BRITISH COLUMBIA
LUNG ASSOCIATION

RADON: Commercial Buildings and BC Law

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Healthy Indoor Environments. Legal Brief No. 1

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Executive Summary

Radon gas is a naturally occurring radioactive gas, emanating from the ground and often entering and remaining in buildings. When inhaled, alpha radiation from radon and its decay products can damage the lung tissue cells and DNA. Radon is the leading cause of lung cancer after smoking. Canada has a Radon Guideline of 200 $Bq/m^{3.}$ and it is easy to test for high radon and have the problem fixed by professional radon mitigators. While still widely unrecognized as a problem by the general public, there is growing momentum to address radon in British Columbia, from changes to the BC Building Code, to efforts by Interior Health to regulate radon in daycares, to new guidance from the Real Estate Council of British Columbia to consider radon a latent defect.

This report sets out current law in BC as it relates to commercial buildings. We argue that operators of commercial buildings will need to address radon. While radon is not *specifically* addressed in applicable legislation, there are broad provisions to consider around health and safety. This includes general obligations to exercise duty of care under Occupiers Liability legislation, and general duties around health and safety and radiation exposure in the *Occupational Health and Safety Regulation.* Provisions in the BC Building Code, 2018 also point to radon being addressed in new construction. Newer commercial buildings should be designed and built with radon in mind, and existing buildings will need to be tested, and mitigated if levels are over the Canada Radon Guideline.

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About our program. The BC Lung Association's Healthy Indoor Environments program is focused on providing education, resources, and policy options for addressing priority indoor air pollutants in British Columbia. Canadians spend 90% of their day indoors, with about 70% at home and 20% at work or school. The air we breathe indoors can contain particulates, gases, allergens and fumes that can significantly affect our health in both the short and long term. Knowing the main indoor air pollutants, their sources, and how to reduce them are key to reducing harm to our health. Radon has been identified as the leading environmental carcinogen in Canada. For more information visit our website at https://bc.lung.ca/programs-initiatives/healthy-indoor-environments-program

1. What is Radon?

Radon gas is a naturally occurring radioactive gas, emanating from the ground and often entering and accumulating in buildings. When inhaled, alpha radiation from radon and its decay products can damage the lung tissue cells and DNA, leading to the development of lung cancer. Radon exposure is the leading cause of lung cancer in non-smokers, and accounts for an estimated 16% of lung cancer deaths in Canada.[1] Health Canada has set a Radon Guideline of 200 Bq/m.[3] An estimated 7% of homes in Canada have radon levels above this Guideline but there is considerably regional variation. Some health service delivery areas studied, such as Kootenay-Boundary, and Okanagan have much higher rates of elevated radon, with 29.3% and 19% respectively of homes tested being over the Guideline.[2] As radon can be a problem in any building, many workplaces can also have radon problems. One estimate put 188,000 Canadians as occupationally exposed, with schools, public administration and financial institutions as leading industries where this is a problem.[3] The Canadian government found radon levels over 200 Bq/m^3 in 3.6 % of its buildings.

Knowledge of radon remains low and few homeowners or businesses have taken steps to address it.[4] Despite federal government action, radon has been largely under the radar of British Columbia policy, legislation and regulation. In the last decade this has been slowly changing, with recent steps including:

- Changes to the BC Building Code (as described below)
- Testing of government buildings through Shared Services BC [5]
- Efforts by the Interior Health Authority to require radon testing as part of day-care licensing [6]

[1] Chen, J., Moir, D. and Whyte, J., 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), pp.9-13.
[2] Health Canada, 2012 Cross Canada Survey of Radon Concentrations in Homes, Final Report. available at . https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/cross-canada-survey-radon-concentrations-homes-final-report-health-canada-2012.html accessed January 20, 2020.
[3] CAREX Canada, 2021. Radon: Occupational Exposures. Available at https://www.carexcanada.ca/profile/radon-occupational-exposures/ accessed March 30, 2021
[4] Statistics Canada. Table 38-10-0086-01 Knowledge of radon and testing DOI: https://doi.org/10.25318/3810008601-eng
[5] BC Government, 2021. Radon Testing and Mitigation. https://www2.gov.bc.ca/gov/content/careers-myhr/managers-supervisors/occupational-health-safety/radon-testing-mitigation
[6] Interior Health, 2017. News and Resources from Licensing – May 2017. Available at https://www.interiorhealth.ca/YourEnvironment/ChildCareFacilities/LicenseeResources/Documents/May%20News%202017.pdf accessed March 25, 2021

- New guidance in 2020 from the British Columbia Real Estate Association and Real Estate Council of British Columbia for real estate agents and property managers to treat radon as a latent defect[7]

There remain many areas of where radon requirements are not explicitly specified but implicit in health and safety provisions. Commercial property owners and managers need to consider radon.

2. How It Can Be Fixed

First there is a need for testing using inexpensive, three month Do-It-Yourself monitors available from online retailers, including the British Columbia Lung Association.[8] There are also professional radon testers certified through the Canadian National Radon Proficiency Program ("C-NRPP")[9]. Radon levels vary by region, and in areas known to have high radon it is more likely that buildings will have a problem. The federal government's *Cross Canada Survey of Radon Concentrations in Homes* (2012) indicated that the following Health Service Areas have higher radon levels, with over 10% or more of homes having radon above Canada's Radon Guideline: East Kootenay, Kootenay-Boundary, Okanagan, Northern Interior, Northeast.[10] Knowledge of local radon levels are constantly being updated with new surveys and as more buildings are tested and reports shared.

If elevated levels are found, professional mitigators (again certified through C-NRPP) can install systems to ensure building air pressures does not draw radon in, and that any radon is vented out of a building. Health Canada has released guides to testing radon in public buildings[11] and there are widely accepted standards for how to reduce radon.[12]

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[7] Devji, S. 2020 Property Disclosure Statement Revised and Released Alongside New Online Course. British Columbia Real Estate Association, April 27, 2020. Available at https://www.bcrea.bc.ca/standard-forms/property-disclosure-statement-revised-and-released-alongside-new-online-course/; Real Estate Council of British Columbia, 2020. Radon Regulatory Standards Information. Available at https://www.recbc.ca/professionals/knowledge-base/articles/radon-precautions-regulatory-standards-information accessed March 30, 2021

[8] British Columbia Lung Association 2021. Buy a Home Radon Test Kit. Available at https://bc.lung.ca/programs-initiatives/buy-home-radon-test-kit accessed March 30, 2021.

[9] See https://c-nrpp.ca

[10] Health Canada, 2012. Cross Canada Survey of Radon Concentrations in Homes. Available at https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/cross-canada-survey-radon-concentrations-homes-final-report-health-canada-2012.html accessed March 30, 2021

[11] Health Canada, 2016. Guide for Radon Measurements in Public Buildings (Workplaces, Schools, Day Cares, Hospitals, Care Facilities, Correctional Centres).available at https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/guide-radon-measurements-public-buildings-schools-hospitals-care-facilities-detention-centres.html accessed Dec. 1 2020.

[12] Health Canada, 2010. Reducing Radon Levels in Existing Homes: A Canadian Guide for Professional Contractors. available at https://carst.ca/resources/Documents/Reducing%20Radon%20Levels%20in%20Existing%20Homes%20A%20Canadian%20Guide%20for%20Professional%20Contractors-E.pdf accessed March 30, 2021
Canadian General Standards Board, 2017. Radon mitigation options for existing low-rise residential buildings. CAN/CGSB-149.12-2017. available at https://carst.ca/resources/Documents/P29-149-012-2017-eng.pdf accessed March 30, 2021; Canadian General Standards Board, 2019. Radon control options for new construction in low-rise residential buildings. CAN/CGSB-149.11-2019. available at http://publications.gc.ca/collections/collection_2019/ongc-cgsb/P29-149-011-2019-eng.pdf accessed March 30, 2021. Environmental Protection Agency, USA, 1994. Radon Prevention in the Design and Construction of Schools and Other Large Buildings. EPA625 R-92/016, available at https://www.wbdg.org/ffc/epa/criteria/epa-625-r-92-016 accessed Dec. 1, 2020.Note that professional mitigators will likely design site specific systems for commercial buildings and schools that slighly differ from standards designed for residential buildings.

Radon concentrations can almost always be reduced to levels well below the Government of Canada Radon Guideline. Some options can easily be built in at the time of construction while others are more appropriate for mitigating existing buildings. Techniques include:

- ***Barriers:*** Radon resistant construction typically involves soil gas barriers— a thin membrane between the slab and the ground below that stops radon from entering. It is also important to minimize any gaps or cracks in the foundation that can let radon in.
- ***Sub-slab depressurization***. This involves a hole in the foundation connected to a vent pipe runs upwards through the inside of the building and vents to the outside, usually at the roofline. The addition of a fan may be necessary to ensure the flow of air through the system, and that any radon that accumulates below the slab is cleared away. This is the preferred option found in leading technical documents such as Health Canada's 2010 *Reducing Radon Levels in Existing Homes: A Canadian Guide for Professional Contractors* [13] and the Canadian General Standard Board's 2019 *"Radon control options for new construction in low-rise residential buildings".*
- ***Dilution through ventilation.*** Radon concentrations can be diluted through increasing ventilation—typically in larger buildings-- by increasing use of the heating, ventilation, and air conditioning system.

For commercial buildings, professional mitigators will investigate and make calculations for the most efficient and effective approaches. [14]

3. Commercial Buildings and the BC Building Code

The BC Building Code 2018 now has mandatory provisions for "Part 9" buildings—low-rise residential buildings. The Code provisions apply in listed municipalities.[15] The Code calls for a 'rough in'—an incomplete system that can later be updated if testing shows it is necessary. It comprises the first stages of a sub-slab depressurization system (a membrane, hole in slab, and outside venting pipe) which can easily be converted to a full system through adding a fan.[16]

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[13]Health Canada, 2010. Reducing Radon Levels in Existing Homes: A Canadian Guide for Professional Contractors. available at https://carst.ca/resources/Documents/Reducing%20Radon%20Levels%20in%20Existing%20Homes%20A%20Canadian%20Guide%20for%20Professional%20Contractors-E.pdf accessed March 30, 2021

[14] Khan, S. M., Gomes, J., & Krewski, D. R. (2019). Radon interventions around the globe: A systematic review. Heliyon, 5(5), e01737. https://doi.org/10.1016/j.heliyon.2019.e01737 available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6538966/

[15] See BC Building Code, 2018. Division B Appendix C Climatic and Seismic Information for Building Design in British Columbia. Table C-4 -Locations in British Columbia Requiring Radon Rough-Ins. Listed municipalities include 100 Mile House, Abbotsford, Ashcroft, Atlin, Barriere, Burns Lake, Cache Creek, Castlegar, Carmi, Chetwynd, Clearwater, Cranbrook, Crescent Valley, Dawson Creek, Dease Lake, Dog Creek, Duncan, Elko, Fernie, Fort Nelson, Fort St. John, Genelle, Glacier, Golden, Grand Forks, Greenwood, Hope, Invermere, Kamloops, Kaslo, Kelowna, Kimberley, Lillooet, Little Fort, Lytton, Mackenzie, McBride, McLeod Lake, Merritt, Montrose, Nakusp, Nelson, Osoyoos, Penticton, Prince George, Princeton, Quesnel, Revelstoke, Rossland, Salmon Arm, Sechelt, Smith River, Smithers, Stewart, Taylor, Terrace, Trail, Valemont, Vaverby, Vernon, Whistler and Williams Lake.

[16] BC Building Code, 2018, s. 9.1.3.4 available at https://www.bcpublications.ca/BCPublications/ accessed December 1, 2020.

There is, however, language which indicates that radon should be attended to in all buildings. All buildings should have "Air Barrier Systems" that prevent radon (and other gases such as methane) from entering from below the building.[17] Notes to the relevant sections refer to Health Canada radon guides and to the US Environmental Protection Agency's *Radon Prevention in the Design and Construction of Schools and Other Large Buildings*.[18] As well, heating, ventilation, and air-conditioning systems, including mechanical refrigeration equipment, shall be designed, constructed and installed in conformance with good engineering practice. Here, there is also specific reference to the US EPA *Radon Prevention in In the Design and Construction of Schools and Other Large Buildings*.[19] In the notes to this section, there is particular mention of radon control. The Building Code states that "measures may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada". The Building Code refers the reader to publications on radon by Health Canada and the US EPA.[20]

4. Occupiers Liability

Under principles of occupiers' liability, a plaintiff can seek relief in the courts if a hazard causes the plaintiff to suffer losses.[21] This suggests the possibility for substantial damages awards where plaintiffs can show on the balance of probabilities that their sickness or loss of employment income is attributable to radon exposure. The common law established general obligations of an "occupier"— a person in control of premises— to exert a duty of care. Liability could attach to an occupier if a plaintiff could show: (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.[22] Now, provincial legislation—the *Occupiers Liability Act* now sets up a statutory duty of care.[23]

We did not find any cases where occupiers' liability law has been used for lung cancer victims exposed to radon. However, a variety of factors suggest high radon concentrations could give rise to a successful claim.

(a) In British Columbia cases have considered, inter alia: failure to install smoke alarms in residential premises,[24]slip and fall due to the absence of a handrail on steep

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[17] BC Building Code, 2018, s. 5.4.1.
[18] (see BC Building Code, 2018. Notes to Part 5 A-5.4.1.1. Resistance to Air Leakage, referencing EPA625 R-92/016, "Radon Prevention in the Design and Construction of Schools and Other Large Buildings.").
[19] BC Building Code, 2018 s 6.2.1.5.
[20] BC Building Code, 2018, Notes to Part 6,A-6.2.1.1. Good Engineering Practice).....Radon Control.
[21] MacLeod v. Yong, [1997] B.C.J. No. 2108 (S.C.), aff'd 1999 BCCA 249 (CanLII), 67 B.C.L.R. (3d) 355.
[22] Sythes and Co. Ltd. v. Gibsons Ltd., 1927 CanLII 41 (SCC), [1927] 2 D.L.R. 834 (S.C.C.). MacLeod v. Yong, 1999 BCCA 249 (CanLII), 67 B.C.L.R. (3d) 355.
[23] Rendall v. Ewart (1989), 1989 CanLII 232 (BC CA), 38 B.C.L.R. (2d) 1 (C.A.).
[24] Bueckert v. Mattison (1996), 1996 CanLII 6701 (SK QB); Daniels v. McKelvery, 2010 MBQB 18 (CanLII), Leslie v. S & B Apartment Holding Ltd., 2011 NSSC 48 (CanLII).

stairs;[25]snow and icing conditions;[26] a faulty balcony railing which gave way leading to a three story plummet;[27] an unlit and unguarded basement stairwell at the back of the residence at night resulting in the loss of vision in one eye;[28] insufficient locks leading to a sexual assault;[29] theft of goods;[30] an unsecured planter that ultimately fell and hurt a small child,[31] and a cracked sidewalk causing a broken ankle.[32] Across Canada there are also a number of specific cases that consider environmental health problems, including: faulty renovation procedures leading to release of heavy metals,[33]use of chemical defoliants creating toxic areas of a military base,[34] and mouldy housing affecting an Indigenous community.[35]

(b) The test of reasonable foreseeability means that occupiers cannot hide behind ignorance of radon. There are positive obligations on occupiers to inspect as part of taking reasonable steps to ensure premises are safe.[36]

(c) The courts will consider whether an occupier has been provided with an indication as to potential risks of harm.[37] While radon levels will be hidden to visitors it is not hard for those in control of buildings to conduct testing and mitigate.

(d) Courts impose an objective standard distinct from customary practices or existing building codes.[38] The fact that many buildings do not yet address radon will not be a defence.

Plaintiffs will likely face significant challenges. Radon-induced cancer has a long latency period, and it may be difficult for indoor radon exposure stand out from other factors, such as genetics, smoking, diet, age, and other chemical exposures.[39] Plaintiffs may also face difficulties in tracing their exposure back to a particular building. All the same, managers of commercial spaces can take steps to reduce liability through testing, posting test results, and mitigating using C-NRPP certified professional mitigators.

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[25] McLeod v. Yong, 1999 BCCA 249 (CanLII).
[26] Hunter v. Anderson, 2010 BCSC 1037.
[27] Jack v. Tekavec, 2010 BCSC 1773.
[28] Zavaglia v. MAQ Holdings Ltd. (1986), 1986 CanLII 919 (BC CA) 6 B.C.L.R. (2d) 286 (C.A.
[29] Q et al. v. Minto Management Ltd. et al., 1985 CanLII 2103 (ONSC) upheld (1986), 1986 CanLII 2518 (ON CA), 57 O.R. (2d) 781
[30] Robertson v. Stang, 1997 CanLII 2122 (BC SC); Coueslan v. Public Storage Canadian, 2000 BCPC 137.
[31] Klajch v. Jongeneel et al., 2001 BCSC 259, affirmed (on this point) Klajch (Guardian ad litem of) v. Jongeneel, 2002 BCCA 1.
[32] Kiceluk v. Oliverio, 2001 ABQB 704.
[33] MacIntyre v. Cape Breton District Health Authority, 2009 NSSC 202 (court finding breach of duty of care but not causation); affirmed MacIntyre v. Cape Breton District Health Authority, 2011 NSCA 3.
[34] R. v. Brooks, 2009 SKQB 509 duty of care found (at para 102) but certification falters on basis of lack of common class, affirmed R. v. Brooks, 2010 SKCA 55
[35] Grant v. Canada (Attorney General), 2009 CanLII 68179, class proceeding certification, duty of care under Occupier's Liability prima facie established at para 107.
[36] Waldick et al. v. Malcolm et al., 1987 CanLII 4303 (ON SC) aff'd Waldick v. Malcolm, 1991 CanLII 71 (SCC), [1991] 2 S.C.R. 456.
[37] Zavaglia v. MAQ Holdings Ltd. (1986), 1986 CanLII 919 (BC CA), 6 B.C.L.R. (2d) 286 (C.A.) Klajch (Guardian ad litem of) v. Jongeneel, 2002 BCCA 14 (CanLII), 174 B.C.A.C. 184, Tolea v. Ialungo, 2008 BCSC 395.
[38] Waldick v. Malcolm, 1991 CanLII 71 (SCC), [1991] 2 S.C.R. 456 at p. 474.
[39] Dearing, D. "Radon Litigation: An Overview of Homeowners' Potential Causes of Action", 20 Cumb. L. Rev. 825 1989-1990, p. 837-38; Cross, F., and Murray, P. 1988., Liability for Toxic Radon Gas in Residential Home Sales, 66 N.C. L. Rev. 687; Prussman,J. 1991. The Radon Riddle: Landlord Liability for a Natural Hazard B.C. Envtl. Aff. L. Rev. 715.

5. Occupational Health and Safety Regulations

British Columbia's Occupational Health and Safety Regulation (OHSR) has a number of provisions that point to the need to address radon. The British Columbia Lung Association has produced a specific document on workplace radon law— *Radon in BC: Employers Duties, Worker Strategies, and WorkSafeBC Policies.* This section offers a shorter summary and explains the two most important ways that radon is covered in the OHSR.

Ionizing radiation. International standards have been developed for protection from ionizing radiation,[40] which are incorporated into federal laws covering the nuclear fuel chain[41] and in BC directly into the OHSR.[42] Three "bands" of exposure are identified. The lowest band applies to 'normal workers' and represents a level at which radiation exposure does not significantly increase health risk. In Canadian federal law and the OHSR this is set at an effective dose of 1 mSv. While workplaces should always strive to keep radiation exposure as low as reasonably achievable (ALARA) in some cases there will be necessary exposure above the lower band (e.g. of 1 mSv), in which case workers are 'occupationally exposed' or 'nuclear energy workers'. For such settings, a second band covers exposures for which a worker exposure should be monitored, measured and managed. This should start at exposures of 5 mSv per year. Finally, there are upper limits on exposure. In Canada (and in BC) this is generally set at 100 mSv over 5 years, and 4 mSv for the balance of pregnancy. [43] The sections of the OHSR that covering ionizing radiation do not particular mention radon, however, radon *is* widely understood to produce ionizing radiation.[44]

Converting radon concentrations to effective dose. In order to see how the OHSR provisions on ionizing radiation apply a further step needs to be taken. Radiation standards (in the federal *Nuclear Safety and Control Act* S.C. 1997, c. 9 or BC's OHSR) are provide in millisieverts (mSv), which is a measure of radiation dose to a person. However, radon is typically measured in becquerels per cubic meter of air, (Bq/m^3) which is a measure of concentrations of the gas in air. Some work is needed to understand how concentrations of radon in air result in effective dose. This concerns the ways radon progeny are absorbed in the lungs. The leading international agency (the International Commission on Radiological Protection) has long held that exposure to 200 Bq/m^3 over a 2000 hour work-year translate into an effective dose of at least 1.4 mSv.[45]

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[40] ICRP, 2007. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4).
[41] Nuclear Safety and Control Act, SC 1997, and Radiation Protection Regulations SOR/2000-203
[42] OHSR s. 7.17 to 7.22
[43] Radiation Protection Regulations SOR/2000-203 s. 13(1)
[44] OHSR s. 7.17 to 7.22
[45] ICRP, 1993. ICRP Publication 65: Protection against radon-222 at home and at work, Annals of the ICRP 23: 1-45; ICRP, 2014. ICRP Publication 126: Radiological Protection against Radon Exposure Annals of the ICRP 43(3):5-73. Note that in 2010 the ICRP revised its dose conversions upwards, so that effective dose from radon concentrations are now considered much greater. See

NORM Guidelines. Further guidance on radon and effective radiation dose is provided by the Federal-Provincial Territorial Radiation Protection Committee's *Naturally Occurring Radioactive Materials (NORM) Guidelines*(2013).[46] These accept the conversion conventions so that 200 Bq/m^3 average radon concentrations in a workplace would result in 1.4 mSv effective dose for a full time worker. Exposure of 1.4 mSv for radon (as opposed to the normal 1 mSv limit was deemed acceptable to account for naturally occurring background radon radiation. As well, this would allow for 200 Bq/m^3 as a uniform standard that could apply equally in workplaces as homes. While 200 Bq/m^3 was identified as the workplace standard, it was accepted that in some workplaces some radiation exposure might be necessary, and so "NORM Management" would kick in from between 200 and 800 Bq/m^3, — requiring public and incidentally exposed worker access controls and changes in work practices.[47] If radon levels exceed 800 Bq/m^3 the NORM classification is "Radiation Protection Management". This requires a Radiation Protection Management Program including dose monitoring. The NORM Guidelines, on their own, do not have the force of law, but help confirm that workplaces should test for radon and mitigate if long-term radon concentrations are at or above 200 Bq/m^3.

General Duty Clauses. The OHSR provides, at section 2.2. that "despite the absence of a specific requirement, all work must be carried out without undue risk of injury or occupational disease to any person." These broad measures are sufficient to cover radon. Ontario has adopted the formal policy that the 'general duty clause' includes protection from elevated radon. The guidance is easily accessed through a website titled "Radon in the Workplace" [48] It follows the NORM Guidelines to establish 200 Bq/m^3 as the level at which radon mitigation to as low as reasonably achievable should begin. This same reasoning should apply in BC.

Safety Programs, Inspections, and Radon Testing There are various mechanisms in the *Workers Compensation Act* and OHSR which point to requiring radon testing in the workplace. Employers must ensure regular inspections are made to prevent development of unsafe working conditions.[49] Unsafe or harmful conditions need to be remedied without delay.[50] The OHSR mandates that employers have an occupational healthy and safety program, comprising, at minimum, regular monthly meetings to discuss

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ICRP, 2010. Lung Cancer Risk from Radon and Progeny and Statement on Radon.ICRP Publication 115, Ann. ICRP 40(1) , ICRP Publication 126 Radiological Protection against Radon Exposure Annals of the ICRP 43(3):5-73 ICRP, 2017. Occupational Intakes of Radionuclides: Part 3. ICRP Publication 137. Ann. ICRP 46(3/4).For a short summary see ICRPaedia. Calculating Radon Doses, 2020. Available at See http://icrpaedia.org/Calculating_Radon_Doses accessed February 19, 2021. However, these have not yet been integrated in Health Canada or Federal-Provincial Territorial Radiation Committee guidance.

[46] See Federal Provincial Territorial Radiation Committee, 2013. Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM). ISBN: 978-1-100-23019-1; Cat. No.: H129-34/2013E-PDF available at https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/canadian-guidelines-management-naturally-occurring-radioactive-materials.html accessed October 26, 2020

[47] NORM Guidelines, 4.2.3

[48] Ontario Ministry of Labour, Training and Skills Development, 2016. Radon in the workplace. Available at https://www.labour.gov.on.ca/english/hs/pubs/gl_radon.php accessed September 15, 2020

[49] OHSR s. 3.5

[50] OHSR s. 3.9

health and safety matters and correct unsafe conditions and practices.[51] If there are over 50 workers this will also involve formal committees. The occupational health and safety program must be designed to prevent injuries and occupational diseases, including regular inspection of the premises.[52] Radon induced lung cancer is listed in the WCA as an occupational disease.[53]

6. Conclusion

Owners, operators and managers of commercial buildings need to address radon as part of general requirements for health and safety. This is now referenced for buildings in general in the BC Building Code. As popular understanding of radon grows, it is likely that commercial building operators will face more pressure to address the issue. Commercial building owners, operators and managers can take steps now to minimize risk—by having buildings tested, posting test results for people who work in and regularly visit the building, and if levels are at or over 200 Bq/m^3 hiring C-NRPP certified professional mitigators to address the situation. While WorksafeBC currently now only provides very general guidance on radon, this might change in the future—for now, radon squarely fits within the provisions on ionizing radiation and under general duties to create safe work spaces.

[51] OHSR s. 3.1 (1)
[52] OHSR s. 3.3.
[53] WCA s. 137, and Schedule 1, Item 6 (7)