659863F /526g0
[94] *Ibid.*
[95] Occupational Health and Safety Regulation, BC Reg 296/97, Part 7 — Noise, Vibration, Radiation and Temperature, s. 7.12, online: http://canlii.ca/t/52326

[96] A 2009 report on radon in BC workplaces recommended a policy review to clarify whether the Occupational Health and Safety Regulation applies to radon gas in BC work places falling under provincial jurisdiction. See Worksafe BC website, Raymond Copes et al., "Radon in British Columbia Work Places" (2009), online: http://www.worksafebc.com/contact_us/research/funding_decisions/assets/pdf/2006/RS2006_DG09.pdf
[97] Occupational Health and Safety Regulation, BC Reg 296/97, Parts 3, s. 3.5, online: http://canlii.ca/t/52326
[98] *Ibid* at s. 3.9.
[99] *Ibid* at ss. 4.72 (1) and (2).
[100]*Ibid* at s. 4.78.
[101] *Ibid* at ss. 4.79 (1), (2).
[102] *Homeowner Protection Act*, SBC 1998, c 31, online: http://canlii.ca/t/51vmp
[103] Homeowner Protection Act Regulation, BC Reg 29/99, online: http://canlii.ca/t/kvz8
[104] *Supra* Note 102 at s. 22(1).
[105] *Ibid* at s. 23(1).
[106] *Ibid* at s. 22(1.1).
[107] *Ibid* at s. 22(2).
[108] *Ibid* at s. 22(3).
[109] *Ibid* at ss. 28.1-28.4.
[110] *Occupiers' Liability Act*, RSBC 1996, c 337, online: http://canlii.ca/t/51vbv
[111] The Act does not apply to several kinds of potential rental arrangements, including: commercial tenancies, community care, continuing care and assisted living facilities, public or private hospitals, accommodation owned or operated by an educational institution, or correctional institutions.
[112] *Residential Tenancy Act*, SBC 2002, c 78, <http://canlii.ca/t/520x2> retrieved on 2013-12-20
[113] *Public Health Act*, SBC 2008, c 28, s. 123.
[114] Health Hazards Regulation, BC Reg 216/2011, s. 7.
[115] Manitoba Building Code, Man Reg 31/2011, online: http://canlii.ca/t/5226k
[116] *Ibid.*
[117] *The Buildings and Mobile Homes Act*, CCSM c B93, <http://canlii.ca/t/51tx3, online: on 2013-12-26
[118] *Supra* Note 115 at s. 1.
[119] *Ibid* at s.1.1(1).
[120] *The Public Health Act*, RSM c. P210, online: http://canlii.ca/t/kbcn
[121] *Ibid* at s.4(1).
[122] *Ibid* at ss. 24, 26.
[123] *Ibid* at ss. 26(3), 35(3).
[124]*Ibid* at ss. 25.
[125] *Ibid* at s. 39.
[126] *Ibid* at s. 83.
[127]*Ibid* at s. 86.
[128] *Ibid* at s. 83.
[129] Dwellings and Buildings Regulation, Man Reg 322/88 R, online: http://canlii.ca/t/kf7t.
[130]*Ibid* at ss. 14-15.
[131] *The Public Schools Act*, CCSM, c. P250.

[132] *The Education Administration Act*, CCSM c E10, online: http://canlii.ca/t/526x3
[133]*Supra* Note 131 at s. 72(1).
[134]*Ibid* at s. 72(2).
[135] *Ibid* at s. 41(1).
[136] *Workplace Safety and Health Act*, CCSM c W210, online: http://canlii.ca/t/527bb
[137]*Ibid* at s. 4(1).
[138]*Ibid* at, s. 4(2).
[139] *Ibid* at s. 7.2.
[140]*Ibid* at s. 7.5(4). Note that "required information" refers to any information (a) that may affect the safety and health of a person at a workplace; (b) that is necessary to identify and control any existing or potential hazards with respect to a workplace or any process, procedure or biological or chemical substance used at a workplace; or (c) prescribed by regulation as required information. See: *Workplace Safety and Health Ac*t, CCSM c W210, s. 7.5(1), online: http://canlii.ca/t/527bb.
[141] Workplace Safety and Health Regulation, Man Reg 217/2006, Part 4, online: http://canlii.ca/t/528gn
[142]*Ibid* at s.4.1.
[143]*Ibid* at s.4.2.
[144] Manitoba Real Estate Association website, "Frequently Asked Questions": http://www.realestatemanitoba.com/faq.htm; Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[145] Real Estate Brokers Regulation, Man Reg 56/88 R, online: http://canlii.ca/t/51v09.
[146] *The Real Estate Brokers Act*, CCSM c R20, online: http://canlii.ca/t/l2d8
[147] The *Real Estate Brokers Act* requires that the printed form of offer and printed form of acceptance (for a single family residential house or single family residential unit in a Condominium) be in a prescribed form (attached in Schedule A of the Regulation). Form 1 of the Schedule (Residential Form of Offer to Purchase), which is prescribed under The *Real Estate Brokers Act* for the purchase of single family residential houses, provides a model for the Seller of a Property Disclosure Statement. Appendix A (Appendix A to Residential Form of Offer to Purchase – Property Disclosure Form) under paragraph 15 provides a list of substances, including radon gas, and the option of including a clause in the property disclosure form requesting that the Seller indicate whether they are aware if any building on the property contains, or if the they have any reason to believe that it once contained, any substance in the list. Real Estate Brokers Regulation, Man Reg 56/88 R, Schedule A, Form 1, s. 7, online: http://canlii.ca/t/51v09.
[148] *Supra* Note 145, Schedule A, Form 1.
[149] *Ibid* at Appendix A to Residential Form of Offer to Purchase – Property Disclosure Statement, online: http://canlii.ca/t/51v09.
[150] *The New Home Warranty Act*, SM 2013, c 23, [not yet in force], online: http://canlii.ca/t/5253t.
[151] *Ibid* at s.5.
[152]*Ibid* at s.6, [not yet in force].
[153]*Ibid* at s. 9(2), [not yet in force].
[154] *Ibid* at s. 10(1)-(3), (5), [not yet in force].
[155]*Ibid* at ss. 9(6), 10(6), [not yet in force].
[156] *The Occupiers' Liability Act*, CCSM c O8, online: http://canlii.ca/t/kb4v
[157] Government of Manitoba, Tourism, Culture, Heritage, Sport and Consumer Protection, Residential Tenancies Branch website: http://www.gov.mb.ca/cca/rtb/
[158] *The Residential Tenancies Act*, CCSM c R119, s. 59, online: http://canlii.ca/t/5279f
[159]*Ibid* at s. 58.

[160] Dwellings and Buildings Regulation, Man Reg 322/88 R, online: http://canlii.ca/t/kf7t.
[161] *Ibid* at ss. 14-15.
[162] Government of Canada website, "National Model Code Construction Documents" http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html
[163] If the regulation is passed, it will come into effect on January 1, 2015. See: New Brunswick Regulation 90-128, s. 2, online: http://www2.gnb.ca/content/dam/gnb/Departments/eco-bce/pdf/pr/2014/06/14-050Bil.pdf
[164] *Metric Conversion Act*, SNB 1977, c M-11.1, online: http://canlii.ca/t/jsls
[165] *Supra* Note 163.
[166] National Building Code Designation Regulation, NB Reg 90-128, online: http://canlii.ca/t/klxb.
[167] Provincial Building Regulation NB, Reg. 81-126
[168] *Community Planning Act*, RSNB 1973, c C-12, online: http://canlii.ca/t/528lp
[169] Provincial Building Regulation, 2002, NB Reg 2002-45, online: http://canlii.ca/t/ks66.
[170] *Ibid* at s.5.
[171] *New Brunswick Building Code Act*, SNB 2009, c N-3.5, online: http://canlii.ca/t/51z2w. Note this Act is not yet in force. 00B42B14DCBAC27CBA0E659863F
[172] *School Act*, RSBC 1996, c 412.
[173] *Ibid* at s. 73.
[174] Government of New Brunswick, Department of Education, "New Brunswick Public Education: A Shared Responsibility," online: http://www.gnb.ca/0000/publications/polplan/RolesandResponsibilities.pdf
[175] *Education Act*, SNB 1997, c E-1.12, s. 45 (4).
[176] *Ibid* at s. 40.2(1)(a).
[177] *Ibid* at s. 40.3(1)(a).
[178] *Ibid* at s. 45 (1) and (2).
[179] *Ibid* at s. 3(1).
[180] New Brunswick Department of Education, "New Brunswick Public Education: A Shared Responsibility", online: http://www.gnb.ca/0000/publications/polplan/RolesandResponsibilities.pdf
[181] *Ibid.*
[182] *Supra* Note 175 at s. 28(2)(c).
[183] Part IV of the Underground Mine Regulation under the New Brunswick's *Occupational Health and Safety Act* deals with mine air quality. It includes provisions addressing requirements for air monitoring plans and s. 53(5) indicates employers must detail the frequency of measurement of the concentration of radon and thoron disintegration products when the concentration of radon and thoron disintegration products are less than 0.04 WL. Under s. 62(3) it also sets out monitoring requirements, and if radon levels at any time exceed 0.30 WL, requires that employers "take immediate steps to reduce the level of concentration by engineering controls and shall ensure that precautions are taken to protect the health and safety of employees if the engineering controls are ineffective." Under s. 62(4), employers are also required to ensure that that the exposures of employees to radon are maintained as low as reasonably achievable by appropriate engineering controls and that individual exposures do not exceed 4.8 WLM per year and the time weighted average concentration does not exceed 0.40 WL. Where exposures are more than 0.10 WLM per quarter year, section 63(5) requires employers to appoint a person to measure and record the exposure of each employee exposed to radon; report these exposures to the Commission; and post a copy of the report in a conspicuous place at the place of employment.Underground Mine Regulation, NB Reg 96-105, online: <http://canlii.ca/t/l0fm> retrieved on 2013-11-18; Occupational Health and Safety Act, SNB 1983, c O-0.2, online: <http://canlii.ca/t/js5h> retrieved on 2013-11-18; Occupational Health Regulations, YOIC 1986D/164, ss. 53(5) (c), 62(2) (c), online: <http://canlii.ca/t/kgl3> retrieved on 2013-11-18

[184] WorkSafeNB, "Radon in the Workplace" (2013), online: http://www.worksafenb.ca/radon-in-the-workplace?alttemplate=Printable&
[185] *Ibid.*
[186] Personal communication with Worksafe NB, May 15, 2014.
[187] *Ibid.*
[188] *Workplace Health, Safety and Compensation Commission Act*, SNB 1994, c W-14, online: http://canlii.ca/t/kf1l
[189] *Workers' Compensation Act*, RSNB 1973, c W-13, online: http://canlii.ca/t/51z17
[190] *Occupational Health and Safety Act*, SNB 1983, c O-0.2, online: http://canlii.ca/t/js5h
[191] *Firefighters' Compensation Act*, SNB 2009, c F-12.5, <http://canlii.ca/t/51vjm
[192] General Regulation, NB Reg 91-191, online: http://canlii.ca/t/l3r6> retrieved on 2013-12-28
[193] *Supra* Note 190 at s. 9(1), online: http://canlii.ca/t/js5h
[194] Supra Note 192.
[195] *Occupational Health and Safety Act*, SNB 1983, c O-0.2, online: http://canlii.ca/t/js5h
[196] *Supra* Note 192 s. 2.
[197] *Ibid* at s. 20.
[198] *Ibid* at s. 24(1).
[199] *Ibid* at s. 24(3).
[200] Personal communication with Worksafe NB, May 15, 2014.
[201] Ibid.
[202] *Sale of Goods Act*, RSNB 1973, c S-1, online: http://canlii.ca/t/jt7n
[203] *Consumer Product Warranty and Liability Act*, SNB 1978, c C-18.1, online: http://canlii.ca/t/522zt
[204] *Supra* Note 202 at s. 15, online: http://canlii.ca/t/jt7n
[205] *Ibid.*
[206] *Consumer Product Warranty and Liability Act*, SNB 1978, c C-18.1, ss. 4-7, online: http://canlii.ca/t/522zt
[207] Government of New Brunswick, Consumer Affairs Division website, "Consumer Product Warranties": http://www2.gnb.ca/content/gnb/en/services/services_renderer.20216.Consumer_Product_Warranties.html
[208] *Supra* Note 206 at ss. 8-12.
[209] *Ibid* at s. 27(1). See also, Josh J.B. McElman & Arthur T. Doyle, "Guide to Doing Business in New Brunswick," Cox & Palmer LLP, online: http://www.coxandpalmerlaw.com/site/media/coxandpalmer/GuideToBusinessInNB_proof02.pdf
[210] *Residential Tenancies Act*, SNB 1975, c R-10.2, online: http://canlii.ca/t/522c7
[211] Government of New Brunswick, Service New Brunswick, Office of the Rentalsman; http://www.snb.ca/e/1000/1000-2/e/1000-2_003_e.asp; *Residential Tenancies Act*, SNB 1975, c R-10.2, s. 2, online: http://canlii.ca/t/522c7
[212] *Supra Note 210 at* ss. 3(1)(b),(c).
[213] Residential Properties Maintenance and Occupancy Code Approval Regulation, NB Reg 84-86, online: http://canlii.ca/t/jw21.
[214] *Municipalities Act*, RSNB 1973, c M-22, online: http://canlii.ca/t/52572
[215] *Supra* Note 213 at Schedule A, s. 2.
[216] *Ibid*.
[217] *Ibid* at ss. 10 (1), (2), NB Reg 84-86.
[218] *Ibid* at ss. 17 (1), (2), (3).
[219] *Ibid* at ss. 18 (1), (2).

[220] *Ibid* at ss. 30(1)-(3).
[221] *Municipalities Act*, 1999, SNL 1999, c M-24, s. 414(3)(1)(d) ,online: http://canlii.ca/t/527tm
[222] *Health and Community Services Act*, SNL 1995, c P-37.1, online: http://canlii.ca/t/jz9s
[223] *Ibid* at s. 11(ll).
[224] *Ibid* at s. 11(r).
[225] *Ibid* at s. 11(h).
[226] *Ibid* at s. 11(d).
[227] *Schools Act*, 1997, SNL 1997, c S-12.2, online: http://canlii.ca/t/52608
[228] *Ibid.*
[229] *Ibid* at s.75(1)(p).
[230] *Occupational Health and Safety Act*, RSNL 1990, c O-3, online: http://canlii.ca/t/526s8
[231] Government of Newfoundland and Labrador, Service NL website, "Legislation Summary": http://www.servicenl.gov.nl.ca/ohs/legislation_summary.html
[232] *Supra* Note 230 at, s.4.
[233] *Ibid* at s.5.

[234] *Ibid* at s.26.
[235] *Ibid* at s.27.
[236] *Ibid* at s.45.
[237]*Ibid* at Part XVIX (Underground Operations), s. 544.
[238]*Ibid* at, Part XVIII (Excavation, Underground Work and Rock Crushing), s. 413.
[239] *Health and Community Services Act*, SNL 1995, c P-37.1, online: http://canlii.ca/t/jz9s
[240] *Ibid* at s. 11.
[241] *Radiation Health and Safety Act*, RSNL 1990, c R-1, online: http://canlii.ca/t/jxtc
[242] *Condominium Act*, 2009, SNL 2009, c C-29.1, online: http://canlii.ca/t/knnh
[243]*Ibid* at ss. 40, 41.
[244] *Consumer Protection and Business Practices Act*, SNL 2009, c C-31.1, online: http://canlii.ca/t/526qz
[245] *Residential Tenancies Act*, 2000, SNL 2000, c R-14.1, online: http://canlii.ca/t/jzp4
[246] *Ibid* at s. 4. Note that does the Act does not apply to hotels, vacation rentals, or public buildings such as correctional facilities, nursing homes, or educational facilities, homeless shelters or housing coops, or rooming/boarding houses (if bathroom/kitchen is shared with the owner or if meals/linens are provided by the owner).
[247]*Ibid* at s. 8(1).
[248] Occupancy and Maintenance Regulations, CNLR 1021/96, online: http://canlii.ca/t/ld1s.
[249] 2000, SNL 2000, c U-8, online: http://canlii.ca/t/51vm6.

[250] Nova Scotia Building Code Regulations, NS. Reg. 322/2009, online: https://www.canlii.org/en/ns/laws/regu/ns-reg-322-2009/latest/ns-reg-322-2009.html
[251] *Nova Scotia Building Code Act*, NSRS, 1989, c. 49, online: https://www.canlii.org/en/ns/laws/stat/rsns-1989-c-46/latest/rsns-1989-c-46.html.
[252] *Supra* Note 250.
[253] *Ibid* at s. 1.1.2.1.
[254] *Health Protection Act*, SNS 2004, c 4.

[255] *Education Act*, SNS 1995-96, c 1, online: http://canlii.ca/t/524c7
[256] *Ibid* at s. 64(2)(f).
[257] *Ibid* at s. 39(2)(g).
[258] *Ibid* at s. 38(2).
[259] *Ibid* at s. 40(1)(b).
[260]*Ibid* at s.140A(2)(iii).
[261] *Ibid* at s.64(1)
[262]*Ibid* at s. 64 (2)(ae).
[263] *Ibid* at s. 87.
[264] *Ibid* at s. 39(1) and (2).
[265] *Occupational Health and Safety Act*, SNS 1996, c 7, online: http://canlii.ca/t/lflb
[266] *Ibid* at s. 13(1).
[267] Occupational Safety General Regulations, NS Reg 44/99, online: http://canlii.ca/t/5221j
[268]*Ibid* at, s. 15.
[269] Personal communication with Occupational Health and Safety Division, Nova Scotia Department of Labour and Advanced Education, May 20, 2014. See also: Workplace Health and Safety Regulations, NS Reg 52/2013, online: http://canlii.ca/t/52218
[270] The Regulation defines "*TLVs and BEIs*" to mean "the latest version of the publication of the American Conference of Governmental Industrial Hygienists of threshold limit values and biological exposure indices." Part 2 of this regulation adopts the limits for chemical and physical agents set by the American Conference of Governmental Hygienists in their Threshold Value Limits (TLV) publication. In s. 2.1 of the Regulation "threshold limit values" are defined as "the threshold limit values established by the *TLVs and BEIs* that represent
(i) for chemical substances, the airborne concentrations of chemical substances and conditions under which it is believed that nearly all healthy workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects,
(ii) for physical agents, the levels of exposure and conditions under which it is believed that nearly all healthy workers may be repeatedly exposed, day after day, without adverse health effects.
See. Part 2.1 of the Workplace Health and Safety Regulations, NS Reg 52/2013, online: http://canlii.ca/t/52218
[271] Workplace Health and Safety Regulations, NS Reg 52/2013, s. 2.3, online: http://canlii.ca/t/52218
[272] *Occupiers' Liability Act*, SNS 1996, c 27, online: http://canlii.ca/t/jq6d
[273] Nova Scotia Real Estate Commission, "Property Condition Disclosure Statement", for use under the *Real Estate Trading Act*, online: http://www.nsrec.ns.ca/media58bc.pdf?mid=433; *Real Estate Trading Act*, SNS 1996, c 28, online: http://canlii.ca/t/lfqc; Nova Scotia Real Estate Commission website, "Property Condition Disclosure Statement": http://www.nsrec.ns.ca/extensiondb22.html?docex=12. See also: Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), at18, online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[274] *Residential Tenancies Act*, RSNS 1989, c 401, online: http://canlii.ca/t/523w4;
[275] *Fire Prevention Act*, RSNWT 1988, c F-6, online: http://canlii.ca/t/l2nh
[276] The NBC 2010 was adopted by the Marshal of Northwest Territories effective April, 1, 2011. City of Yellowknife, "Frequently Asked Questions: Building Permit, By-Law No. 4469, Building Code, Building and Occupancy Definition", online: http://www.yellowknife.ca/Assets/Planning+and+Lands/Building+Inspections/FREQUENTLY+ASKED+QUESTIONS/Building+Permit$!3bBy-law+No.4469$!3bBuildingCode$!3bBuilding$!26OccupancyDefinition(07-2012).pdf; Fire Prevention Regulations, RRNWT 1990, c F-12, online: http://canlii.ca/t/lg4g. See also: Government of Canada website, "National Model Code Construction Documents"

[277] *Public Health Act*, SNWT 2007, c 17.
[278] *Education Act*, SNWT 1995, c 28, online: http://canlii.ca/t/527hd
[279] *Ibid* at s. 128.
[280] *Ibid* at s. 102(3)(d).
[281] *Ibid* at s. 69(2)(k).
[282] *Safety Act*, RSNWT 1988, c S-1, online: http://canlii.ca/t/527hw
[283] *Ibid* at s. 4(1).
[284] *Ibid* at s.9.
[285] *Ibid* at s.12.
[286] *Ibid* at s.13.
[287] General Safety Regulations, RRNWT 1990, c S-1, s. 36, online: http://canlii.ca/t/527n0
[288] *Ibid* at 32-34.
[289] Ray Copes, "Focus on Tomorrow: Radon in British Columbia Workplaces" (2009), Worksafe BC, online: http://www.worksafebc.com/contact_us/research/funding_decisions/assets/pdf/2006/RS2006_DG09.pdf
[290] Canada Mortgage and Housing Corporation website, "Northwest Territories Fact Sheet": http://www.cmhc-schl.gc.ca/en/co/buho/cobugu/cobugu_007f.cfm
[291] *Real Estate Agents' Licensing Act*, RSNWT 1988, c 48 (Supp), online: http://canlii.ca/t/kw2m. See also: Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), at18, online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[292] *Residential Tenancies Act*, RSNWT (Nu) 1988, c R-5, online: http://canlii.ca/t/51tqh
[293] *Ibid* at ss. 7, 30.
[294] *Building Code Act*, SNu, 2012, c. 15 [not yet in force], online: http://canlii.ca/t/51xpd
[295] *Ibid* at s. 4(a) [not yet in force].
[296] *Cities, Towns and Villages Act*, RSNWT (Nu) 1988, c C-8, s. 105(1) and (2) <http://canlii.ca/t/521j7>
[297] *Planning Act*, RSNWT (Nu) c. P-7, s. 15(1)(e), online: https://www.canlii.org/en/nu/laws/stat/rsnwt-nu-1988-c-p-7/latest/rsnwt-nu-1988-c-p-7.html?searchUrlHash=AAAAAQAOYnVpbGRpbmcgY29kZSAAAAAAAQ
[298] *Public Health Act*, RSNWT (Nu) 1988, c P-12, online: http://canlii.ca/t/lcwv
[299] *Ibid* at s.25(1)(c).
[300] *Education Act*, SNu 2008, c 15, online: http://canlii.ca/t/52609
[301] *Ibid* at s. 143.
[302] *Ibid* at s. 183.
[303] *Ibid* at s. 145(e).
[304] *Ibid* at s. 116.
[305] *Safety Act*, RSNWT 1988, c S-1, online: http://canlii.ca/t/527hw
[306] *Ibid.*
[307] *Ibid* at s. 4(1).
[308] *Ibid* at s.9.
[309] *Ibid* at s.12.
[310] *Ibid* at s.13.

[311] General Safety Regulations, RRNWT (Nu) 1990 c S-1, s. 36, online: http://canlii.ca/t/khc8; General Safety Regulations, Amendment, Nu Reg 021-2000, <http://canlii.ca/t/khck
[312] General Safety Regulations, RRNWT (Nu) 1990 c S-1, ss. 32-34, online: http://canlii.ca/t/khc8; General Safety Regulations, Amendment, Nu Reg 021-2000, <http://canlii.ca/t/khck
[313]Ray Copes, "Focus on Tomorrow: Radon in British Columbia Workplaces" (2009), Worksafe BC, online: http://www.worksafebc.com/contact_us/research/funding_decisions/assets/pdf/2006/RS2006_DG09.pdf
[314] *Real Estate Agents' Licensing Act*, RSNWT (Nu) 1988, c 48 (Supp), online: http://canlii.ca/t/khr0. See also: Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), at18, online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[315] *Residential Tenancies Act*, RSNWT (Nu) 1988, c R-5, online: http://canlii.ca/t/51tqh
[316] *Ibid* at ss. 7, 30.
[317] Ontario Building Code, O.Reg 332/12.
[318] *Building Code Act*, S.O. 1992, C. 23.
[319] *Supra* Note 317 at Articles 3.1.1.2. and 9.1.1.7.
[320] Government of Ontario, Presentation: "Ontario's 2012 Building Code, Division B, Part 9 (Ontario Regulation 332/12), online: http://www.mah.gov.on.ca/Asset10222.aspx?method=1
[321] Supra Note 317 at Sentence 9.32.3.8 (1).
[322] *Supra* Note 317 at Article 9.13.4.1.
[323] Supra Note 2 at Part 9, Sentence 9.13.4.2 (1).
[324] *Supra* Note 317 at Sentences 9.13.4.2.(2) and (3).
[325] *Supra* Note 317 at Article 9.25.3.1; See also: National Research Council of Canada: Canadian Commission on Building and Fire Codes, "National Building Code of Canada 2010," 13th ed., Second Printing (including revisions and errata released Dec. 21 2012), ISBN: 0-660-19975-7, Volume 2, Part 9, Subsection 9.25.3.1.
[326] *Supra* Note 2 at Part 9, Subsection 9.13.4, Subsection 9.13.4.3 (Providing for the Rough-in for a Subfloor Depressurization System), pp. 9-82 – 9-83.
[327] *Ibid* at Part 9, Subsection 9.25.3.4.
[328] *Ibid* at Part 9, Subsection 9.25.3.6.
[329] *Health Protection and Promotion Act*, R.S.O. 1990, c. H-7.
[330] *Ibid* at s. (2).
[331] *Ibid* at s. 9.
[332] See "Ontario Public Standards 2008, Table 1 on pp 7-9 for an inclusive listing of current Ontario Acts and regulations within which boards of health and medical officers of health are cited. Online: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/ophs_2008.pdf
[333] *Supra* Note 329.
[334] *Ibid* at s. 1(1)
[335] *Ibid* at s.5
[336] *Ibid* at s.11(1).
[337] *Ibid* at s. 10(1).
[338] *Ibid* at s. 13.
[339] *Ibid* at s.41
[340] *Westend Development Corp. v. Peel Regional Health Unit*, 1994 CarswellOnt 5688

[341] *Education Act*, R.S.O. 1990, c. E-2.
[342] *Ibid*.
[343] *Ibid* at s. 265 (1) (j)
[344] See also: Pollution Probe, "Health Schools – Healthy Children – Improving the Indoor Environment in Ontario Schools", online: http://www.pollutionprobe.org/old_files/Reports/schools%20main%20-%20pdf.pdf
[345] which limit radon daughters in mines and mining plant
[346] Personal communication, Ontario Ministry of Labour (May 16 2014). Note that "incidentally exposed workers" are defined in the NORM Guidelines as those "employees whose regular duties do not include exposure to NORM sources of radiation. They are considered as members of the public who work in an occupational exposure environment and, as such, the annual effective dose limit for these workers is 1 mSv." See: Health Canada, Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM), Rev'd 2011, at p. 11, online: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/pdf/pubs/contaminants/norm-mrn/norm-mrn-eng.pdf
[347] Note that exposure to radon at 100 Bq/m^3 will be equivalent to an annual effective dose of 1.72 mSv; 200 Bq/m^3 equal to 3.44 mSv. See discussion on ICRP radon dose conversions in: Jing Chen (Radiation Protection Bureau, Health Canada), "A Review of Radon Doses," Radiation Protection Management , Volume 22, No. 4 (2005)online: http://www.radpro.com/Chen-2.pdf
[348] *Supra* Note 8 at pp. 13-16.
[349] Supra Note 8 at t Article 3.3.3.4., p. 17. Note that the personal radiation dosimetry program should meet the requirements of S-106 revision 1, Technical and Quality Assurance Requirements for Dosimetry Services.
[350] *Ibid.*
[351] *Ibid.*
[352] *Ibid* at Subsection 4.2.4 Radiation Protection Management for Radon, p. 20.
[353] *Ibid* at pp. 18 – 24.
[354] *Supra* Note 8 at p.11. Note that "incidentally exposed workers" are defined in the Guideline as those "employees whose regular duties do not include exposure to NORM sources of radiation. They are considered as members of the public who work in an occupational exposure environment and, as such, the annual effective dose limit for these workers is 1 mSv."
[355] *Supra* Note 8 at p. 21. Note that the ALI values for "incidentally exposed workers" are 1/20 of the ALI values listed in Table 4.1.
[356] *Occupational Health and Safety Act*, RSO 1990, c O.1, online: http://canlii.ca/t/lg8v
[357] *Ibid* at s. 3(1). The Act does not apply to workplaces under federal jurisdiction, and section 3(1) of the Act provides that the Act does not apply to work done by an owner or occupant, or a servant, in a private residence or on the connected land.
[358] *Supra* Note 356 at s. 25(2)(h).
[359] *Ibid* at ss. 27(2)(c).
[360] *Ibid* at s. 29(1)(a)(ii).
[361] *Ibid* at s. 54(1).
[362] *Ibid* at ss. 8(6), 9 (26).
[363] *Ibid* at s. 55.
[364] *Ibid* at s. 57(1).
[365] *Ibid* at s. 57(6).
[366] *Ibid* at s. 29(1)(a)(ii).
[367] *Ibid* at s. 25(2)(a).
[368] *Ibid* at ss. 27(2)(a).

[369] *Ibid* at ss. 25(2)(l),(m).
[370] *Ibid* at s. 43. The right to refuse work is limited in specified circumstances, such as in the case of police officers and firefighters, health care workers. For more information of the applicability of the Act.
[371] *Ibid* at s. 43, 50(1). Once the employee has informed the employer of the work refusal and has explained the circumstances for the refusal, the employer (or supervisor) must investigate the situation in the presence of the worker. After this first stage of the work refusal, a worker can continue the work refusal if the worker has reasonable grounds for believing that the circumstances that caused the worker to initially refuse work continue. During the second phase of the work refusal, a Ministry of Labour investigator will investigate the refusal in consultation with the worker and the employer, and the inspector must decide whether the circumstance(s) that led to the work refusal is likely to endanger the worker (or another person). If the inspector finds that the cause for the work refusal is likely to endanger the worker or another person, then the inspector will generally order the employer to remedy the hazard. During the course of a work refusal, and after, an employer is expressly prohibited by the Act from penalizing, dismissing, disciplining, suspending or threatening to do any of these things to a worker who has obeyed or sought enforcement of the Act. See also Government of Ontario, Ministry of Labour, "Rights and Duties: FAQs", online: http://www.labour.gov.on.ca/english/hs/faqs/rights.php#general
[372] Note that the Ministry does not receive many, if any at all, complaints with respect to radon in indoor air.
[373] Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), at 76, online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[374] *Ontario New Home Warranties Plan Act*, RSO 1990, c O.31, online: http://canlii.ca/t/kqb6
[375] *Ibid* at s. 13.
[376] For additional information on radon warranty coverage, refer to Tarion's educational video: http://www.youtube.com/watch?v=54PhQtSBWUM
[377] Tarion website, "Ontario New Home Warranties Plan Act and Regulations: https://www.tarion.com/About-Tarion/Pages/Warranties-Plan-Act-and-Regulations.aspx
[378] *Occupiers' Liability Act*, RSO 1990, c O.2, online: http://canlii.ca/t/1hwc
[379] *Residential Tenancies Act*, S.O. 2006, C. 17
[380] "What are my rights as a tenant to have high radon levels corrected?", Canadian Environmental Law Association (July 2012), online: http://www.cela.ca/node/2494
[381] *Supra* Note 378.
[382] Summerside's Building Code By-Law adopts the NBC 2010 and any amendments made thereto. City of Summerside, Building By-Law No. SS-09 (Rev. 2009) and Regulation SS-09-01, online: http://www.city.summerside.pe.ca/cache/files/11/Bylaws/SS-09_Rev_2009_and_Regulation_SS-09-01.pdf
[383] Charlottetown's Building Code By-Law adopts the NBC 2010 as well as its appendix notes (except for where modified by the By-Law) including all of the radon protective provisions. City of Charlottetown, Building Code By-Law, made pursuant to *Charlottetown Area Municipalities Act* and the *Planning Act* (amended/approved June 13, 2011), online: http://www.city.charlottetown.pe.ca/pdfs/bylaws/Building_Code_Bylaw.pdf
[384] Stratford's Building By-Law adopts the NBC 2010 and any amendments made thereto. Town of Stratford, By-Law No. 32, online: http://www.townofstratford.ca/town-hall/government/bylaws/by-laws/
[385] Government of Prince Edward Island website, Finance, Energy and Municipal Affairs Department, "Municipalities: http://www.gov.pe.ca/mapp/index.php?number=1040430&lang=E; Government of Prince Edward Island website, Finance, Energy, and Municipal Affairs Department, "Building": http://www.gov.pe.ca/finance/index.php3?number=13766&lang=E See also: Government of Canada website, "National Model Construction Code Documents": http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html

[386] See: Government of Prince Edward Island website, Department of Finance, Energy and Municipal Affairs, Municipal Affairs and Provincial Planning Branch, Map: "Prince Edward Island Municipal Boundaries": http://www.gov.pe.ca/photos/original/fma_municimap11.pdf. See also: Government of Prince Edward Island website, Finance, Energy, and Municipal Affairs Department, "Building": http://www.gov.pe.ca/finance/index.php3?number=13766&lang=E
[387] *Provincial Building Code Act*, RSPEI 1988, c P-24, online: http://canlii.ca/t/51vtn.
[388] *Planning Act*, RSPEI 1988, c P-8.
[389] *Public Health Act*, RSPEI 1988, c P-30.1.
[390] *Ibid* at s.3.
[391] *Ibid* at s. 22(2).
[392] *Ibid* at s. 23.
[393] *Ibid* at s. 24.
[394] *Ibid* at s. 27 (2), (4).
[395] *Ibid* at s. 59(1).
[396] *Ibid* at s. 59(3).
[397] *Ibid* at s. 59(6).
[398] *Ibid* at s. 63.
[399] *Ibid* at s. 67.
[400] *Ibid* at s. 69(1).
[401] Rental Accommodation Regulations, PEI Reg EC142/70.
[402] *Public Health Act*, RSPEI 1988, c P-30.1.
[403] *School Act*, RSPEI 1988, c S-2.1, online: http://canlii.ca/t/528zf
[404] *Ibid* at s. 47(1).
[405] *Ibid* at s. 99(d).
[406] *Ibid* at ss. 98(f), 99(m).
[407] *Occupational Health and Safety Act*, RSPEI 1988, c O-1.01, online: http://canlii.ca/t/521jq
[408] *Ibid* at s. 12(1).
[409] *Ibid* at s. 18.
[410] *Ibid* at ss. 7, 8.
[411] *Ibid* at s. 28.
[412] Community Legal Information Association of Prince Edward Island, "Buying Property in Prince Edward Island", online: http://www.cliapei.ca/sitefiles/File/publications/GEN5.pdf; Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[413] *Occupiers' Liability Act*, RSPEI 1988, c O-2, online: http://canlii.ca/t/k3rn
[414] General Regulations, PEI Reg EC10/89, online: http://canlii.ca/t/k50n
[415] *Rental of Residential Property Act*, RSPEI 1988, c R-13.1, online: http://canlii.ca/t/51vv9
[416] Rental Accommodation Regulations, PEI Reg EC142/70.
[417] *Supra* Note 403.
[418] Supra Note 417 at s. 9.
[419] *Ibid* at s. 15.

[420] *Ibid* at s. 16(3).
[421] Construction Code, CQLR c B-1.1, r 2, online: http://canlii.ca/t/525tf; National Research Council of Canada, Quebec Construction Code 2005, Chapter I, Building and National Building Code of Canada 2005, Second Printing, 2008, (Includes revisions and errata released on December 1, 2007, June 20, 2008 and November 30, 2012), ISBN 978-0-660-19837-8.
[422] B*uilding Act*, CQLR c B-1.1, s. 132, online: http://canlii.ca/t/525r1
[423] *Ibid.*
[424] *Supra* Note 422.
[425] National Research Council of Canada, Quebec Construction Code 2005, Chapter I, Building and National Building Code of Canada 2005, Second Printing, 2008, (Includes revisions and errata released on December 1, 2007, June 20, 2008 and November 30, 2012), ISBN 978-0-660-19837-8.
[426] *Ibid* at Article 9.13.4.1, Sentence 9.13.2.7(2).
[427] *Ibid* at Appendix Note, A-9.13.4.1.(1).
[428] *Ibid*. The Canadian Action Level specified is 800 Bq/m^3 as set in "HC H46-2/90-156E, Exposure Guidelines for Residential Indoor Air Quality".
[429] *Ibid*. Article 9.13.4.6 provides for a subfloor depressurization system, and Sentence 9.13.4.6 (6) requires that radon testing be conducted according to EPA 402-R-93-003, "Protocols for Radon and Radon Decay Product Measurements in Homes," to determine the radon concentration in the *building*, including basement concentrations. See: National Research Council of Canada, Quebec Construction Code 2005, Chapter I, Building and National Building Code of Canada 2005, Second Printing, 2008, (Includes revisions and errata released on December 1, 2007, June 20, 2008 and November 30, 2012), ISBN 978-0-660-19837-8, Division II, Sentences 9.13.4.6. (6), (7), (8), (9). Note that the Appendix Note to Article 9.13.4.6. states that the radon "test should be of sufficient duration to provide a reasonable indication of the concentration;;" that the "minimum period for testing should be three months or as recommended by the authority having jurisdiction;" and that the "preferred testing location is centrally in the basement or the main floor for houses without basements."
[430] *Ibid* at Appendix Note, A-9.13.4.6. Soil Gas Control by Depressurization.
[431] *Public Health Act*, CQLR c S-2.2.
[432] *Education Act*, CQLR c I-13.3, online: http://canlii.ca/t/526kq
[433] *Ibid* at s. 210.
[434] *Ibid* at s.266 (2).
[435] *Ibid* at s.96.22.
[436] *An Act Respecting Occupational Health and Safety*, CQLR c S-2.1, online: http://canlii.ca/t/526l9
[437] *Ibid* at s.51.
[438] *Ibid* at Chapter X.
[439] *Ibid* at s.15.
[440] *Real Estate Brokerage Act*, CQLR c C-73.2, online: http://canlii.ca/t/525q1; Organisme d'autoréglementation du courtage immobilier du Québec (OACIQ), "Residential Real Estate Brokerage - Seller's Guide: A practical quick reference guide for the sale of your property with a real estate broker" (March 2014) online: http://www.oaciq.com/uploads/ckeditor/attachments/402/sellers-guide.pdf. See also: Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), at18, online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[441] Article 1726 of the *Civil Code of Quebec* provides a warranty of quality, stating that*:* "The seller is bound to warrant the buyer that the property and its accessories are, at the time of the sale, free of latent defects which render it unfit for the use for which it was intended or which so diminish its usefulness that the buyer would not have bought it or paid so high a price if he had been aware of them. The seller is not bound, however, to warrant against any latent defect known to the buyer or any apparent defect; an apparent defect is a defect that can be perceived by a prudent and diligent buyer without the need to resort to an expert." See: Civil Code of Québec, LRQ, c C-1991, Article 1726, online: http://canlii.ca/t/5290z.

[442] Civil Code of Québec, LRQ, c C-1991, Article 1728, online: http://canlii.ca/t/5290z.
[443] Health Canada, "Séance d'information sur le radon a l'intention des MRC de Québec" (January 2010), online: http://extranet.santemonteregie.qc.ca/userfiles/file/sante-publique/sante-environnementale/QAE-RAD-Radon-Info-MRC.pdf
[444] Civil Code of Québec, LRQ, c C-1991, Article 1913, online: http://canlii.ca/t/5290z
[445] *Ibid* at Articles 1910, 1912.
[446] *Ibid*.
[447] *Ibid* at Article 1863.
[448] Project results (French only) can be viewed here: Institut national de santé publique, "Projet piloted dépistage sur radon dans des écoles de Québec", online: http://www.inspq.qc.ca/radon/
[449] Government of Quebec website, Santé et Services sociaux, "Radon": http://www.msss.gouv.qc.ca/sujets/santepub/environnement/index.php?radon_en
[450] The *Uniform Building and Accessibility Standards Act*, SS 1983-84, c U-1.2
[451] *Ibid.*
[452] Uniform Building and Accessibility Standards Regulations, RRS c U-1.2 Reg 5, Appendix, online: http://canlii.ca/t/52883
[453] Personal communication with Government of Saskatchewan, Building Standards and Licensing Branch, Ministry of Government Relations (June 26 2014).
[454] *Public Health Act*, SS 1994, c P-37.1
[455] *Ibid* at s. 21.
[456] *Ibid* at s. 22(1).
[457] *Ibid* at s. 24.
[458] *Ibid* at s. 25.
[459] *Ibid* at s. 29(1).
[460] *Public Health Act*, 1994, SS 1994, c P-37.1, s. 53 (1), (2).
[461] See, for example, Heartland Health Region, "Safe Housing", online: http://www.hrha.sk.ca/documents/SafeHousingandAccommodationPage.pdf
[462] *The Education Act*, 1995, SS 1995, c E-0.2, online: http://canlii.ca/t/5244d
[463] *Ibid.*
[464] *Ibid* at s.85(1)(d). With respect to francophone education areas, fransaskois schools and the division scolaire francophone, s. 86 places this duty on the conseil scolaire.
[465] *Ibid* at s.85(1)(w).
[466] *Ibid* at s.190(6). Note that the Act specifies that no action lies against those involved with a safety patrol for any loss or damage suffered by a person by reason of anything done in good faith in exercise of a safety patrol under the Act and its regulations. See section 190(7).
[467] *Ibid* at s. 353.
[468] *The Saskatchewan Employment Act*, SS 2014, c S-15.1, online: http://canlii.ca/t/527zn
[469] *Ibid* at Div. 3, s. 3-8.
[470] *Ibid* at Div. 3, s. 3-14.
[471] *Ibid* at Div. 10.
[472] *Ibid* at Div. 3, 4.
[473] *Supra* Note 8.
[474] Public Legal Education Association of Saskatchewan, ""What You Should Know About Property Disclosure Statements", (April 2010), online: http://www.plea.org/legal_resources/?a=496&searchTxt=&cat=5 Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real

Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[475] *Real Estate Act*, SS 1995, c R-1.3, online: http://canlii.ca/t/kx0h
[476] Residential Tenancies Act, 2006, SS 2006, c R-22.0001, online: http://canlii.ca/t/5236z
[477] Residential Tenancies Regulations, 2007, RRS c R-22.0001 Reg. 1, online: http://canlii.ca/t/5272t
[478] *Supra* Note 477 at s. 49(1). See also: Residential Tenancies Regulations, 2007, RRS c R-22.0001 Reg. 1, s. 8(1).
[479] *Public Health Act*, SS 1994, c P-37.1
[480] See, for example, Heartland Health Region, "Safe Housing", online: http://www.hrha.sk.ca/documents/SafeHousingandAccommodationPage.pdf
[481] *Ibid.*
[482] The 2012 NBC Revisions and Errata were fully implemented in the Yukon on April 1, 2013. Yukon Community Services – Building and Safety Standards Branch, "2012 Revisions & Errata to the 2010 Edition of the National Construction Codes", (January 25, 2013), online: http://www.community.gov.yk.ca/pdf/ncc_revision.pdf
[483] Section 9.36 does not apply for any permits issued between April 1, 2014 – March 31, 2015. As of April 1, 2015 all of the NBC will again apply in the Yukon. Personal Communication with Government of Yukon, Department of Community Services, Protective Services, Fire and Life Safety, Building Safety and Standards Branch (June 27, 2014).
[484] *Building Standards Act*, RSY 2002, c 19, online: http://canlii.ca/t/kfnq.
[485] Government of Canada website, "National Model Construction Code Documents": http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html
[486] Yukon Community Services – Building and Safety Standards Branch, "2012 Revisions & Errata to the 2010 Edition of the National Construction Codes", (January 25, 2013), online: http://www.community.gov.yk.ca/pdf/ncc_revision.pdf
[487] *Public Health and Safety Act*, RSY 2002, c 176, online: http://canlii.ca/t/5265z
[488] *Ibid* at s.16.
[489] *Ibid* at s. 17.
[490] *Education Act*, RSY 2002, c 61, online: http://canlii.ca/t/525j5
[491] *Ibid* at s.116(1)(f).
[492] *Ibid* at s.168 (i).
[493] *Ibid* at s.169 (g).
[494] Occupational Health Regulations, YOIC 1986D/164, online: <http://canlii.ca/t/kgl3.
[495] *Occupational Health and Safety Act*, RSY 2002, c 159, online: <http://canlii.ca/t/kfkt.
[496] *Supra* Note 495 at ss. 43-46.
[497] *Real Estate Agents Act*, RSY 2002, c 188, <http://canlii.ca/t/525dp. See also: Madeleine Bélisle, "Can Seller Disclosure be Improved to Better Protect Parties During a Real Estate Transaction?" presented by the Association des Consommateurs pour la Qualité dans la Construction to Industry Canada's Office of Consumer Affairs (June 2013), at18, online: http://acqc.ca/wp-content/uploads/2013/11/SDD-Report-eng.pdf
[498] *Residential Landlord and Tenant Act*, SY 2012, c 20, online: http://canlii.ca/t/51xqn
[499] *Landlord and Tenant Act*, RSY 2002, c 131, online: http://canlii.ca/t/kfn7
[500] *Ibid* at s. 76(1).
[501] *Residential Landlord and Tenant Act*, SY 2012, c 20, online: http://canlii.ca/t/51xqn
[502] *Ibid* at s.33(1).

Appendix 2: Survey of Radon Protection in Building Codes in Canada[1]

Contents

[1]This Appendix does not contain a complete statement of the law in the area and changes in the law may occur from time to time. Please note that the legal framework described, and legislation and regulations cited, within this Appendix does not include an analysis of related case law. As such the interpretation given the legislation by the courts is not included. The information contained here is meant for reference only. Anyone needing specific advice on his/her own legal position should contact a lawyer.

PART A: Radon Protective Provisions in the NBC, 2010

Radon protection provisions appear in Parts 5, 6 and 9 of the NBC, 2010. Part 5 addresses soil gas control, sets targets for the control of air leakage, and details air barrier system requirements to minimize the ingress of airborne radon from the ground with an aim to maintain the indoor radon concentration at an acceptable level. Part 6 addresses Good Engineering Practice. Part 9 is where the majority of radon protection provisions appear, and include provisions which address the control of the ingress of soil gases, and requirements for air and soil gas barriers (Sections 9.13, 9.18 and 9.25).

Part 5 (Environmental Separation)

Part 5 addresses soil gas control, sets targets for the control of air leakage, and details air barrier system requirements to minimize the ingress of airborne radon from the ground with an aim to maintain the indoor radon concentration at an acceptable level.

Article 5.4.1.1, requires that air leakage is controlled, or venting to the exterior permitted,[2] so as to:

a) provide acceptable conditions for the *building* occupants,
b) maintain appropriate conditions for the intended use of the *building*,
…
e) minimize the ingress of airborne radon from the ground with an aim to controlling the indoor radon concentration to an acceptable level, and
f) not compromise the operation of *building* services.

Sentences 5.4.1.1 (2) and (3) requires the installation of an air barrier to provide the principal resistance to air leakage except where uncontrolled air leakage will not adversely affect any of

(a) the health of safety of *building* users,
(b) the intended use of the *building*, or
(c) the operation of *building* services. [3]

The Appendix to Part 5 (Article 5.4.1.1) notes that an air barrier system can reduce the likelihood of infiltration of dust and other pollutants which can lead to serious health or safety hazards. This section requires the installation of an air barrier system in components and assemblies in contact with the ground to control the ingress of radon. The Appendix references the new Health Canada guideline of 200 Bq/m³ for indoor radon concentration, stating that "[m]easures may be necessary to reduce the radon concentration to a level below the Health Canada guideline." [4]

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[2] National Research Council of Canada: Canadian Commission on Building and Fire Codes, "National Building Code of Canada 2010," 13th ed., Second Printing (including revisions and errata released Dec. 21 2012), ISBN: 0-660-19975-7. Note this section applies " [w]here a *building* component or assembly separates interior *conditioned space* from exterior space, interior space from the ground, or environmentally dissimilar interior spaces"
[3] *Ibid* at Section 5.4, Subsection 5.4.1, Article 5.4.1.1, pp. 5-5.
[4] *Ibid* at Volume 2, A-5.4.1.1, pp. A-59 – A-60.

Part 5, Article 5.4.1.2, details the requirements for materials used to resist air leakage; specifies the air leakage limit and exemptions to the limit.[5] It also sets out that air barrier systems must be continuous,[6] and sets compliance standards with which the structural design of air barriers systems subject to air pressure loads must conform.[7] The Appendix to Part 5 (section 5.4.1.2 (1) and (2)) details materials and system requirements; notes the circumstances in which it may be acceptable to have air leakage characteristics in exceedance of the maximum provided in the Subsection 5.4.1.2; provides recommended maximum air leakage rates; and recommendations with respect to testing of air barrier airtightness. [8]

Part 6 (Heating, Ventilating and Air-Conditioning)

Part 6, Article 6.2.1.1. (Good Engineering Practice) requires heating, ventilating and air-conditioning systems to be designed, constructed and installed in conformance with good engineering practice. Included in a list of examples of good engineering practice is EPA/625/R-92/016, "Radon Prevention in the Design and Construction of Schools and Other Large Buildings."[9]

The Appendix for Article 6.2.1.1. (Good Engineering Practice) discusses the differences in humidification and pressurization in new and existing buildings and provides recommendations with respect to pressurization requirements, as well as HVAC design/system changes. The Appendix also includes a section on radon control which references the federal Radon Guideline. It states: "[m]easures may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada. Further information on reducing the indoor concentration of radon can be found in the following Health Canada publications:

- "Guide for Radon Measurements in Public Buildings (Schools, Hospitals, Care Facilities, Detention Centres)," and
- "Radon: A Guide for Canadian Homeowners" (CMHC/HC)."[10]

Ventilation requirements are also discussed in Subsection 6.2.2. All buildings, except storage garages, are required to have mechanical ventilation, and natural ventilation is permitted in prescribed circumstances.[11] Natural ventilation or a combination of mechanical and natural ventilation can be provided in

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[5] *Ibid* at Part 5, Section 5.4, Sentences 5.4.1.2 (1) and (2).
[6] *Ibid*. Under Sentence 5.4.1.2 (3) continuity is required:
a) across construction, control and expansion joints,
b) across junctions between different *building* assemblies, and
c) around penetrations through the *building* assembly.
[7] *Ibid* at Part 5, Section 5.4, Sentence 5.4.1.2(4).
[8] *Ibid* at Volume 2, A-5.4.1.1, pp. A-60 – A-61.
[9] *Ibid* at Article 6.2.1.1., pp. 6-1. See also: Health Canada, "Radon: What you Need to Know," Newfoundland and Labrador Chapter of the Canadian Home Builder's Association (June 11, 2013), online: http://chbanl.ca/wp-content/uploads/2013/06/Health-Canada-Presentation.pdf
[10] *Ibid* at Volume 2, A-6.2.1.1., p. A-64. See also: Health Canada, "Radon: What you Need to Know," Newfoundland and Labrador Chapter of the Canadian Home Builder's Association (June 11, 2013), online: http://chbanl.ca/wp-content/uploads/2013/06/Health-Canada-Presentation.pdf
[11] *Ibid* at Subsection 6.2.2, 9.32.3. Requirements for ventilation, and mechanical ventilation systems, are laid out in Subsections 6.2.2. and 9.32.3.

a) *Buildings* of other than *residential occupancy* having an *occupant load* of not more than one person per 40m² during normal use,
b) *Buildings* of *industrial occupancy* where the nature of the processes contained therein permits or requires the use of large openings in the *building* envelope even during the winter, and
c) Seasonal *buildings* not intended to be occupied during the winter. [12]

And buildings with non-residential occupancies may use natural ventilation if climatic conditions permit, if "engineering data demonstrates that such a method will provide the required ventilation for the type of *occupancy.*"[13]

Part 9 (Housing and Small Buildings)

The majority of radon protection provisions appear in Part 9 (Housing and Small Buildings). In the newest version of the NBC, air barrier requirements have been consolidated and prescriptive measures included on providing a rough-in for a future radon mitigation system. [14] Section 9.13 addresses measures for resisting the ingress of soil gases; Sections 9.18 and 9.25 include requirements for air and soil gas barriers in assemblies in contact with ground (and crawl spaces); Section 9.14. addresses the provision of control joints to reduce cracking of foundation walls and airtight covers for sump pits to reduce radon ingress. [15] Part 9 also includes new Appendix Notes and Illustrations. [16] These as well as other relevant sections are described below.

The Appendix to Part 9 states that various sections require the application of certain radon exclusion measures in all dwellings and that these measures are

- low in cost,
- difficult to retrofit, and
- desirable for other benefits they provide[17]

Radon exclusion is primarily accomplished by ensuring that the pressure difference across the ground/space interface is positive (air moves towards the outside) so that the inward flow of radon through any remaining leaks will be minimized. The requirements provided in Article 9.13.4.3 are explained in Appendix Note A-9.13.4.3.[18]

Subsection 9.13.4 addresses the leakage of *soil* gas from the ground into buildings. Resisting ingress of soil gases is required for all buildings.[19] The principal method to accomplish this is "to seal the interface between the soil and the occupied space, so far as is reasonably practicable." [20] Subsection 9.13.4 details protective measures to be taken to control soil gas ingress, and provides

[12] *Ibid* at Subsection 6.2.2, Sentence 6.2.2.2 (1) , p. 6-3.
[13] *Ibid*..
[14] Health Canada, "Radon: What you Need to Know," Newfoundland and Labrador Chapter of the Canadian Home Builder's Association (June 11, 2013), online: http://chbanl.ca/wp-content/uploads/2013/06/Health-Canada-Presentation.pdf
[15] *Supra* Note 2 at Volume 2, Division B, Appendix A, A-9.13.4, p. A-180.
[16] *Supra* Note 14.
[17] *Supra* Note 2 at Volume 2, Division B, Appendix A, A-9.13.4, p. A-180.
[18] *Ibid*.
[19] *Ibid* at Part 9, 9.13.4.2. (1), p. 9-82. See also Appendix A, A-9.13.4, p. A-180.
[20] *Ibid* at Volume 2, Division B, Appendix A, A-9.13.4, p. A-180.

that, for dwelling units and residential occupancies, a rough-in for a radon extraction system must be provided. Sentence 9.13.4.2. (1) requires the installation of an air barrier system and addresses protection from all soil gases. The rest of Article 9.13.4.2., along with Article 9.13.4.3., which requires the provision of the means to depressurize the space between the air barrier and the ground, target the future mitigation of high radon concentrations. [21]
Sentences 9.13.4.2 (1) and (2) state:

> 1) All wall, roof and floor assemblies separating *conditioned space* from the ground shall be protected by an *air barrier system* conforming to Subsection 9.25.3.
>
> 2) Unless the space between the *air barrier system* and the ground is designed to be accessible for the future installation of a subfloor depressurization system, *dwelling units* and *buildings* containing *residential occupancies* shall be provided with the rough-in for a radon extraction system conforming to Article 9.13.4.3.

Subsection 9.25.3 addresses radon gas infiltration and requirements relating to air barrier systems. Subsection 9.25.3.1 includes requirements for barriers to air leakage and provides that air barrier systems separating conditioned spaces from unconditioned spaces or the ground must be a continuous barrier. Subclause 9.25.3.1. (1) (b) (iii) specified that the air barrier system must prevent air leakage from the exterior or ground inward "sufficient to … minimize the ingress of soil gas." [22]

For occupancies that are neither dwelling units nor residential occupancies, Sentence 9.13.4.2 (3) requires protection from radon ingress in conformance with

> a) Article 9.13.4.3., or
>
> b) Parts 5 and 6 (see Article 5.4.1.1.[23] and 6.2.1.1.[24]).

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[21] *Ibid* at Part 9, Article 9.13.4.2., p. 9-82. See also Appendix A, A-9.13.4, p. A-180.

[22] *Ibid* at Part 9, Subclause 9.25.3.1. (1) (b) (iii).

[23] *Ibid* at Article 5.4.1.1. As discussed above, Article 5.4.1.1. requires that air leakage is controlled, or venting to the exterior permitted,[23] so as to:

> a) provide acceptable conditions for the *building* occupants,
>
> b) maintain appropriate conditions for the intended use of the *building,*
>
> …
>
> e) minimize the ingress of airborne radon from the ground with an aim to controlling the indoor radon concentration to an acceptable level, and
>
> f) not compromise the operation of *building* services.

Sentences 5.4.1.1 (2) and (3) requires the installation of an air barrier to provide the principal resistance to air leakage except where uncontrolled air leakage will not adversely affect any of

> (a) the health of safety of *building* users,
>
> (b) the intended use of the *building,* or
>
> (c) the operation of *building* services.

The Appendix to Part 5 (Article 5.4.1.1) notes that an air barrier system can reduce the likelihood of infiltration of dust and other pollutants which can lead to serious health or safety hazards. This Article requires the installation of an air barrier system in components and assemblies in contact with the ground to control the ingress of radon. The Appendix references the new Health Canada guideline of 200 Bq/m³ for indoor radon concentration, stating that "[m]easures may be necessary to reduce the radon concentration to a level below the Health Canada guidelineSee also Appendix Note A, A-5.4.1.1, pp. A-59 – A-60.

[24] *Ibid* at Article 6.2.1.1. As discussed in the report, above Article 6.2.1.1. (Good Engineering Practice) requires heating, ventilating and air-conditioning systems to be designed, constructed and installed in conformance with good engineering practice. Included in a list of examples of good engineering practice is EPA/625/R-92/016, "Radon Prevention in the Design and Construction of Schools and Other Large Buildings." The Appendix for Article 6.2.1.1. discusses the differences in humidification and pressurization in new and existing buildings and provides

Appendix A explains that since the federal Radon Guideline is established based on the time that occupants spend inside buildings, the installation of a means for the future removal of radon may not be required in buildings that are occupied by persons for less than 4 hours per day. Appendix A notes that radon problems in such buildings (or parts of buildings) may be addressed by providing a means for increased ventilation. [25]

Article 9.13.4.3. requires that a rough-in for subfloor depressurization is provided for floors-on-ground. Requirements relating to what the system must consist of are provided, and these include:

a) a rough in of a gas permeable layer, or
b) clean granular materials and a pipe

Detailed requirements for both (a) and (b) are provided in 9.13.4.3. (2) and (3).[26]

Appendix A clarifies that Subsections 9.13.4.3. (2) and (3) contain two sets of requirements. Sentence (2) describes criteria using performance-oriented language, and Sentence (3) describes one acceptable solution using prescriptive language. Appendix A notes that some cases may require a solution other than that described in Sentence (3).[27] Appendix Note A-9.13.4.3.(2)(b) and (3)(b)(i) of Appendix A provide detailed recommendations for the design of the rough-in to ensure effective depressurization from the extraction system.

Appendix A also addresses the completion of a subfloor depressurization system, and indicates that so doing may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada.[28]

Article 9.14.5.2. requires sump pits covers to be designed to be airtight (in accordance with Sentence 9.25.3.3(7) such that any clearances are sealed to prevent air leakage.[29]

Article 9.16.2.1 also addresses soil gas control with respect to floors-on-ground by providing the requirement that granular material be installed under floors-on-ground (except for under "slabs in garages, carports or accessory buildings, or buildings of industrial occupancy where the nature of the process contained therein permits or requires the use of large openings in the building envelope even during the winter."[30] Note that in the newest version of the NBC, the Subsection 9.16 exemption with respect to fill under slab has been deleted. [31]

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recommendations with respect to pressurization requirements, as well as HVAC design/system changes. The Appendix also includes a section on radon control which references the federal Radon Guideline. It states: "[m]easures may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada. See also Appendix Note, A-6.2.1.1., p. A-64. See also: Health Canada, "Radon: What you Need to Know," Newfoundland and Labrador Chapter of the Canadian Home Builder's Association (June 11, 2013), online: http://chbanl.ca/wp-content/uploads/2013/06/Health-Canada-Presentation.pdf

[25] *Ibid* at Volume 2, Division B, Appendix A, A-9.13.4.2 (3), p. A-181.
[26] *Ibid* at Part 9, Sentences 9.13.4.3. (2) and (3), pp. 9-82 – 9-83.
[27] *Ibid* at Volume 2, Division B, Appendix A, A-9.13.4.3, p. A-181.
[28] *Ibid* at Volume 2, Division B, Appendix A, A-9.13.4.3, p. A-181.
[29] *Ibid* at Part 9, Article 9.14.5.2. and Sentence 9.25.3.3(7).
[30] *Ibid* at Part 9, Article 9.16.2.1, p. 9-95.
[31] *Supra* Note 14.

Under Section 9.18, Article 9.18.6.2 heated crawl spaces are required to have a ground cover that is sealed to the foundation wall, and all penetrations sealed against air leakage.[32] Note that in the newest version of the NBC unheated crawl spaces and accessible heated crawl spaces without slab are exempted.[33]

Air barrier requirements which appeared in Section 9.13 past versions of the NBC are now in Section 9.25. These include:

- For below-ground walls
- Polyethylene soil gas barrier required under slab
- Slab perimeter sealed to air barrier of the wall
- All penetrations sealed.[34]

Subsection 9.25.3 (Air Barrier Systems) addresses radon gas infiltration. Article 9.25.3.1. requires an air barrier system to prevent air leakage for "wall, ceiling and floor assemblies separating conditioned spaces from unconditioned space or from the ground". The barrier must be "continuous" and sufficient to "minimize the ingress of soil gas."[35]

Article 9.25.3.4 addresses soil gas control of walls in contact with the ground, and subsection 9.25.3.6 addresses soil gas control with respect to floors-on-ground.[36]

Appendix A discusses the Air Leakage and Soil Gas Control Requirements of Part 9. Appendix Note A-9.25.3.4 and A-9.25.3.6 (Air Leakage and Soil Gas Control in Floors-on-Ground) note that provisions on sealing of penetrations found in Subsection 9.25.3.3. (6) apply equally to hollow metal and masonry columns penetrating the floor slab. The Appendix also notes that Subsection 9.25.3.6.(6) requirements on drainage openings in slabs can be satisfied with a variety of devices that prevent the entry of radon and other soil gases through floor drains.[37]

The Appendix to Sentences 9.25.3.6 (2) and (3) also notes that "[f]loors-on-ground separating conditioned space from the ground must be constructed to reduce the potential for the entry of air, radon or other soil gases". The Appendix indicates that this is often done with a layer of polyethylene under the floor, and provides a discussion on best practices to avoid cracking of slabs-on-ground. [38]

[32] *Supra* Note 2 at Volume 2, Division B, Appendix A, Article 9.18.6.2, p. 9-99 – 9-100.
[33] *Ibid* at Part 9, Articles 9.13.4.2., 9.18.6.1. and 9.18.6.2.
[34] *Supra* Note 14.
[35] *Supra* Note 2 at Part 9, Article 9.25.3.1., p. 9-154. The air barrier properties, it's continuity of design, and air leakage control in masonry walls and underground roofs are dealt with in Articles 9.25.3.2. – 9.25.3.5 at pp. 9-154 – 9-155.
[36] *Ibid* at Part 9, Subsection 9.25.3, pp. 9-154 – 9-155.
[37] *Ibid* at Volume 2, Division B, Appendix A, A-9.25.3.4 and 9.25.3.6. at p. A-203.
[38] *Ibid* at Volume 2, Division B, Appendix A, A-9.25.3.6 (2) and (3), p. A-204.

PART B: Radon Protective Provisions in Provincial/Territorial Buildings Codes

Alberta Building Code

Alberta has adopted the NBC, with changes and modifications specific to local conditions in Alberta.[39] The Alberta *Safety Codes Act*[40] is the legislation under which Alberta's Building Code is adopted. Note that the Alberta Building Code includes revisions and errata approved to June 2009, but does not include any of the 2012 radon related additions to the NBC, 2010. Alberta's Building Code Regulation,[41] enacted under the *Safety Codes Act*,[42] declares in force the *Alberta Building Code 2006*, as established by the Safety Codes Council. The Alberta Building Code 2006[43] provides technical provisions for the design and construction of new buildings, and also applies to the alteration, change of use and demolition of existing buildings.[44]

While the Alberta Building Code applies to all municipalities, each municipality applies and interprets the Code to establish its own form of development and building approvals. The provincial *Safety Codes Act*[45] requires the issuance of permits for work on buildings covered by the Alberta Building Code. The Safety Services Office of the Ministry of Municipal Affairs is responsible for establishing and interpreting the Alberta Building Code, standards and respective regulations under the *Safety Codes Act*. Building permit issuance and enforcement are the responsibility of the Local Authority Having Jurisdiction (AHJ).

The Alberta Building Code 2006 does not include explicit radon protection provisions in Section 5.4, as does the same section in the NBC 2010.[46] The associated Appendix note states that "[a]n air barrier system may be required in components and assemblies in contact with the ground to control the transfer of soil gases such as radon and methane."[47] Section 5.4.1.1. (Environmental

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[39] National Research Council of Canada, Alberta Building Code, 2006 (8th Ed., 2nd printing, includes all revisions and errata approved to June 2009), ISBN 0-660-19637-9, Vol. 1, p. v.

[40] *Safety Codes Act*, RSA 2000, c S-1, online: http://canlii.ca/t/51xx9

[41] Building Code Regulation, Alta Reg 117/2007, online: http://canlii.ca/t/51xxf. Note that the Regulation also repeals Alta Reg 50/1998 and provides a transition provision whereby AR 50/98 remains in force "for work for which a permit is issued by a safety codes officer or other person designated by an Administrator pursuant to s. 44 of the *Safety Codes Act* prior to September 2, 2007, or for work for which a permit application is submitted prior to March 2, 2008 to a safety codes officer or other person designated by an Administrator pursuant to s. 44 of the Safety Codes Act who is satisfied that the preparation of the plans and specifications for the project commenced prior to September 2, 2007, until that work has been completed or the permit has expired or been revoked.

[42] *Supra* Note 40.

[43] Note that the Alberta Municipal Affairs and the Safety Codes Council are developing the next editions of the Alberta Building Code and Alberta Fire Code. Currently, the 2006 editions of these codes are in force in Alberta. The Alberta Building Code, 2006 is available for purchase on the website of the National Research Council of Canada. See: Government of Canada, National Research Council of Canada website: http://www.nrc-cnrc.gc.ca/eng/publications/codes_centre/2006_alberta_building_code.html

[44] Government of Alberta, Municipal Affairs website: http://www.municipalaffairs.alberta.ca/cp_building_codes_standards.cfm

[45] *Safety Codes Act*, RSA 2000, c S-1, online: http://canlii.ca/t/51xx9

[46] Supra *Note* 2. Article 5.4.1.1. of the National Building Code 2010 includes, at clause (e) "minimize the ingress of airborne radon from the ground with a aim to controlling the indoor radon concentration to an acceptable level..."

[47] *Supra* Note 39 at Appendix Note, A-5.4.1.1 (Resistance to Air Leakage).

Separation) of the Alberta Building Code 2006[48] requires air leakage be controlled, or venting to the exterior permitted so as to:

a) provide acceptable conditions for the building occupants,
b) maintain appropriate conditions for the intended use of the building,
...
e) not compromise the operation of building services.

The section detailing design, construction and installation requirements for heating, ventilating and air conditioning systems under Article 6.2.1.1. (Good Engineering Practice) does not include the NBC 2010 the reference to the document "EPA/625/R-92/016, Radon Prevention in the Design and Construction of Schools and Other Large Buildings" from NBC 2010.[49]

Section 9.13 of the Alberta Building Code does not include any of the explicit reference to soil gas control included in the NBC 2010. However, Section 9.13 is paired with Functional Statements and Objectives[50] relevant to soil gas control (F40 and OH1.1). Functional Statement 40 is "to limit the level of contaminants". Objective H1.1 of the Code is to limit the probability that as a result of the design or construction of the building ... a person will be exposed to an unacceptable risk of illness, including due to indoor conditions caused by inadequate indoor air quality. Functional Statement 40 and Objective H1.1 are referenced several times in Table 4.2.7.1,[51] including Subsections 9.13.2. (Dampproofing) and 9.13.3. (Waterproofing). Note that these Statements, while providing clarity on what is required to satisfy provisions in Section 9.13 of the Code, are not legally binding but are advisory in nature.[52]

Also not adopted from the NBC 2010 are the provisions in Clause 9.25.3.1(1)(b) in the NBC 2010, requiring the installation of a continuous barrier to air leakage from the exterior or ground inward "sufficient to ... minimize the ingress of soil gas".[53]

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[48] *Supra* Note 39.
[49] *Supra* Note 39 at Article 6.2.1.1.
[50] The Alberta Building Code is published in an objective-based format for the first time in 2006. Objectives describe in broad terms the overall goals the Code's provisions are intended to achieve. They describe undesirable consequences that the Code's provisions aim to avoid. Two key phrases are: "limit the probability" and "unacceptable risk." The former acknowledges that the Alberta Building Code cannot entirely prevent undesirable situations from happening, and the latter acknowledges that the Alberta Building Code cannot eliminate all risk. "Acceptable risk" is the risk remaining once compliance with the Code has been achieved. Acceptable Solutions, in Division B, are linked to Functional Statements in Division A.
The Functional Statements are qualitative, and describe conditions that help satisfy the objectives. Neither the Objectives nor Functional Statements are not intended to be used on their own to in the design and approval processes. Functional statements can be found in Section 3.2 of Division A of the Alberta Building Code.
Intent statements, while explanatory only and not an integral part of the code, provide plain language explanations of the basic thinking behind each Code provision contained in Division B, and how each provision achieves its objectives and functional statements.
[51] *Supra* Note 39 at Division A, Article 4.2.7.1., Table 4.2.7.1. For the purposes of compliance with the Code, the objectives and functional statements attributed to the acceptable solutions in Part 9 of Division B are those listed in Table 4.2.7.1.
[52] *Ibid* at Vol.1, Division A, pp. viii – ix, and A, A-1.2.1.1.(1)(a).
[53] Ibid at Subsection 9.25.3. The Alberta Building Code provides, at 9.25.3, that "thermally insulated" wall, ceiling, and floor assemblies be constructed with an air barrier system, and focuses on moisture condensation but does not make explicit reference to radon or soil gas control.

Article 9.32.3.5. of the Alberta Building Code, like the NBC 2010 provision, addresses ventilation systems and the associated Appendix Note explains that "[s]entences 9.32.3.5.(2) to (7) require that the supply fan operate at the same time and at the same rate as the principal ventilation fan in order to avoid either pressurizing or depressurizing the house" and that "[d]epressurization can lead to ... increased entry of soil gas."[54]

British Columbia Building Code

The BC Building Code[55] is a regulation of the *Local Government Act*[56] and is substantially based on the model NBC 2010.[57] The Code does not apply to federal lands, First Nations, or the City of Vancouver. The BC Building Code established minimum standards, and generally applies at the time of construction and reconstruction. The BC Building Code is not intended to be used to enforce the retrospective application of new requirements to existing buildings or existing portions of relocated buildings, unless specifically required by local regulations or bylaws.[58] Generally, buildings should conform to the edition of the BC Building Code in force at the time of their construction/renovation, and existing building are not required to be brought up to current BC Building Code standards. [59]

By regulation, the BC Building Code 2012 adopts as "Book 1"[60] Divisions A to C of the NBC 2010 (as it was on June 1, 2012) with the changes set out in the attached Schedule 1 to the Regulation.[61] Note that the Regulation can be accessed for free online, but Schedule 1 is exempt from publication and is available only by purchase. Schedule 1 sets out the ways in which the BC Building Code varies from NBC 2010.[62]

The BC Building Code includes the objective of limiting "the probability that, as a result of the design or construction of the *building*, a person in the *building* will be exposed to an unacceptable risk of illness due to indoor conditions". The risks of illness due to indoor

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[54] Ibid at Appendix Note, A-9.32.3.5 (Ventilation Systems Not Used in Conjunction with Forced Air Heating Systems).
[55] British Columbia Building Code Regulation, BC Reg 264/2012, online: http://canlii.ca/t/5267l
[56] *Local Government Act*, RSBC 1996, c 323, online: http://canlii.ca/t/5286j
[57] Government of British Columbia, "British Columbia Codes 2012", online: http://www.bccodes.ca/building-code.aspx?vid=QPLEGALEZE:bccodes_2012_view
[58] *Supra* Note 55 at Appendix A, Division A, A-1.1.1.1.(1) Application to Existing Buildings
[59] British Columbia Ministry of Energy Mines and Natural Gas, Office of Housing and Construction Standards, "2012 BC Building Code, BC Plumbing Code and BC Fire Code", online: http://www.housing.gov.bc.ca/building/code/ See also FAQs, online: http://www.housing.gov.bc.ca/building/code_questions/index.htm. Information on maintenance responsibilities in rental buildings can be found at http://www.rto.gov.bc.ca/content/rightsResponsibilities/repairs.aspx.
[60] Note that the British Columbia Building Code consists of two Books: Book I (General) and Book II (Plumbing Systems).
[61] Note that Book I (General) of the British Columbia Building Code has been further amended by B.C. Regulations 162/2013 and 167/2013.
[62] Note that for ease of reference, the BC Building Code adopts the same numbering structure as the NBC 2010, to facilitate comparability and possible future harmonization. The electronic version of the BC Codes (available for purchase at www.bccodes.ca) contains functionality to identify where BC variations from the National model occur within the text of the BCBC. One new feature of the 2012 BC Codes is the inclusion of the term "reserved" in place of certain deleted National model content which has not been adopted.

conditions are addressed in this Code and include those caused by inadequate indoor air quality.[63]

Part 5 – Environmental Separation

Radon protection provided in Part 5 of the NBC 2010 is adopted in the BC Building Code. Sentences 5.4.1.1.(1), (2) and (3) of the NBC 2010 are adopted in the BC Building Code. Sentence 5.4.1.1(1) requires that "[w]here a *building* component or assembly separates interior *conditioned space* from exterior space, interior space from the ground, or environmentally dissimilar interior spaces, the properties and position of the materials and components in those components or assemblies shall be such that they control air leakage or permit venting to the exterior so as to ... minimize the ingress of airborne radon from the ground with an aim to controlling the indoor radon concentration to an acceptable level...".[64]

As with the NBC 2010, Sentence 5.4.1.1 (2) and (3) require, respectively that an air barrier system by installed to provide the principal resistance to air leakage except where it can be shown that uncontrolled air leakage will not adversely affect any of (a) the health or safety of *building* users, (b) the intended use of the *building*, or (c) the operation of *building* services.[65]

As with the NBC 2010, Article 5.4.1.2. details the requirements for materials used to resist air leakage; notes the air leakage limit and the exemptions to the limit; and specifies that air barrier systems must be continuous.[66]

As with the Appendix Notes included in the NBC 2010, the BC Building Code's Appendix Notes to Part 5 state that "[a]n air barrier system in above-grade building components and assemblies separating conditioned space from the exterior will reduce the likelihood... the infiltration of dust and other pollutants**"** which can "can lead to a wide range of health problems.**"**[67] Also adopted from the NBC 2010, the BC Building Code's Appendix Notes make reference to the federal Radon Guideline, stating that "[a]n air barrier system is required in components and assemblies in contact with the ground to control the ingress of radon, and may be required to control the ingress of other soil gases such as methane. In addition to an air barrier system, other measures may be required to reduce the radon concentration to a level below the guideline specified by Health Canada."[68] Note that the Appendices of the BC Building Code have no legal effect.[69]

Part 6 – Heating, Ventilating and Air-Conditioning

The BC Building Code incorporates the requirements in Article 6.2.1.1 of the NBC 2010 pertaining to Good Engineering Practice, which require that "heating, ventilating and air-conditioning systems ... be designed, constructed and installed in conformance with good engineering practice", and list as an example EPA 625/R-92/016, "Radon Prevention in the

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[63] *Supra* Note 55 at Division A, Part 1, Article 2.2.1.1., Objective OH1.1
[64] *Ibid* at Division B, Part 5 – Environmental Separation, Article 5.4.1.1.(1).
[65] *Ibid* at Division B, Part 5 – Environmental Separation, Article 5.4.1.1. (2), (3).
[66] *Ibid* at Division B, Part 5 – Environmental Separation, Article 5.4.1.2. (1) – (4).
[67] *Ibid* at Appendix A, Division B, A-5.4.1.1 - Resistance to Air Leakage
[68] *Ibid* at Appendix A, Division B, A-5.4.1.1.
[69] Ibid. Note that except for the Appendices and Appendix Notes that are directly referenced in a Part of this Code, which A-5.4.1.1 is not.

Design and Construction of Schools and Other Large Buildings."[70] Like in the NBC 2010 Appendix Notes, the BC Building Code Appendix Notes include a section on radon control stating that "[m]easures may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada."[71] As noted above, the Appendices of the BC Building Code have no legal effect.[72]

Part 9 – Housing and Small Buildings

Part 9 of the BC Building Code is where the majority of radon protective provisions are found.[73] Subsection 9.13 addresses soil gas control, and Sentence 9.13.4.2. (1), adopted from the NBC 2010, requires that "[a]ll wall, roof and floor assemblies separating *conditioned space* from the ground shall be protected by an *air barrier system* conforming to Subsection 9.25.3." The BC Building Code adopts Sentences 9.13.4.2 (2) and (3) from the NBC 2010, providing for the future mitigation of high radon concentrations, including provisions for a rough-in for a radon extraction system. Note however that the BC Building Code adds an exemption at Sentence 9.13.4.2 (4) not included in the NBC 2010. Sentence 9.13.4.2(4) of the BC Building Code exempts "[b]uildings in locations classified as Radon Area 2 by Table C-3" from conforming to the future radon mitigation provided for in Sentences 9.13.4.2 (2) and (3).[74]

The BC Building Code also adopts Section 9.25 of the NBC which addresses radon gas infiltration and requirements relating to air barrier systems. Subclause 9.25.3.1 (1) (b) of the BC Building Code requires that "[w]all, ceiling and floor assemblies separating *conditioned space* from unconditioned space or from the ground shall be constructed so as to include an *air barrier system* that will provide a continuous barrier to air leakage ... from the exterior or the ground inward sufficient to ... minimize the ingress of *soil* gas."[75]

In April 2013, BC adopted the 2012 National Model Building Code amendments for energy efficiency in housing and small buildings. These amendments may impact the ingress of soil gas, and air quality, in new construction. The amendments will come into force in December 2014, along with additional ventilation requirements for residential occupancies and dwelling units including:

- installation of a principal exhaust fan (requiring continuous operation (instead of 8 hr/day) and with a size-based volume of 10 CFM per 1000 square feet)
- Addition of a balanced ventilation system

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[70] *Ibid* at Division A, Part 6, Article 6.2.1.1.
[71] *Ibid* at Appendix A, Division B, A-6.2.1.1.
[72] Ibid. Note that except for the Appendices and Appendix Notes that are directly referenced in a Part of this Code, which A-6.2.1.1. is not.
[73] Note that Part 9 of Division B of the BC Building Code applies to all *buildings* (as defined by the Code) which are 3 *storeys* or less in building height, having a building area not exceeding 600 m^2, and used for major occupancies classified as a) Group C, *residential occupancies* (see Appendix Note A-9.1.1.1.(1) of Division B), b) Group D, *business and personal services occupancies*, c) Group E, *mercantile occupancies*, or d) Group F, Divisions 2 and 3, *medium-* and *low-hazard industrial occupancies. See:* BC Building Code, Division A, Part 1, Article 1.3.3.3.
[74] *Ibid* at Sentences 9.13.4.2 (1)-(4).
[75] *Ibid* at Subclause 9.25.3.1 (1) (b).

- Fresh air distribution to bedrooms (not through mandated central forced air systems or HRVs). [76]

Manitoba Building Code

Manitoba's Building Code[77] is a regulation enacted under the *Buildings and Mobile Homes Act*[78] which has been in force since April 1, 2011. It replaces Man. Reg. 127/2006, and has adopted, except for certain amendments, the NBC 2010. [79] The Schedule to the regulation details the sections of the NBC 2010 which have not been adopted, and Manitoba-specific provisions which have been added. The main differences between the Manitoba Building Code and the NBC 2010 are additions which have been made to the Manitoba Code. The Manitoba Code incorporates all of the NBC 2010 radon protective provisions, including sections Section 5.4 (Air Leakage) and subsection 5.4.1 (Air Barrier Systems), Article 6.2.1.1 (Good Engineering Practice), Section 9.13 (Soil Gas Control), and subsection 9.25.3 (Air Barrier Systems). Note that the NBC 2010, and amendments made before December 1, 2012, have been reflected in Manitoba's adoption of the NBC. [80]

New Brunswick Building Code

New Brunswick municipalities are authorized by the province's *Municipalities Act*[81] to create and enforce by-laws to maintain the health, safety, and wellness of the community. Under section 59(1) of the *Community Planning Act*,[82] a municipal council or rural community council "may enact a building by-law to prescribe standards for the building, locating or relocating, demolishing, altering, structurally altering, repairing or replacing, or any combination thereof, of a building or structure."[83] Municipalities are directed under Section 59(3) of the *Community Planning Act* that in prescribing standards under subsection (1) the Council, "shall adopt by reference or otherwise the National Building Code, or a portion thereof, in relation to (i)buildings, and (ii)structures for which standards are therein provided." [84] As such, municipalities in New Brunswick that have enacted a building by-law have adopted the provisions of the NBC 2005.

New Brunswick's National Building Code Designation Regulation[85] provides that the National *Building Code* of Canada 2005 and its amendments is the code referred to in any reference to the NBC contained in any building by-law under the *Community Planning Act*.[86]

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[76] Government of British Columbia, Ministry of Energy, Mines and Natural Gas, Office of Housing and Construction Standards, "Energy Efficiency", online: http://housing.gov.bc.ca/building/green/energy/index.htm
[77] Manitoba Building Code, Man Reg 31/2011, online: http://canlii.ca/t/5226k
[78] The *Buildings and Mobile Homes Act*, CCSM c B93, <http://canlii.ca/t/51tx3, online: on 2013-12-26
[79] Note that the NBC 2010, including amendments made prior to December 1, 2012, form the Manitoba Building Code. The Schedule to the Code details the ways in which the Manitoba Building Code varies from the NBC 2010. Manitoba Building Code, Man Reg 31/2011, s.1. <http://canlii.ca/t/5226k> retrieved on 2013-12-26
[80] Supra Note 80 at s.1.1(1).
[81] *Municipalities Act*, RSNB 1973, c M-22.
[82] *Community Planning Act*, RSNB 1973, c C-12.
[83] *Ibid* at s. 59(1).
[84] *Ibid* at s. 59(3).
[85] National Building Code Designation Regulation, NB Reg 90-128, online: http://canlii.ca/t/klxb.
[86] *Supra* Note 85.

Regulatory amendments have been proposed which would update the regulation to include the NBC 2010 as the code referred to in any reference to the NBC in any building by-law under the *Community Planning Act*.[87]

Examples of cities which have Building by-laws adopting the NBC include: Saint John, Moncton, Fredericton, and Bathurst:

- The City of Saint John adopts the NBC 2005, with the exception of Part 5 and Part 8.[88]
- The City of Moncton adopts the NBC, and references to "Code" in the City Building By-Law[89] refer to the National Building Code of Canada 2005, and any amendments, revisions and errata subsequently issued. Like in Saint John, Moncton's By-Law adopts the NBC outright, but for Parts 5 and 8. [90]
- The City of Fredericton's Building By-Law[91] adopts the NBC in its entirety. References to the "Code" in the By-Law refer to the latest edition of the NBC. [92]
- The City of Bathurst's Building By-Law[93] adopts the NBC, and any amendments, in its entirety. [94]

For municipalities which have not enacted a building by-law, the Provincial Building Regulation 81-126,[95] enacted under the *Community Planning Act,*[96]applies. The Counties in which the regulation is effective are specified under Section 3(1). Provincial Building Regulation 2002-45, enacted under the *Community Planning Act*, applies in unincorporated areas of the Province and in rural communities which haven't enacted a building by-law. Section 5 of the Provincial Building Regulation 2002-45,[97] provides that "[t]he National Building Code of Canada 2005 is adopted by reference for the purposes of prescribing standards for the building locating or relocating, demolishing, altering, structurally altering, repairing or replacing of a building or structure." [98]

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[87] Government of New Brunswick, Public Review of Draft Regulations, Amendments to the National Building Code Designation Regulation – *Metric Conversion Act, online: http://www2.gnb.ca/content/gnb/en/corporate/public_review_ofdraftregulations.html*

[88] Saint John Building By-Law Amendment No. 28053552 (Nov. 18, 2009), online: https://www.documents.saintjohn.ca/weblink8/0/doc/32108/Page1.aspx; Saint John Building By-Law No. C.P. 101, online: https://www.documents.saintjohn.ca/weblink8/0/doc/10765/Page1.aspx

[89] City of Moncton By-Law No. Z-410, online: http://www.moncton.ca/Assets/Residents+English/By-Laws/Z-410+Building.pdf.

[90] City of Moncton By-Law No. Z-410, Article 2.01, online: http://www.moncton.ca/Assets/Residents+English/By-Laws/Z-410+Building.pdf.

[91] City of Fredericton By-Law No. R-1, online: http://www.fredericton.ca/en/citygovernment/resources/By-lawNoR-1.pdf.

[92] Ibid at Article 3.01.

[93] City of Bathurst, NB By-Law No. 2004-16, online: http://www.bathurst.ca/docs/bylaws/2004-16%20-%20Building%20By-Law.pdf.

[94] Ibid at Article 2(1).

[95] Provincial Building Regulation NB. Reg. 81-126

[96] *Supra* Note 85.

[97] Provincial Building Regulation, 2002, NB Reg 2002-45, online: http://canlii.ca/t/ks66.

[98] *Ibid.*

Note that although the *New Brunswick Building Code Act*,[99] was assented to on June 19, 2009, it is not yet in force. When it comes into effect, it will apply to the design, construction and demolition of buildings in the Province. Section 10 also requires that, even where no construction work will take place, a permit is required for the change the use of a building (or part of a building) with respect to the occupancy classifications of the NBC. The NBC is adopted by reference in the regulations, and sections 4 (1) (a) and (b) require that no construction and demolition work be carried out unless necessary permits are obtained, and the work conforms with the NBC, the standards prescribed by by-law or regulation, and with the terms/conditions of any permits issued.

Newfoundland and Labrador

Municipalities have the jurisdiction and discretion to pass regulations relating to building design and construction, and are provided with regulation-making power under the provincial *Municipalities Act*.[100] If a municipal council passes regulations relating to building design and construction, the Province requires that they adopt the NBC.

In Newfoundland and Labrador municipal councils are able to pass regulations relating to the design, construction and renovation of buildings. In accordance with subsection 414(3) of the *Municipalities Act, 1999*,[101] regulations made by a municipality[102] relating to building design and construction should be in accordance, at a minimum, with the National Building Code of Canada. Section 414(3) states that "[i]In making regulations under paragraph (1)(d),[103] a council shall adopt the National Building Code of Canada and supplements or amendments to that Code and may adopt standards which exceed the requirements of that Code and its supplements and amendments."[104]

As such, the Department of Municipal and Intergovernmental Affairs advises that municipal councils:

(1) pass a resolution to adopt the National Building Code in regard to these regulations;
(2) pass a second resolution confirming the responsibility for compliance with the National Building Code in regard to these regulations is with the home owner and/or developer/contractor.

Note that three municipalities in Newfoundland and Labrador are not subject to the *Municipalities Act, 1999*, but are under different, but similar legislation. According to the

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[99] *New Brunswick Building Code Act*, SNB 2009, c N-3.5, online: http://canlii.ca/t/51z2w. Note this Act is not yet in force.
[100] *Municipalities Act*, 1999, SNL 1999, c M-24, s. 414(3)(1)(d) ,online: http://canlii.ca/t/527tm
[101] *Ibid.*
[102] *Ibid.* Note that this applies only to municipalities that are subject to the *Municipalities Act, 1999.* Three municipalities are not: St. John's, Corner Brook, and Mount Pearl. See: http://assembly.nl.ca/Legislation/sr/statutes/c15.htm; http://assembly.nl.ca/Legislation/sr/statutes/c16.htm; http://assembly.nl.ca/Legislation/sr/statutes/c17.htm
[103] *Ibid.* Section 414(3)(1)(d) of the *Municipalities Act,* 1999 (c M-24) provides regulation-making powers with respect to "controlling and respecting the design, construction, alteration, reconstruction, minimum lot size and occupancy of buildings and classes of buildings and the demolition, removal, relocation and maintenance of buildings".
[104] *Ibid* at s. 414(3).

Department of Municipal and Intergovernmental Affairs, the adoption of standards in the NBC, required by s. 414(3) of the *Municipalities Act*, apply equally.

Section 194 of the *Municipalities Act* prohibits building construction and renovation from being done without a permit. A building permit issued by a municipality in accordance with section 194 of the *Municipalities Act, 1999* should indicate that all work undertaken must be in accordance with the NBC, where applicable, and responsibility for compliance rests with the home owner and/or developer/contractor.[105]

Note also that the Fire Protection Services Regulations,[106] enacted under the *Fire Protection Services Act*,[107] adopts the NBC, 2010 for the construction of buildings, except Part 9 where relative to one and 2 family dwellings within Group C.[108]

Nova Scotia Building Code

The NBC has been adopted into provincial law in Nova Scotia, by the *Nova Scotia Building Code Act*,[109] which was amended in 2005 (and came into effect July 1, 2006). The *Building Code Act* authorizes the Minister to make regulations "adopting by reference the National Building Code of Canada 1985 or any change thereto." [110] The Nova Scotia Building Code Regulations,[111] enacted under the *Nova Scotia Building Code Act*, adopt the NBC 2010 in its entirety, including all revisions and errata made on or before December 31, 2013. [112]

Regulations updating the NBC requirements are made on a regular basis.[113] Nova Scotia adopted in June 2011 (effective June 2011) regulations based on the 2010 NBC. [114] Enforcement of the Code and the issuance of approvals fall under the purview of municipal building officials.[115]

Northwest Territories Building Code

The Northwest Territories has adopted without change the National Building Code, 2010 in the Fire Prevention Regulations enabled by the *Fire Protection Act.*[116] Subsection 2(1) of the Fire Prevention Regulations, adopts the NBC 2010, as amended from time to time.[117] The Authority

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[105] *Ibid* at s. 194.
[106] Fire Protection Services Regulations, NLR 45/12, online: http://canlii.ca/t/lgz5
[107] *Fire Protection Services Act*, SNL 2008, c F-11.01, online: http://canlii.ca/t/jzj1
[108] *Supra* Note 109 at s. 3(1)(a)(i).
[109] *Nova Scotia Building Code Act*, NSRS, 1989, c. 49, online: https://www.canlii.org/en/ns/laws/stat/rsns-1989-c-46/latest/rsns-1989-c-46.html.
[110] *Ibid* at s.4(1).
[111] Nova Scotia Building Code Regulations, NS. Reg. 322/2009, online: https://www.canlii.org/en/ns/laws/regu/ns-reg-322-2009/latest/ns-reg-322-2009.html
[112] *Ibid* at Article 1.1.2.1.
[113] Government of Nova Scotia website, "Building and Pluming Code": http://novascotia.ca/lae/buildingcode/
[114] Government of Canada website, "National Model Code Construction Documents" http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html
[115] *Supra* Note 116.
[116] *Fire Prevention Act*, RSNWT 1988, c F-6, online: http://canlii.ca/t/l2nh
[117] The NBC 2010 was adopted by the Marshal of Northwest Territories effective April, 1, 2011. City of Yellowknife, "Frequently Asked Questions: Building Permit, , By-Law No. 4469, Building Code, Building and Occupancy Definition", online:

Having Jurisdiction is the Northwest Territories is the Fire Marshal, operating from the Department of Municipal and Community Affairs in Yellowknife.

Nunavut Building Code

Nunavut's *Building Code Act,*[118] although not yet in force, provides that the Commissioner in Executive Council may make regulations adopting by reference, in whole or in part, and with such modifications as may be considered necessary or advisable, a prescribed edition of the National Building Code of Canada. [119] Regulations under the Act have not yet been made.

Nunavut's "Good Building Practice Guideline," though not legally binding, provides suggestions specific to the Nunavut climate and include the following areas: a) where more stringent requirements should apply than the National Building Code of Canada or local municipal requirements; b) where there is a need to augment or clarify a code requirement; c) where conditions peculiar to a remote northern community require an approach different from typical Canadian building industry practice; and d) where specific products, systems or methods have been developed and have been found to be superior for northern conditions.[120]The Guideline does not address radon protection or soil gas soil explicitly.

Under the *Cities, Towns and Villages Act*[121] Section 105 under Building Control and Protection of Heritage Resources provides that a "council may, by by-law, adopt in whole or in part the National Building Code of Canada ... as a code of standards for buildings, structures and excavations" and provides that a council can not reduce minimum standards or increase maximum standards found within the NBC without Ministerial approval. [122]

Further, a municipal zoning by-law may contain provisions for the purpose of "imposing building regulations or adopting and constituting as building regulations the regulations published under the titles of the National Building Code of Canada with such modifications to them as the council, with the approval of the Director, may determine.[123]

Ontario Building Code

The Ontario Building Code[124] is a regulation enacted under Ontario's *Building Code Act.*[125] In 2012 the Ontario Building Code amended the 2006 Code. The new Building Code came into

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http://www.yellowknife.ca/Assets/Planning+and+Lands/Building+Inspections/FREQUENTLY+ASKED+QUESTIONS/Building+Permit$!3bBy-law+No.4469$!3bBuildingCode$!3bBuilding$!26OccupancyDefinition(07-2012).pdf; Fire Prevention Regulations, RRNWT 1990, c F-12, online: http://canlii.ca/t/lg4g. See also: Government of Canada website, "National Model Code Construction Documents"

[118] *Building Code Act,* SNu, 2012, c. 15 [not yet in force], online: http://canlii.ca/t/51xpd

[119] *Ibid* at s. 4(a) [not yet in force].

[120] Government of Nunavut, "Good Building Practices Guideline" 2nd Ed., (2005), online: http://cgs.gov.nu.ca/PDF/Good%20Building%20Practices%20Guideline.pdf.

[121] Cities, Towns and Villages Act, RSNWT (Nu) 1988, c C-8, online: http://canlii.ca/t/521j7>

[122] *Ibid* at s. 105(1) and (2).

[123] *Planning Act,* RSNWT (Nu) c. P-7, s. 15(1)(e), online: https://www.canlii.org/en/nu/laws/stat/rsnwt-nu-1988-c-p-7/latest/rsnwt-nu-1988-c-p-7.html?searchUrlHash=AAAAAQAOYnVpbGRpbmcgY29kZSAAAAAAAQ

[124] Ontario Building Code, O.Reg 332/12.

[125] *Building Code Act,* S.O. 1992, C. 23.

effect on January 1, 2014, with some provisions being phased in over the next 3 years.[126] The Ontario Building Code does not adopt the model NBC 2010, but the Ministry of Municipal Affairs and Housing indicates that the new amended Building Code is more consistent with the NBC 2010, and in particular "enhances harmonization" with the NBC 2010, including:

- Editorial changes and updated standard references stemming from those in the NBC 2010;
- Guidance on technical requirements to ensure consistency in enforcement; and
- More flexible, performance-oriented methods design and installation of some building elements.[127]

The Code's objectives are many and touch on: health, safety, fire protection, accessibility and resource conservation. The Code applies to the design and construction of new buildings as well as extensive renovations. It is administered by the Building and Development Branch of the Ministry of Municipal Affairs and Housing. Building code enforcement is normally undertaken by municipal building departments. In the case of on-site sewage systems, enforcement is sometimes undertaken by boards of health or conservation authorities.

Radon protection is explicitly provided under Ontario's Building Code for three Ontario regions: the City of Elliot Lake, the Township of Faraday, and the Township of Hyman. All of these geographic areas are known to have high radon levels. The Ontario Building Code incorporates the federal Radon Guideline of 200 $Bq/m^{3,}$ lowering the trigger for radon protection in design and construction from 250 Bq/m3 for activities subject to the Building Code regulation within these three regions. Provisions within Part 3 (Fire Protection, Occupant Safety and Accessibility) and Part 9 (Housing and Small Buildings) state that "[i]n 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 Bq/m^3 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."[128]

Subject to exceptions provided in the Regulation (for farm buildings, for example), Part 3 of Division B applies to all *buildings* used for "*major occupancies"*[129] or for buildings that exceed 600 m^2 in *building area* or exceed three *storeys* in *building height* and are used for *major*

[126] Provisions relating to energy efficiency provisions are scheduled to come into effect January 1, 2015 and 2017, and changes related to on-site sewage systems to come into effect December 31, 2016. See: Ontario Ministry of Municipal Affairs and Housing website, "2012 Building Code Overview": http://www.mah.gov.on.ca/Page10300.aspx

[127] Ministry of Municipal Affairs and Housing, Building and Development Branch, Presentation: "2012 Building Code, O. Reg. 332/12", online: http://www.mah.gov.on.ca/Asset10201.aspx?method=1

[128] O. Reg. 332/12. Articles 3.1.1.2. and 9.1.1.7.

[129] This refers to majors occupancies classified as: *assembly occupancies*; *care, care and treatment* or *detention occupancies*; or *high hazard industrial occupancies.* O. Reg. 332/12, Sentence 1.1.2.2 (1).

occupancies.[130] Likewise, subject to exceptions in the Regulation, Part 9 of Division B applies to all *buildings* that have three or fewer *storeys; have* a *building area* not exceeding 600 m^2, and are used for *major occupancies*.[131]

Various other radon protective provisions apply across Ontario. Note that, to facilitate comparison, the Ontario Building Code can be easily cross-referenced with the NBC 2010 as section titles have been made consistent. A few of the key provisions are discussed below.

Air Leakage

As in Section 5.4 of the NBC 2010, the Ontario Building Code's Section 5.4 addresses Air Leakage. Subsection 5.4.1.1. (Required Resistance to Air Leakage) under Section 5.4.1. (Air Barrier Systems) provides that leakage must be controlled and venting permitted where a *building* component or assembly separates interior *conditioned space* from: exterior space, the ground, or environmentally dissimilar interior spaces. Section 5.4.1.1. (1) provides a list of outcomes that the resistance to air leakage must ensure. These include:

(a) provide acceptable conditions for the *building* occupants,
(b) maintain appropriate conditions for the intended use of the *building*,
(c) minimize the accumulation of condensation in and penetration of precipitation into the *building* component or assembly,
(d) control heat transfer to roofs where ice damming can occur, and
(e) not compromise the operation of *building* services.

Note that the Ontario Building Code Article 5.4.1.1. is identical to the NBC 2010 except that the radon protective provision in (e) is absent from the Ontario Code. Subsection 5.4.1.1. (1)(e) in the NBC 2010 requires the building construction to control air leakage or permit venting so as to "minimize the ingress of airborne radon from the ground with an aim to controlling the indoor radon concentration to an acceptable level."[132]

Also, as in the NBC 2010, the Ontario Building Code provides that an air barrier system be installed to provide the principal resistance to air leakage,[133] unless it can be shown that the following will not be adversely affected:

a) the health or safety of *building* users,
b) the intended use of the *building*, or
c) the operation of *building* services. [134]

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[130] This refers to major occupancies classified as: *residential occupancies*; *business and personal services occupancies; mercantile occupancies*; *medium hazard industrial occupancies* and *low hazard industrial occupancies.* O. Reg. 332/12, Sentence 1.1.2.2 (1).
[131] This refers to major occupancies classified as: *residential occupancies*; *business and personal services occupancies*; *mercantile occupancies*; *medium hazard industrial occupancies* and *low hazard industrial occupancies.* O. Reg. 332/12, Sentence 1.1.2.4(1).
[132] *Supra* Note 131 at Clause 5.4.1.1.(1)(e); National Research Council of Canada: Canadian Commission on Building and Fire Codes, "National Building Code of Canada 2010," 13th ed., Second Printing (including revisions and errata released Dec. 21 2012), ISBN: 0-660-19975-7, Volume 2, Division B, Section 5.4, Subsection 5.4.1 (Article 5.4.1.1), pp. 5-5.
[133] *Ibid* at Sentence 5.4.1.1.(2).
[134] Ibid at Sentence 5.4.1.1.(3).

Section 5.4.1.2. of the Ontario Building Code addresses Air Barrier System Properties. This section is identical with the NBC 2010.

Good Engineering Practice

The Ontario Building Code has adopted Subsection 6.2.1.1.(1) from the NBC 2010, requiring that "[h]eating, ventilating and *air-conditioning* systems, including related mechanical refrigeration systems ... be designed, constructed and installed to conform to good engineering practice." Like with the NBC 2010, the Ontario Building Code references a list of resources for good engineering practice, but provides that it be followed "as appropriate to the circumstances."

The list is not identical to that provided within the NCB 2010, but the recent amendment to the Ontario Code included the addition of "EPA/625/R-92/016, 'Radon Prevention in the Design and Construction of Schools and Other Large Buildings.' "[135]

Ventilation

The Ontario Building Code's Section on Ventilation is substantially the same as the NBC 2010. Minor differences include the Ontario Building Code's explicit addition under 6.2.2.1. that "[l]*ive/work units* shall be mechanically ventilated."[136] Note that the NBC 2010 maintains the same requirement that mechanical ventilation is required except for:

- non-residential buildings (with occupant loads of not more than 40m² during normal use), industrial buildings (where the nature of the processes contained therein permits or requires the use of large openings of the building envelope even during the winter), and seasonal building not intended to be occupied during the winter; [137] and
- non-residential occupancies where climatic conditions permit and where engineering data demonstrates the required ventilation will be provided for the occupancy type. [138]

Soil Gas Control

As with the NBC 2010, the Ontario Building Code addresses Soil Gas Control under section 9.13.4. Ontario Building Code Subsection 9.13.4 is substantially the same as the same subsection in the NBC 2010 except for one important difference: the scope of application of Subsection 9.13.4 in the Ontario Building Code is limited to those areas "[w]here methane or radon gases or known to be a problem." In such areas, the Ontario Building Code requires construction to comply with the requirements for soil gas control in MMAH Supplementary Standard SB-9, "Requirements for Soil Gas Control".[139] The NBC 2010, on the other hand, recommends an application of the section to any:
a) wall, roof and floor assemblies separating *conditioned space* from the ground, and
b) the rough-in to allow the future protection of *conditioned space* that is separated from the ground by a wall, roof or floor assembly. [140]

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[135] *Ibid* at Sentence 6.2.1.1. (1).
[136] *Ibid* at Sentence 6.2.2.1 (1).
[137] *Supra* Note 2 at Part 6, Subsection 6.2.2, Sentence 6.2.2.2 (1) , p. 6-3.
[138] Ibid at Part 6, Subsection 6.2.2, Article 6.2.2.2 (2), p. 6-3.
[139] *Supra* Note 131 at Article 9.13.4.1.
[140] *Supra* Note 2 at Part 9, Articles 9.13.4.1 and 9.13.4.2.

Under Subsection 9.13.4.2., the Ontario Building Code requires "all wall, roof and floor assemblies in contact with the ground shall be constructed to resist the leakage of *soil* gas from the ground into the *building.*"[141] Note that unlike the NBC 2010, the Ontario Building Code requires construction that will "resist the leakage of soil gas" but does not specify that this protection must be done by way of an air barrier system. [142] This section of the Ontario Building Code provides a list of exclusions, which includes: garages and unenclosed portions of buildings; building in areas where it can be demonstrated the soil gas does not constitute a hazard; and building that contain a single dwelling unit and are constructed to provide for subfloor depressurization..." [143] Rather, the Ontario Building Code provides that a *soil* gas barrier is required "[w]here *soil* gas control is required."[144]

The Ontario Building Code also does not provide that dwelling units (and buildings containing residential occupancies) be provided with a rough-in for a radon extraction system, as does the NBC 2010. The NBC 2010 also provides for radon protective measures for non-residential occupancies in Subsection 9.13.4.2(3). [145]

Also not included in the Ontario Building Code is the NBC 2010's Subsection 9.13.4.3 (Providing for the Rough-in for a Subfloor Depressurization System) which requires that floors-on-ground "be provided with a rough-in for subfloor depressurization consisting of

a) a gas permeable layer, an inlet and an outlet as described in Sentence (2), or
b) clean granular materials and a pipe as described in Sentence (3)." [146]

Air Barrier Systems

Another new addition in the 2012 version of Ontario's Building Code is Section 9.14.5.2.(2)(b) which requires sump pit covers to be sealed to maintain the continuity of the air barrier system.[147] This is in line with the requirements provided in the NBC 2010.

Also added to the Ontario Building Code is the broader application of s. 9.25.1.1. Now, the Section on heat transfer, air leakage and condensation control is no longer limited to buildings of residential occupancy. [148]

Another notable exclusion from the Ontario Building Code is found in Subsection 9.25.3 (Air Barrier Systems). Subsection 9.25.3.1. (Required Barrier to Air Leakage) of the Ontario Building Code is identical to the NBC 2010 except for the reference to radon protection measures included in NBC 2010. Both Codes requires air barrier systems which provide a continuous barrier to air leakage between conditioned and unconditioned spaces. However, with respect to

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[141] *Supra* Note 131 at Sentence 9.13.4.2(1).
[142] *Supra* Note 2 at Part 9, Sentence 9.13.4.2 (1).
[143] *Supra* Note 131 at Sentences 9.13.4.2(2).
[144] *Ibid* at Sentences 9.13.4.2.(2) and (3).
[145] *Supra* Note 2 at Part 9, Sentences 9.13.4.2.(2) and (3).
[146] *Ibid* at Part 9, Subsection 9.13.4, Article 9.13.4.3 (Providing for the Rough-in for a Subfloor Depressurization System), pp. 9-82 – 9-83.
[147] Government of Ontario, Presentation: "Ontario's 2012 Building Code, Division B, Part 9 (Ontario Regulation 332/12), online: http://www.mah.gov.on.ca/Asset10222.aspx?method=1
[148] *Ibid.*

air leakage from the exterior inward, the Ontario Building Code only requires that the air barrier system provide a continuous barrier to air leakage "from the exterior inward sufficient to prevent moisture condensation on the room side during the heating season." The following two radon-protective outcomes included in the NBC 2010 are absent from the Ontario Code:

> ii) ensure comfortable conditions for the occupants, and
> iii) minimize the ingress of *soil* gas.[149]

Under 9.25.3.3. (Continuity of the Air Barrier System), the Ontario Building Code requires that "[w]here the *air barrier system* consists of an air-impermeable panel-type material, all joints shall be sealed to minimize air leakage" Note that the same Article in the NBC 2010 requires that joints "prevent air leakage."[150]

The Ontario Building Code allows for foundation walls, floor slab,[151] and vapour barriers[152] to be used as an air barrier.

The sections of the NBC 2010 on Air Leakage Control in Masonry walls,[153] and Air Barrier Systems in Floors-on-ground (with respect to the ingress of air through floors-on-ground and related best practices)[154] do not appear in the Ontario Building Code.

Depressurization

Also new in the 2012 Ontario Building Code are provisions within Sentence 9.32.3.8.(3). Soil gas must be considered when determining the need to provide protection against depressurization. [155] Make-up air is not required for a subfloor radon depressurization system.[156]

Prince Edward Island Building Code

In Prince Edward Island the authority over building and development and the related approvals process rests either with the Province or the municipality. The Prince Edward Island *Municipalities Act*[157] sets out a process by which areas may incorporate as municipalities. Roughly 30% of the province's population lives in 70% of the PEI land mass; an area which is not municipally incorporated. These unincorporated areas have no form of local governance in place, and the authority for building and development falls to the province. The same applies to municipalities with no official plan and zoning bylaws in place. In these areas, where the

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[149] *Supra* Note 131 at Article 9.25.3.1; National Research Council of Canada: Canadian Commission on Building and Fire Codes, "National Building Code of Canada 2010," 13th ed., Second Printing (including revisions and errata released Dec. 21 2012), ISBN: 0-660-19975-7, Volume 2, Part 9, Article 9.25.3.1.
[150] *Ibid* at Article 9.25.3.3; National Research Council of Canada: Canadian Commission on Building and Fire Codes, "National Building Code of Canada 2010," 13th ed., Second Printing (including revisions and errata released Dec. 21 2012), ISBN: 0-660-19975-7, Volume 2, Part 9, Article 9.25.3.3.
[151] *Ibid* at Article 9.25.3.3.(15).
[152] *Ibid* at Article 9.25.3.4.
[153] *Supra* Note 2 at Part 9, Article 9.25.3.4.
[154] *Ibid* at Part 9, Article 9.25.3.6.
[155] i Note 131 at Sentence 9.32.3.8 (1).
[156] *Ibid* at Sentence 9.32.3.8 (3). See also: Government of Ontario, Presentation: "Ontario's 2012 Building Code, Division B, Part 9 (Ontario Regulation 332/12), online: http://www.mah.gov.on.ca/Asset10222.aspx?method=1
[157] *Municipalities Act*, RSPEI 1988, c M-13

Province has the authority to issue building/development permits, land is governed by a general set of subdivision and development regulations.[158]

Under the *Provincial Building Code Act*[159] the Lieutenant Governor in Council may make regulations to regulate and control the use of buildings, the use of materials, equipment and appliances in the construction of buildings, and set standards of construction in the erection of buildings. These regulation-making powers permit the GIC to make regulations to: "declare a specified edition or printing of the National Building Code of Canada and any subsequent amendment, abridgment or revision to be in force in whole or in part with such revisions, revocations or modifications as may be specified in the regulations."[160] Likewise, under the *Planning Act*, the Lieutenant Governor in Council is authorized to, in areas other than those with official plans and bylaws, make provincial planning regulations with respect to building standards including the adoption of all or part of the National Building Code.[161] However, the Province has not done so under either Act and the National Building Code of Canada has not been adopted.

In areas where the Province is not the authority for issuing building/development permits, the jurisdiction to do so lies with the municipality. Some major municipalities in Prince Edward Island have adopted the National Building Code of Canada (these include: Summerside,[162] Charlottetown,[163] and Stratford,[164] all of which adopted the NBC in 2011).[165]

Note that in addition to the above, building construction provisions under s. 9 of the Nursing Home Regulations,[166] enacted under the *Community Care Facilities and Nursing Homes Act*,[167] requires that "[a]ll new construction, major or structural renovations or additions which are

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[158] See: Government of Prince Edward Island website, Department of Finance, Energy and Municipal Affairs, Municipal Affairs and Provincial Planning Branch, Map: "Prince Edward Island Municipal Boundaries": http://www.gov.pe.ca/photos/original/fma_municimap11.pdf. See also: Government of Prince Edward Island website, Finance, Energy, and Municipal Affairs Department, "Building": http://www.gov.pe.ca/finance/index.php3?number=13766&lang=E

[159] *Provincial Building Code Act*, RSPEI 1988, c P-24, online: http://canlii.ca/t/51vtn.

[160] *Ibid* at s. 2(1)(c).

[161] *Planning Act*, RSPEI 1988, c P-8, s. 8(1)(e), online: http://canlii.ca/t/51vtd

[162] Summerside's Building Code By-Law adopts the NBC 2010 and any amendments made thereto. City of Summerside, Building By-Law No. SS-09 (Rev. 2009) and Regulation SS-09-01, online: http://www.city.summerside.pe.ca/cache/files/11/Bylaws/SS-09_Rev_2009_and_Regulation_SS-09-01.pdf

[163] Charlottetown's Building Code By-Law adopts the NBC 2010 as well as its appendix notes (except for where modified by the By-Law) including all of the radon protective provisions. City of Charlottetown, Building Code By-Law, made pursuant to *Charlottetown Area Municipalities Act* and the *Planning Act* (amended/approved June 13, 2011), online: http://www.city.charlottetown.pe.ca/pdfs/bylaws/Building_Code_Bylaw.pdf

[164] Stratford's Building By-Law adopts the NBC 2010 and any amendments made thereto. Town of Stratford, By-Law No. 32, online: http://www.townofstratford.ca/town-hall/government/bylaws/by-laws/

[165] Government of Prince Edward Island website, Finance, Energy and Municipal Affairs Department, "Municipalities: http://www.gov.pe.ca/mapp/index.php?number=1040430&lang=E; Government of Prince Edward Island website, Finance, Energy, and Municipal Affairs Department, "Building": http://www.gov.pe.ca/finance/index.php3?number=13766&lang=E See also: Government of Canada website, "National Model Construction Code Documents": http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html

[166] Nursing Home Regulations, PEI Reg EC10/88.

[167] *Community Care Facilities and Nursing Homes Act*, RSPEI 1988, c C-13, online: http://canlii.ca/t/kt48.

commenced after these regulations come into effect shall comply with the specifications of the National Building Code...."[168]

Quebec Construction Code

Construction and renovations in Québec are subject to requirements laid out in the Quebec *Building Act,*[169] and the Construction Code,[170] and Safety Code. The purpose of the Quebec *Building Act* is "(1) to ensure proper quality of the construction work of buildings, and in certain cases, facilities intended for use by the public and (2) to ensure the safety of the public who have access to a building or facilities intended for use by the public." [171] The Act applies to all buildings used or intended to be used to shelter or receive persons, animals or goods; facilities intended for public use; and the vicinities of such buildings and facilities. [172] Under the Act, 'construction work' includes: foundation, erection, renovation, repair, maintenance, alteration and demolition work. [173] The Act provides for the professional qualification of contractors and owner-builders. [174]

The Act creates a Board, the Régie du bâtiment du Québec, whose mission it is to supervise the administration of the Act, particularly with a view to protecting the public. The Board's powers enable it to, among other things:

- enter a building to examine and make copies of the books, ledgers and files of the manager of a guaranty plan, of a contractor, of an owner-builder, or of the owner of a building, and require disclosure of any related document, and all information necessary for the application of the *Building Act*; [175]
- take samples for analysis; [176]
- require the submission of material, equipment, or an installation to a test, analysis or check so as to ensure it conforms to the *Building Act*;[177]
- make tests, take photographs or make recordings at a construction site or building; [178]
- install a measurement apparatus (or order that the contractor, owner-builder, or building owner) install one and provide the data gathered;[179]
- give a remedial notice in writing indicating to a person the defects noted by the Board and fix a time limit for compliance with Building Act and regulations. In such a notice the Board may, in addition, enjoin the person to take any suppletory measures it considers

[168] *Supra* Note 169 at s. 9(5).
[169] B*uilding Act*, CQLR c B-1.1, online: http://canlii.ca/t/525r1
[170] Construction Code, CQLR c B-1.1, r 2, online: http://canlii.ca/t/525tf.; National Research Council of Canada, Quebec Construction Code 2005, Chapter I, Building and National Building Code of Canada 2005, Second Printing, 2008, (Includes revisions and errata released on December 1, 2007, June 20, 2008 and November 30, 2012), ISBN 978-0-660-19837-8.
[171] B*uilding Act*, CQLR c B-1.1, s.1, online: http://canlii.ca/t/525r1
[172] *Ibid* at s.2.
[173]*Ibid* at s.9.
[174] *Ibid* at s.1.
[175] *Ibid* at s.112.
[176] *Ibid* at s.113.
[177] *Ibid* at s.114.
[178] *Ibid* at s.115.
[179] *Ibid* at s.116.

necessary in order that the building...be made safe for the persons living in it, frequenting it, using it or, as the case may be, having access to it; [180]

- issue an order enjoining compliance with this Act and fix a time limit for doing so, including any suppletory measures considered necessary in order that the building ... be made safe for the persons living in it, frequenting it, using it or, as the case may be, having access to it; [181]
- order that a building intended for public use be closed, evacuated or demolished if the Board believes there is danger to the safety and well-being of the public; [182]
- may move the Superior Court to issue an injunction compelling compliance (where a person against whom the Board has made an order refuses or neglects to comply). This can also be done by an 'interested party'. The court may order that work be carried out at the expense of the person it names or authorize the Board to perform the work at that person's expense. [183]

Under the Quebec *Building Act*, the Board can, by agreement, delegate certain powers and duties to a municipality.[184] A local municipality may codify measures different from those provided in a code or regulation adopted under the *Building Act* if the provisions of the code or regulation are shown not to be reasonably applicable. [185] However, a municipal council may not create by-laws which "set standards that are identical or equivalent to those of [the] Code or regulation or that restrict their scope or application." Standards that are identical to or more stringent than those of the Safety Code are permitted. [186]

Quebec's Construction Code and Safety Code

The *Building Act* requires the Board, the Régie du bâtiment du Québec, to adopt two Codes: a Construction Code and a Safety Code. Section 13 of the *Building Act* requires the establishment of a building code, which is intended to develop standards for construction work on buildings.[187] Section 31 of the *Building Act* requires the establishment of a safety code for the purpose of ensuring the safety of public buildings.[188] Owners (including managers and occupants) are required to comply with the Safety Code.[189] These two codes are adopted chapter by chapter and are progressively replacing the seven laws and thirty-odd regulations that were previously in effect.

Safety Code

Section 175 of the *Building Act* provides that the Board must create a Safety Code by regulation. The Act provides that the Code must contain safety standards for buildings and facilities

[180] *Ibid* at s.122.
[181] *Ibid* at s.123.
[182] *Ibid* at s.124.
[183] *Ibid* at s.125.
[184] *Ibid* at s. 132. These include powers and duties pursuant to ss.14-19, 21, 22, 24 to 27, 32 to 37.2 and 37.4 to 39 B*uilding Act*.
[185] *Ibid* at ss. 128, 138.
[186] *Ibid* at s. 193.
[187] *Ibid* at s.13.
[188] *Ibid* at CQLR c B-1.1, s.31.
[189] *Ibid* at ss. 31, 32.

intended for use by the public as well as standards for their maintenance, use, state of repair, operation and hygiene.[190]

Construction Code

The Construction Code[191] of Quebec, has been developed as a regulation under the *Building Act.* The Construction Code adopts the National Building Code 2005, and incorporates modifications made in Québec.[192] As the Regulation does not reproduce the entire Construction Code, but only lists the amendments made to the NBC 2005 by Quebec, the *Construction Code, Chapter I – Building* was published by the National Research Council of Canada and is available for purchase. It has been in force since November 7, 2000. Amendments to the NBC subsequent to 17 May 2008 take effect in Quebec 6 months following the month of publication of the amendments in French. [193] The NBC 2005 appears in Chapter I of the Construction Code. Chapter I of the Construction Code applies to all construction work that is performed on a building to which the *Building Act*. [194]

As noted above, the *Quebec Construction Code, Chapter I – Building and National Building Code 2005*, is intended to facilitate the application of the Construction Code adopted under the *Building Act*[195] throughout Quebec. [196] All references to the NBC in the Quebec Construction Code, Chapter I are to the 2005 version.[197] Note that while the version of the NBC adopted is the 2005 edition, which has fewer radon-specific protective provisions than the NBC 2010, the Quebec Construction Code has been amended in December 2007, June 2008, and August 30, 2012.

Amendments made by Quebec to the NBC 2005 are listed in the Regulation,[198] and can be found in in full in Division II of Volume 1 of the Construction Code, Chapter I. As the version of the NBC adopted in Quebec is the 2005 version, several of the radon protective provisions added to the NBC in 2012 are not mirrored in the Quebec Construction Code. Under Section 5.4. (Air Barrier Systems) the Quebec Construction Code does not adopt the NBC 2012 specific reference to controlling air leakage so as to minimize the ingress of airborne radon with the aim of controlling the indoor radon concentration to an acceptable level (See the NBC 2010, under Article 5.4.1.1. Required Resistance to Air Leakage). However, Article 5.4.1.2. addresses Air Barrier Systems, and while otherwise identical to the NBC 2010, its Appendix Note includes a comparable, though not legally binding, provision, that "[a]n air barrier system may be required

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[190] *Ibid* at ss.175, 32.
[191] Construction Code, CQLR c B-1.1, r 2, online: http://canlii.ca/t/525tf.
[192] For the status of the adoption of chapters of the Construction and Safety Codes please refer to the Government of Quebec website, "Laws, Regulations and Codes": https://www.rbq.gouv.qc.ca/en/laws-regulations-and-codes/construction-code-and-safety-code.html
[193] *Supra* Note 194 at s. 1.01.
[194] *Ibid* at s. 1.02.
[195] RSQ, c. B-1.1. Order in Council 293-2008, 19 March 2008, 2008, G.O. 2. 1435.
[196] National Research Council of Canada, Quebec Construction Code 2005, Chapter I, Building and National Building Code of Canada 2005, Second Printing, 2008, (Includes revisions and errata released on December 1, 2007, June 20, 2008 and November 30, 2012), ISBN 978-0-660-19837-8.
[197] *Ibid* at Division 1, s. 1.01.
[198] *Supra* Note 194 at s. 1.02.

in components and assemblies in contact with the ground to control the transfer of soil gases such as radon and methane."[199]

Similarly, the reference to radon protection[200] under Article 6.2.1.1 (Good Engineering Practice) that has been included in the 2012 update of the NBC 2010 does not appear in the Quebec Construction Code.[201] Likewise, the specific reference in the NBC 2010 to air barrier systems providing s continuous barrier to air leakage so as to minimize the ingress of soil gas does not appear under Subsection 9.25.3 of the Quebec Construction Code, but rather states that the required barrier to air leakage should be sufficient to "sufficient to prevent moisture condensation on the room side during winter and to ensure comfortable conditions for the occupants."[202]

Subsection 9.13.4 addresses soil gas control in both the NBC and the Quebec Construction Code, with notable differences. In geographic locations where it is recognized that *soil* gas presents a danger, the Quebec Construction Code requires wall, roof and floor assemblies in contact with the ground be constructed to resist the leakage of *soil* gas from the ground into a *building* (except for garages and unenclosed portions of *buildings).* Where soil gas control is required, a soil gas barrier must be installed and protection to prevent leakage shall consist of a membrane that can ensure *soil* gas control, and where the *building* contains a single *dwelling unit* only, a subfloor depressurization system.*[203]* Note that an Appendix Note specifies that a location may constitute a soil gas hazard "when it is situated in a zone identified by an authority having jurisdiction in a directive or report as a zone potentially having soil gas in concentrations that are likely to exceed the toxicity level prescribed by Health Canada." The Appendix Notes provides the Oka region as an example, which was formally identified in 1998 by the Public Health Department as a zone with potential soil gas concentrations exceeding the prescribed toxicity level.[204]

Additional soil gas control provisions not included in the NBC appear in the Quebec Construction Code under Section 9.13. These detail requirements for soil gas control in masonry walls, underground roofs, floors and provide that floors-on-ground must be sealed at their perimeter and all penetrations through the floor sealed against soil gas leakage.[205]

The Quebec Construction Code also requires that radon testing be conducted during construction, and if radon levels exceed the (former) Canadian Action Level[206] a subfloor depressurization system is required. A copy of the radon test results must be submitted to the home owner and the Authority Having Jurisdiction.[207] The provision for depressurization is

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[199] *Supra* Note 199 at Appendix Note, A-5.4.1.2.(1) and (2).
[200] EPA 625/R-92/016, "Radon Prevention in the Design and Construction of Schools and Other Large Buildings."
[201] *Supra* Note 199 at Article 6.2.1.1.
[202] *Ibid* at Article 9.25.3.1.
[203] *Ibid* at Article 9.13.4.1, Sentence 9.13.2.7(2).
[204] *Ibid* at Appendix Note, A-9.13.4.1.(1).
[205] *Ibid* at Articles 9.13.4.3, 9.13.4.4, 9.13.4.5, 9.13.4.7.
[206] The Canadian Action Level specified is 800 bq/,m3 as set in "HC H46-2/90-156E, Exposure Guidelines for Residential Indoor Air Quality".
[207] *Supra* Note 199 at Sentences 9.13.4.6. (6), (7), (8), (9). 6. Note that Article 9.13.4.6. provides for a subfloor depressurization system, and Sentence 9.13.4.6 (6) requires that radon testing be conducted according to EPA 402-R-93-003, "Protocols for Radon and Radon Decay Product Measurements in Homes," to determine the radon concentration in the *building,* including basement concentrations. Where the radon concentration exceed the

provided as an alternative to the installation of polyethylene below floor slabs. Using this option, a vent pipe for a subfloor depressurization system is installed but only connected if soil gas levels are found to be excessive.[208] The Appendix Note states that it is recommended that the building be re-tested for radon after completion of the depressurization system.[209]
The Appendix Notes provide detailed discussion on these requirements, and clarify that the action level referred to above is 800bq/m3. The Appendix Note to Section 9.13 of the Québec Construction Code discusses the rationale for radon gas control,[210] the Appendix Note to Article 9.13.2.1 states that dampproofing is required to protect "occupants against the effects of soil gas such as radon."[211] The Appendix Note also states that "floors-on-ground serving all types of occupancies other than garages must be constructed to reduce the potential for entry of radon or other soil gases. In most cases, this will be accomplished by placing 0.15 mm polyethylene under the floor."[212]

Saskatchewan Building Code

Saskatchewan has adopted the NBC, with few amendments, as the appropriate standard for construction, renovation, repair, use and occupancy of buildings throughout the province. The *Uniform Building and Accessibility Standards Act*[213] together with *The Fire Prevention Act, 1992* (the FPA) provide the legislative framework for application of minimum standards for new construction, renovation and the fire safe operation of buildings. *The Uniform Building and Accessibility Standards Act*[214] delegates the administration of minimum building standards to local authorities (municipalities and regional parks). The Ministry of Government Relations provides advice and reviews of building bylaws.[215]

In March 2013, Saskatchewan adopted regulations (The Uniform Building and Accessibility Standards Regulations) based on the 2010 NBC. [216] Section 3(1) of the Regulations adopts the NBC 2010, and provides that anyone required to comply with the *Uniform Building and Accessibility Standards Act* and regulations is required to comply with the NBC 2010. The Regulations provides that the application of the NBC is not retroactive in that building permits

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Canadian Action Level for radon in residential indoor air, as specified in HC H46-2/90-156E, "Exposure Guidelines for Residential Indoor Air Quality," a subfloor depressurization system must be installed to reduce the radon concentration to a level below the Canadian Action Level. A copy of the radon test results must be submitted to the Authority Having Jurisdiction. Note that the Appendix Note to Article 9.13.4.6. states that the radon "test should be of sufficient duration to provide a reasonable indication of the concentration;;" that the "minimum period for testing should be three months or as recommended by the authority having jurisdiction;" and that the "preferred testing location is centrally in the basement or the main floor for houses without basements."

[208] *Ibid*. See additional information in Appendix Note A-9.13.4.6. Soil Gas Control by Depressurization.

[209] *Ibid* at Appendix Note A-9.13.4.6. Soil Gas Control by Depressurization.

[210] *Ibid* at Appendix Note, A-9.13.4. Exclusion of Soil Gas

[211] *Ibid* at Appendix Note, A-9.13.2.1.(3) Required Dampproofing

[212] *Ibid* at Appendix Note, A-9.13.4.5.(1) and (2) Polyethylene Soil Gas Barriers under Slabs-on-Ground

[213] The *Uniform Building and Accessibility Standards Act*, SS 1983-84, c U-1.2

[214] *Ibid*. See also: Uniform Building and Accessibility Standards Regulations, RRS c U-1.2 Reg. 5, online: http://canlii.ca/t/52175.

[215] Government of Saskatchewan website, Building Standards and Licensing Branch, "Codes and Standards Program": http://www.gr.gov.sk.ca/Codes-and-Standards

[216] Government of Canada website, "National Model Construction Code Documents": http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html

are required to conform to the edition of the NBC that is in force on the day the permit issued.[217] These regulations address both basic as well as specific radon protection provisions found within the NBC 2010. The Saskatchewan-specific amendments to the NBC 2010 are found in the appendix to The Uniform Building and Accessibility Standards Regulations.[218] None of the Saskatchewan amendments address the issue of soil gas control. Saskatchewan has adopted those provisions of the NBC 2010 as published in the NBC, 2010 without modification.[219]

Yukon Building Code

The Yukon Territory adopts the most recent version of the NBC (as amended or replaced from time to time)[220] without modifications or additions, except for s 9.36 of the NBC which does not apply for any permits issued between April 1, 2014 – March 31, 2015. Section 9.36 applied for permits issued from April 1, 2013 – March 31, 2014, and will apply again as of April 1, 2015. [221]

The Yukon adopted regulations in April 2011 based on the NBC 2010. [222] Under the *Building Standards Act*[223] s. 2(1) states that [e]xcept as otherwise prescribed pursuant to this Act, the National Building Code is hereby adopted as the building code to apply throughout the Yukon as if enacted by the Legislative Assembly." [224]

For projects within the City of Whitehorse, the NBC applies unless municipal by-law requirements are more stringent. In Whitehorse, conformity with the NBC is overseen and enforced by the Building Inspections, Development Services, and in the rest of Yukon they are administered by the Building Safety Branch, Yukon Government. [225]

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[217] Uniform Building and Accessibility Standards Regulations, RRS c U-1.2 Reg 5, s. 3(1). online: http://canlii.ca/t/52175.
[218] *Ibid* at Appendix.
[219] Personal communication, Government of Saskatchewan, Building Standards and Licensing Branch, Ministry of Government Relations (June 26 2014).
[220] The 2012 NBC Revisions and Errata were fully implemented in the Yukon on April 1, 2013. Yukon Community Services – Building and Safety Standards Branch, "2012 Revisions & Errata to the 2010 Edition of the National Construction Codes", (January 25, 2013), online: http://www.community.gov.yk.ca/pdf/ncc_revision.pdf
[221] Personal Communication, Government of Yukon, Department of Community Services, Protective Services, Fire and Life Safety, Building Safety and Standards Branch (June 27, 2014).
[222] Government of Canada website, "National Model Construction Code Documents": http://www.nationalcodes.nrc.gc.ca/eng/code_adoption.html
[223] *Building Standards Act*, RSY 2002, c 19, online: http://canlii.ca/t/kfnq.
[224] *Ibid* at, s. 2(1).
[225] Yukon Community Services – Building and Safety Standards Branch, "2012 Revisions & Errata to the 2010 Edition of the National Construction Codes", (January 25, 2013), online: http://www.community.gov.yk.ca/pdf/ncc_revision.pdf

Appendix 3: Two case studies of the applicability and scope of radon protection in legislation and under the common law.

Case Study #1

A public health official has professional knowledge of the radon test result of a particular home. The indoor radon level is above the Government of Canada Radon Guideline reference level of 200 Bq/m^3. The public health official happens to live near the house and is aware that it has been listed for sale. Does the public health official have a duty to prospective buyers to inform them? Where does the professional duty start and stop?

The duty to disclose radon test results to prospective purchasers in a third party real estate transaction (in which the public health official has no financial interest) rests with the building owner/seller. While public health legislation, freedom of information legislation and the common law may require public disclosure of information relating to radon test results, such disclosure in the case of the sale of this private home is beyond the scope of a public health officer's statutory duties.

The participation of building owners in radon testing programs is voluntary. If tests indicate a high radon level, the decision to remediate is also at the discretion of the building owner. The duty to advise prospective purchasers of any actual knowledge about indoor radon in the building, also rests with the building owner/seller.

Duties of the Seller

If a seller of real property has knowledge that there is, or has been in the past, high levels of indoor radon they are required to disclose that information to prospective purchasers. The same disclosure requirement applies to situations where a seller of real property has not tested for radon but is provided with information indicating that radon levels may be high. Failure to disclose knowledge of the presence, or potential presence, of radon by the seller may constitute a statutory or common law breach of an implied warranty (if the seller had actual knowledge of the presence of radon gas). Or, it may amount to fraudulent misrepresentation (if the seller made the false statement with the intent to deceive) or negligent misrepresentation (if the seller was under a duty to the plaintiff to exercise reasonable care and the buyer was expected to rely on the information provided).

Duties of the Public Health Authority

Depending on the statutory language and the specifics of the case, there is generally no requirement, under public health legislation, for a public health officer to convey knowledge obtained in their professional capacity to parties to a real estate transaction, including knowledge of historical radon levels in a building, to prospective purchasers. So doing would likely be well beyond the scope of legislated public health duties.

The duties of public health authorities are laid out in provincial/territorial legislation and regulations. Duties and powers often cover the delivery of public education, collection of data, and inspection and enforcement with respect to hazards to public health, among others. Some public health units have undertaken pilot radon testing programs, in which a sample of residential, public and/or workplace buildings are tested for radon.

In possessing public interest statutory powers and functions, on which the public rely for the protection of their health, public authorities (such as a local public health unit) stand in a special relation to the public and are not analogous to private individuals. However, a public authority is not liable under the law of negligence where conduct that results in harm is a policy decision, but may be liable if harm arises from the *operation* of the policy. To establish a duty of care in negligence against a public authority there must be *proximity* between the defendant government and injured plaintiff. This proximity is determined according to the legislative intent of the governing statute which specifies the statutory duties. The statute must include the intent to create a private law duty of care in favour of the persons in the position of the plaintiffs. Public health statutes do not intend to impose private law duties of care on civil servants acting in their private capacity.

The law of negligence in Canada distinguishes between acts and omissions (misfeasance and nonfeasance). The common law does not, as a general rule, impose positive duties on otherwise legal strangers. Provided the public health official did not: create or have control of the risk to which others have been invited; did not stand in a relationship of supervision and control; and did not cause anyone to reasonably rely on them to take precautions to reduce the risk, he/she is not likely to be subject to an action under the law of negligence.

Whether or not an action would succeed against a government official depends on the governing statute and the specifics of the case.

The above is not legal advice. For a case-specific legal opinion please seek independent legal advice.

Case Study #2

> **A public health unit has instituted a pilot program to test for indoor radon levels at child care centres within the health unit. Does the public health unit have a duty to inform users of the building (i.e., the parents of the children) with notice of the radon testing program and test results?**

Child care centres operate in many different contexts, locations, and under different governance structures. Some are government-funded, others are private, some operate within government-owned buildings, including schools, and often within rented space.

Recognizing that most public health units would probably notify parents about radon testing as a matter of courtesy and open dialogue, the duty to disclose information or warn, in the context of public health powers to implement programs, is not well defined in legislation or case law.

Generally, public health authorities in provinces/territories that have enacted freedom of information legislation may have a duty to disclose information that is in the public interest, and this may extend to radon testing and test results in private or public buildings. Other provincial/territorial legislation may also impose disclosure requirements on building owners. Additionally, depending on the nature and purpose of the radon testing program, public health authorities may be required, under the law of negligence, to provide public notices of the presence of high levels of indoor radon.

At present, case law does not provide much guidance, and interpretations of the legal responsibilities (regarding inspection, enforcement and what standard to apply) vary significantly, and action within and across provinces/territories is not uniform

In what follows, a general answer to the above question is provided and does not constitute legal advice. For a case-specific legal opinion please seek independent legal advice.

Duties of Public Health Officials

The statutory requirements of public health officials are laid out in provincial/territorial legislation. The responsibility to test for, and remediate indoor radon, rests with building owners. Radon testing programs undertaken by public health units require the consent of the owners/managers of buildings. When private building owners agree to participate in a radon testing program, the conditions of the testing, remediation, and disclosure of test results can be negotiated. At present, there is no legislation in Canada explicitly requiring that public buildings, or government service providers, engage in periodic radon testing or disclose radon test results.[1]

Radon testing programs could fall under one of the several public health powers enumerated within the governing legislation. While public health officials are not required by public health legislation to provide public notice of radon test results taken in private buildings, other provincial/territorial legislation may impose such duties (more on this below). As well, public health powers under health hazard enforcement often do require that public notices be made.

Provincial/territorial freedom of information legislation imposes legal duties on the government to disclose information that is "in the public interest". However, many such statutes which require this disclosure (whether or not a request for disclosure is made) stipulate that the information is to be disclosed if it also poses a "grave" [2] or "significant" [3] environmental, health or safety hazard to the public. Depending on the legislative language, it may be necessary that the public interest in disclosure be found to clearly outweigh the invasion of third party privacy that could result from the disclosure.[4]

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[1] Note that some U.S. states have passed legislation which makes the testing for radon in licensed childcare facilities mandatory, and requires the posting of public notices to inform building users of radon test results. Such explicit provisions are not provided in any piece of public health legislation in Canada. See: for example, New Jersey Department of Environmental Protection, Radon Program, "Testing for Radon in Child Care Centres" DEP Guidance Document", online: http://www.njradon.org/school/scldown/dc_guide.pdf

[2] *Freedom of Information and Protection of Privacy Act*, R.S.O 1990, c. F-31, s. 11.

[3] *Freedom of Information and Protection of Privacy Act* [RSBC 1996], c. 165, s. 25.

[4] *Freedom of Information and Protection of Privacy Act*, SS, c. F-22.01, s. 19(3).

For provinces/territories with freedom of information legislation in place, public health units, or other government agencies with knowledge of the presence of high indoor radon levels, may be under a legal duty to disclose this information in order to protect the public interest; this may be the case even where there is not building owner consent for the release of information. To date, the courts have not considered whether public health officials are required to provide public notice of radon test results taken in the course of a radon testing program.

The government may also be subject to liability in tort for failure to disclose information on the presence of high levels of indoor radon. If harm results from exposure to indoor radon, common law theories of liability may be applicable, such as negligence.

A main hurdle in a negligence action against the Crown is to establish the existence of a *prima facie* duty of care. Generally, the traditional tort law duty of care applies equally to a government agency as it does to a private individual. To establish a duty of care in negligence against a public authority there must be *proximity* between the defendant government and injured plaintiff, and this is determined according to the legislative intent of the governing statute which specifies the statutory duties.

The courts willingness to impose liability on the government varies depending on the extent to which the limits of liability are discernable (for instance where there is a single plaintiff injured by a particular act of government negligence versus where a large segment of the population could allege the same injury). Public authorities may be found liable in negligence where the government agency or official fails to take preventative steps where they knew or ought to have known harm would result. Although health legislation imposes statutory duties on public authorities to safeguard the public, a general public law duty does not necessarily give rise to a private law duty sufficient to ground an action in negligence. What must be found in the statute is the intent to create a private law duty of care in favour of the persons in the position of the plaintiffs. [5] If a duty of care is found to exist, it must next be determined if there is an exemption from this imposition of duty that may occur as a result of an explicit statutory exemption or as a result of the nature of the decision (i.e., pure policy. decisions). If it is found that a duty of care is owed by the government and no exemption exists, the issue of standard of care required of the government must next be considered.

Liability under the law of negligence for failing the legal duty to warn (if public notices of radon levels are not provided) will largely depend on the degree of risk and whether a decision by a

[5] *Eliopoulos v. Ontario* involved a claim by the estate of a man who had died as a result of complications from treatment of West Nile Virus. In considering whether proximity could be made out on the basis of a statutory duty on the province to safeguard the health of its residents, the Ontario Court of Appeal referred to the governing legislation, the *Health Protection and Promotion Act*, and held no private law duty of care was triggered in connection with the implementation or failed implementation of a plan to prevent the spread of a virus. The Court relied on the statute, finding that the powers it establishes are discretionary in nature and not capable of creating a private law duty. See: *Eliopoulos v. Ontario*, CanLII 37121 (ON CA), (2006), 82 O.R. (3d) 321 (C.A.), leave to appeal refused, [2006] S.C.C.A. No. 514). For analysis on the government's duties to the public, in relation to that which occurs naturally, see also: *ooper v. Hobart*, 2001 SCC 79 (CanLII), [2001] 3 S.C.R. 537; *Edwards v. Law Society of Upper Canada*, [2001] 3 SCR 562, 2001 SCC 80*; Doe v. Metropolitan Toronto (Municipality) Commissioners of Police* 1998 CanLII 14826 (ON SC), (1998), 39 O.R. (3d) 487 (Gen. Div.).

public authority can be better captured as a policy or operational decision. If the latter, consideration may be given to whether provision of public warnings should have been part of the program. The distinguishing line between policy and operational decisions is not always very clear. Policy decisions usually relate to high level economic and social decisions and are exempt from interference by the courts, while operational decisions usually involve the day-to-day activities/decisions of government in the implementation of a policy decision. The decision to establish a radon testing pilot project would be a policy decision, and the decision not to establish such a pilot program would not be reviewable by the courts. The nature of a radon testing program, and its day-to-day handling, would likely be an operational decision and is reviewable by the courts.[6] Once a decision to implement such a radon testing program has been made, the court may review the scheme of the program to ensure it is reasonable and has been reasonably carried out in light of all the circumstances, including the availability of funds, to determine whether the government agency has met the requisite standard of care.

It is important to note that public health legislation does not require periodic radon testing or a system of inspections. The powers at issue here (regarding whether provision of public notices/warnings should be part of a radon testing program implemented by a public health unit) are separate from the legislated public health powers to inspect or investigate health hazards. At issue is the policy decision by certain health units to gather data on radon risk through the implementation of a radon testing program. While a government agency cannot be held to be negligent because it formulated one policy of operation rather than another, the manner and quality of a radon testing program is clearly an operational aspect of governmental activity and the requisite standard of care to be applied to the particular operation must be assessed in light of all the surrounding circumstances. Determining the standard of care, and whether any radon testing program requires public notice of collected data be disclosed depends to some degree on the underlying rationale for the policy.

The courts have declined to find a duty of care where federal bodies engaged in promoting safe building construction failed to pass on information or failed to warn about geographic-specificity of certain building designs.[7] The courts have been more willing to impose a duty of care where the government defendant had responsibility for the creation of the risk.[8]

If it is logistically difficult for public health to provide notice to building users of the radon test results, or if it is not justified under the governing provincial/territorial legislation, public health units could advise the owners/managers of buildings to post notices of the testing program as

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[6] *Just v. British Columbia*, [1989] 2 S.C.R. 1228.

[7] In *McMillan v. Canada Mortgage and Housing Corporation*, an action was brought against the Canada Mortgage & Housing Corp. for alleged negligence in failing to warn, and stop construction, of residential dwellings in BC that it knew had a fundamental design flaw. The court held no duty of care was owed by the federal body CMHC to a private homeowner as there was no statutory obligation (i.e., nothing in the *CMHC Act* or the *Housing Act*) to suggest a duty of the federal body to protect against poor design choices, or to prevent construction of residences. The court found the plaintiffs' action was based upon the defendant's failure to act, and that the statutes do not suggest that the defendant has a special relationship to the plaintiffs or a material role in the creation or management of the risk in question. See: *McMillan v. Canada Mortgage and Housing Corporation*, 2007 BCSC 1475 (CanLII), online: http://canlii.ca/t/1t33q .

[8] For an analysis of the courts' treatment of such cases, see: Jane Matthews Glenn, "Government Wrongs": Civil Liability for GMO Regulation in Canada" (2008) 18 J. Env. L. & Prac. 169.

well as test results, when obtained, within the building and to provide these notices to building users.

Duties of the Building Owner/Manager

Failure to notify building users of high indoor radon levels, or remediate any known, radon-related risk, building owner(s)/manager(s) could be found liable under various provincial/territorial statutes or the common law.

All building owners are liable under provincial/territorial, occupier's liability legislation, or the common law where legislation hasn't been enacted, which imposes a duty of care on the occupier of property (i.e., the person with physical control of, or control over the conditions 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, and establishes the duty as one to take reasonable care in the circumstances 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.

Depending on the type of building, the building owner, the child care provider, and the child care location, additional legal duties may be imposed. For example, school boards,[9] landlords, and employers have specific duties laid out in provincial/territorial legislation with respect to ensuring a healthy and safe environment and protecting students, tenants and employees, respectively, from hazards. Depending on the governing legislation and regulations, there may be general duties relating to health and safety, or specific duties with respect to ensuring adequate indoor air quality or minimum ventilation.

Please note that the above is not legal advice. For a case-specific legal opinion please seek independent legal advice.

[9] Although some child care centres are operated within schools, the legislation governing schools which imposes duties on school boards to ensure pupil safety does not, generally, extend to user of the schools broadly but is limited to registered students. As such, this legislation would not extend duties to registrants at child care centres.