

BRITISH COLUMBIA LUNG ASSOCIATION

RADON AND DAYCARES: British Columbia Law



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Legal Brief No. 7. Healthy Indoor Environments

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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, leading to the development of lung cancer. Canada has a Radon Guideline of 200 Bq/m³ and it is easy to test for high radon and have the problem fixed by professional radon mitigators.

Daycares are a particular concern in preventing radon exposure. Radon has a disproportionate effect on young children due to their fast breathing, little lungs and rapidly dividing cells. Most childcare facilities in British Columbia are not tested for radon, thereby leaving children and staff potentially exposed to harmful levels of a known carcinogen.

This report sets out current law in BC and how it might be used to address radon in daycares. Currently, only the Interior Health Authority mandates clear rules for daycare providers. However, there are many possible ways that general rules concerning health and safety could be harnessed to protect children and workers in daycare settings. Daycare providers have a legal duty to ensure spaces are safe for children under the *Community Care and Assisted Living Act*, and Child Care Licensing Regulation. Workers must also be kept safe under the *Workers Compensation Act* and Occupational Health and Safety Regulation. Health authorities oversee licensing and can impose radon testing as a licensing requirement. The Ministry of Health can create guidelines and practice standards to address radon in daycares. Public health officers can investigate elevated radon as a health hazard. Parents can educate daycares about the need to address radon, make complaints to local public health officers and WorkSafeBC officers, and organize to have health authorities impose licensing requirements.

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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. Introduction

Radon is a colourless, odourless radioactive gas that arises from the gradual breakdown of uranium in soil and rock. As radon gas is released into the air, it decays and emits alpha particles, a short-lived but powerful form of radiation. Radon poses little risk when it is diluted in outdoor air. However, radon can build up indoors, exposing people to much higher levels of radiation. When inhaled, alpha radiation from radon and its decay products can damage the lung tissue cells and DNA, leading to the development of lung cancers. Yet radon is easy to test with low cost Do-It-Yourself kits and professional mitigators can usually fix the problem in a days work.

Daycares are a particular concern in preventing radon exposure. Radon has a disproportionate effect on young children due to their fast breathing, little lungs and rapidly dividing cells.¹ 58% of children under the age of 6 participate in some form of child care in British Columbia.² The World Health Organization has emphasized the importance of radon control in child care settings.³ Despite being a well understood and serious health risk, most child care facilities in British Columbia are not tested for radon, thereby leaving children and staff potentially exposed to harmful levels of a known carcinogen. To date, there have been significant efforts to promote testing in daycares by radon professionals and the Canadian National Radon Proficiency Program has downloadable materials.⁴ Across Canada there are have been repeated calls for mandatory testing of daycares.⁵ In 2017 the Alberta legislature has passed specific legislation that would mandate radon testing in daycares, although it has not yet been proclaimed in force.⁶

This brief considers the situation in current BC law and assesses existing levers to ensure testing and, if necessary, radon mitigation in childcare settings. It includes childcare licensing rules, Building Codes, and the rules governing both occupational health and safety and public health.

¹ x Chen, J., 2013. Canadian lung cancer relative risk from radon exposure for short periods in childhood compared to a lifetime. *Int. J. Environ. Res. Public Health* 10, 1916–1926; Moore, S., Stanley, F. K. & Goodarzi, A. A., 2014 The repair of environmentally relevant DNA double strand breaks caused by high linear energy transfer irradiation—no simple task. *DNA Repair (Amst)* 17, 64–73. Pearson DD, Anikin A & Goodarzi AA, 2016. Environmental sources of ionizing radiation and their health consequences. In *Genome Stability*. Elsevier, 712

² Statistics Canada, 2019. Use of early learning and childcare arrangements, household population aged 0 to 5 years [Statistics Canada](https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=4210000401), Table: 42-10-0004-01 available at <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=4210000401> accessed March 25, 2021

³ World Health Organization, 2009. WHO handbook on indoor radon: a public health perspective. World Health Organization available at https://www.who.int/ionizing_radiation/env/9789241547673/en/ accessed March 25, 2021, at page 85

⁴ Canadian National Radon Proficiency Program, 2018. Testing Child Care Centres. available at <https://c-nrpp.ca/professionals/testing-child-care-centres/> accessed March 25, 2021

⁵ Phipps, E., Nicol, A.M., Giesbrecht, D., Cooper, K., Baytalan, G. and Bush, K., 2017. Call for action on radon in childcare settings. *Environmental Health Review*, 60(3), pp.77-81. Cooper, K., Phipps, E., and Giesbrecht, D. 2018. Policy Measures to Address Radon in the Child Care Sector: Briefing Note for Child Care Sector Leaders. Canadian Environmental Law Association, Canadian Child Care Federation and Canadian Partnership for Children's Health and Environment. Accessed at <https://cela.ca/wp-content/uploads/2019/07/Policy-Radon-Child-Care-Sector-EN-Mar2018-Update.pdf>;

⁶ *Radon Awareness and Testing Act*, SA 2017, c R-2.5 available at <https://canlii.ca/t/54wjk> accessed March 25, 2021

2. General Duties of Childcare Operators

Rules and guidelines for licensed childcare facilities are found in the *Community Care and Assisted Living Act*, SBC 2002, c. 75, the Child Care Licensing Regulation, B.C. Reg. 332/2007, and the standards of practice. There are many provisions that relate to health and safety of children, such as the broad provision in the Act that a licensee must operate the community care facility in a manner that will promote the health, safety and dignity of persons in care (s. 7(1)(b)) and in the Regulation that “A licensee must ensure that a healthy and safe environment is provided at all times while children are under the supervision of employees” (s. 13(1)). As well, under section 17 of the Regulation a licensee must ensure that children do not have access to any object or substance that may be hazardous to the health or safety of a child. While we would hope that childcare providers would see these provisions as binding them to test and, if necessary, mitigate for radon, it is likely that more specific guidance and enforcement measures will be needed.

Children in daycares will also be covered by the laws of occupier liability and negligence. The *Occupiers Liability Act*, RSBC 1996, c. 337, provides that an occupier of premises owes a legal duty to take reasonable care to see that those who use or are present on the premises are reasonably safe. Daycares will likely be held to the “careful and prudent parent standard” when determining what is reasonable in all the circumstances of the particular case. This widely used in cases involving schools.⁷ Claims under the laws of negligence may also succeed if the plaintiff can show that the defendant (daycare provider) owed them a duty of care; that the defendant breached the applicable standard of care; that the plaintiff sustained damages; and that the damages were caused by the defendant’s breach. Daycares should address radon both because it is a legal duty, and also to avoid risks of litigation. However, there is likely to be a very long-time lapse between early childhood exposure and later development of lung cancer which will reduce the occurrence of lawsuits.

3. Childcare Licensing

Health authorities have the power to make radon testing a licensing requirement. The *Community Care and Assisted Living Act* empowers medical health officers to attach terms and conditions to a license (s. 11) and to revoke licenses if there is a risk to persons in the care of such facilities (s. 14). Once there are licensing requirements, health officers can inspect as part of the licensing process (s. 19 (2)(b))

⁷ *Myers v. Peel County Board of Education*, 1981 CanLII 27 (SCC), [1981] 2 S.C.R. 21; *Deo v Vancouver School District No. 39*, 2018 BCSC 133 (CanLII) *Parks v. Vancouver School District No. 39*, 2003 BCPC 3. *Deo v Vancouver School District No. 39*, 2018 BCSC 133.

In May 2017 Interior Health Authority (IHA) began to use these powers to address radon. IHA invoked s. 17 of the Regulation and mandated that day cares test as a condition of licensing.⁸

4. Building Codes

Elevated radon can be avoided in new construction through putting in a radon mitigation system. The best systems use “sub-slab depressurization”. This involves

- Gravel under the building foundation ‘slab’ to allow gases to circulate
- A membrane under the slab to ensure soil gases do not pass into the building
- A hole in the building foundation and a vent pipe ensures low pressure on the ground floor does not result in radon being sucked into the space.

Best practices in radon mitigation are described in the Canadian General Standards Board’s *Radon Control Options for New Construction in Low-Rise Residential Buildings*.⁹ The BC Building Code has provisions for radon prevention in “Part 9” which applies to low-rise residential dwellings including single family homes (s. 9.13.4). This does not involve a complete sub-slab depressurization system, but instead a form of ‘rough-in’. It includes the vent pipe but not a fan. The provisions provide in select municipalities (listed in table C-4 to Division B, Appendix C)— mostly east of the Coast Mountains (see Figure 2)). The ‘rough-in’ is designed to reduce costs if a full radon system is needed and is not itself a complete system. New occupants are thus encouraged to test for radon and make additions to the system if necessary.¹⁰

The BC Building Code does have special rules that apply to some, larger daycares but they relate to issues of additional sprinklers (as fire protection), exits, smoke detectors and bathrooms. The BC Building Code’s radon provisions are particularly oriented towards low-rise buildings, and do not apply to other types of buildings. Many daycares e.g. smaller daycares with 8 or less children and located in homes, will also be effectively governed by the rules for Part 9 buildings.¹¹

Daycares are also likely to be in buildings constructed before the radon provisions were implemented in the 2010s. The Building Code provisions will not suffice on their own to protect children in daycares from radon ingress. Most daycares will either have been built before the Code provisions on radon came into force or be in buildings for which the

⁸ 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

⁹ Canadian General Standards Board (CGSB)’s Radon control options for new construction in low-rise residential buildings, CAN/CGSB-149.11-2019. available at publications.gc.ca/collections/collection_2019/ongc-cgsb/P29-149-011-2019-eng.pdf

¹⁰ This is stated in the BC Building Code, 2018 at Notes to Part 9, A-9.13.4.3.

¹¹ see British Columbia Building and Safety Standards Branch, 2014. Information Bulletin No. B14-04. Revisions to the 2012 BC Building Code – Daycare Facilities for Children. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/bulletins/b14-04_daycares.pdf, and Community Care and Assisted Living Act, s 20

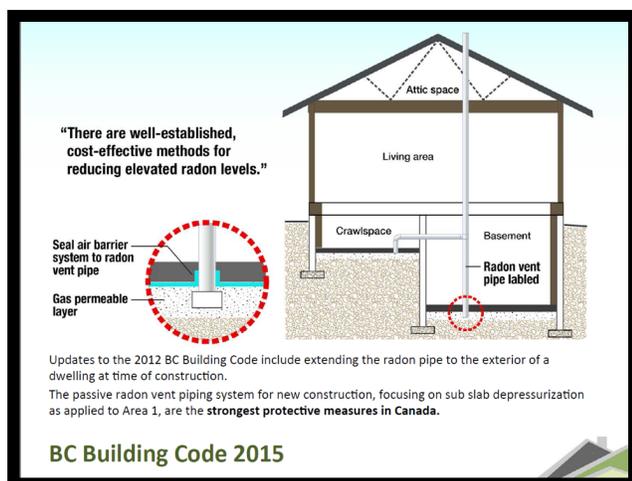


Figure 1: Rough-in for the BC Building Code.



Figure 2: Locations in BC Requiring Radon Rough-Ins

provisions do not apply. Even if there are radon ‘rough-ins’ in place, there will still be a need for testing.

5. Occupational Health and Safety

The people who work in daycares are covered by the *Workers Compensation Act* (WCA) and the Occupational Health and Safety Regulation (OHSR). While existing workplace regulation in British Columbia covers radon, the issue has been overlooked for many years. 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, and steps that daycare workers might take to have radon addressed.

Ionizing radiation. International standards have been developed for protection from ionizing radiation,¹² which are incorporated into federal laws covering the nuclear fuel chain¹³ and in BC directly into the OHSR.¹⁴ 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

¹² ICRP, 2007. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4).

¹³ Nuclear Safety and Control Act, SC 1997, and Radiation Protection Regulations SOR/2000-203

¹⁴ OHSR s. 7.18

Canada, this is generally set at 100 mSv over 5 years, and 4 mSv for the balance of pregnancy.¹⁵ The sections of the OHSR that covering ionizing radiation do not particular mention radon, however, radon *is* widely understood to produce ionizing radiation.¹⁶

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 miliseverts (mSv), which is a measure of radiation dose to a person. However, radon is typically measured in becquerels per cubic meter of air, (Bq/m³) 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/m³ over a 2000 hour work-year translate into an effective dose of 1.4 mSv.¹⁷

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).¹⁸ These accept the conversion conventions so that 200 Bq/m³ 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/m³ as a uniform standard that could apply equally in workplaces as homes. While 200 Bq/m³ 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/m³, — requiring public and incidentally exposed worker access controls and changes in work practices.¹⁹ If radon levels exceed 800 Bq/m³ 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/m³.

¹⁵ Radiation Protection Regulations SOR/2000-203 s. 13(1)

¹⁶ OHSR s. 7.18

¹⁷ 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 drawing on new 'dosimetric' modelling, so that effective dose from radon concentrations are now considered greater. See 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. Moreover, a recent assessment has suggested significant uncertainties in the higher results from the dosimetric approach—see United Nations Scientific Committee on the effects of Atomic Radiation (UNSCEAR), 2020. Sources, Effects, and Risks of Ionizing Radiation. Annex B: Lung Cancer from Exposure to Radon. Available at <https://www.unscear.org/unscear/en/publications/2020b.html> accessed March 30, 2021.

¹⁸ 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

¹⁹ NORM Guidelines, 4.2.3

General Duty Clauses. The OHSR provides 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" (s. 2.2) 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"²⁰ It follows the NORM Guidelines to establish 200 Bq/m³ 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. The OHSR mandates that employers have an occupational health and safety program, comprising, at minimum, regular monthly meetings to discuss health and safety matters and correct unsafe conditions and practices.²¹ If there are over 50 workers (unlikely in the daycare setting) 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 (s. 3.3). Radon induced lung cancer is listed in the WCA as an occupational disease.²² The WCA also provides for worker health and safety representatives to send written recommendations to the employer and receive a response and to report the issue to WorksafeBC if unsatisfied.²³ This applies to small workplaces (e.g. with over 9 workers).²⁴ For smaller (e.g. under 9 workers) there is still a possibility of making direct complaints to WorksafeBC officers who can initiate investigations.²⁵ The Act provides protections from retaliatory moves by the employer for health and safety complaints (made to the employer or to WorksafeBC officers), such as discipline, demotion, suspension or firing.²⁶

Employers must also ensure regular inspections are made to prevent development of unsafe working conditions.²⁷ Unsafe or harmful conditions need to be remedied without delay.²⁸ Employers, in designing health and safety programs should give direction to persons conducting inspections, preferably with checklists ensure consistent and comprehensive inspections.²⁹ There are also specific provisions on investigating indoor air quality when there is a complaint.³⁰ The Investigation should include sampling for airborne contaminants suspected to be present in concentrations associated with the reported

²⁰ 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

²¹ OHSR s. 3.1 (1)

²² WCA s. 137, and Schedule 1, Item 6 (7)

²³ WCA, s. 39

²⁴ WCA, s. 45 stipulates this for workplaces with over 9 workers.

²⁵ WCA s. 75

²⁶ WCA, s. 48

²⁷ OHSR s. 3.5

²⁸ OHSR s. 3.9

²⁹ WorkSafeBC, 2012. Safety Inspections Workbook. Available at <https://www.worksafebc.com/en/resources/health-safety/books-guides/safety-inspections-workbook?lang=en> accessed October 29, 2020 , p. 10

³⁰ OHSR s. 4.79(1)(a))

complaints.³¹ The inspection process should include participation by a worker health and safety representative.³² Unsafe or harmful conditions found in the course of an inspection must be remedied without delay.³³ Anyone at a worksite (including workers) should report what appear to be unsafe or harmful conditions to the employer. The employer is to take corrective action.³⁴

6. Public Health

Health authorities have general powers to produce educational material for childcares. For instance, Vancouver Coastal Health produces Fact Sheets for childcare facility operators, architects and designers that cover areas of traffic related air pollution, noise pollution, wildfire smoke and extreme heat.³⁵ Information on radon is an obvious addendum to this. In 2014 Interior Health embarked on a radon campaign which included Mailing free test kits to health care facilities. As noted above, by 2017 this was turned into a mandatory requirement to test for radon.

The Ministry of Health also has important powers that could shape the radon issue for daycares. The Ministry has already issued fact sheets on other important health issues for daycares: For lead in drinking water, these stress that lead levels can violate provisions of the Child Care Licensing Regulation relating to ensuring safe drinking water is available to children.³⁶ The *Community Care and Assisted Living Act* calls for the creation of a director of licensing (s. 3) who has the power to specify policies and standards of practice for all community care facilities (s. 4(e)). The general power to issue practice standards for daycares was recently seen around COVID-19.³⁷ The Ministry of Health could issue fact sheets and/or practice standards around radon. As well, the Ministry, through the Director of Licensing could also order Health Authorities to make investigations and reports about radon in daycares in their geographic areas (s. 4(1)(a) to (d))

Health Hazards. The *Public Health Act* empowers public health officers to inspect places to see if health hazards exist (s. 23(a)(iv), and s. 24(1)), and make orders to prevent the health hazard (s. 30-31). Much turns, then, on what counts as a “health hazard.” The Health Hazards Regulation BC Reg 216/2011 provides only a partial list (and does not point to radon): The *Public Health Act* provides a very general definitions of “health hazard”

³¹ OHSR s. 4.79(2)(c)

³² OHSR s. 3.8

³³ OHSR, s. 3.9

³⁴ OHSR, s. 3.10

³⁵ See Vancouver Coastal Health, 2021. Factsheet series for child care facility operators, architects and designers: Considerations for Selecting, Designing and Operating Child Care Facilities. Available at <http://www.vch.ca/public-health/licensing/child-care> accessed March 25, 2021

³⁶ BC Ministry of Health, 2017. Fact Sheet, Child Care Licensing Regulation, Community Care and Assisted Living Act: Lead in Drinking Water. Available at https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/child-day-care/fact_sheet_-_lead_in_drinking_water_2017.pdf. see also BC Ministry of Health, 2019. Guidelines on Evaluating and Mitigating Lead in Drinking Water Supplies, Schools, Daycares and Other Buildings. available at https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/how-drinking-water-is-protected-in-bc/guideline_on_reducing_exposure_to_lead_through_drinking_water_april_26_2019.pdf accessed March 25, 2021

³⁷ BC Ministry of Health and the BC Centre for Disease Control, 2021. COVID-19 Public Health Guidance for Childcare Settings. Available at http://www.bccdc.ca/Health-Info-Site/Documents/COVID_public_guidance/Guidance_Child_Care.pdf

as “a condition, a thing or an activity that endangers, or is likely to endanger, public health.” We found no cases in BC that indicate the scope of this general provision. Recourse to “public health” is also somewhat unhelpful, as it is also undefined. Public health officers can draw on this very general definition to address radon in daycares.

- In Ontario, there is similarly broad definition in the *Health Protection and Promotion Act*, RSO 1990, c H.7 “Health hazard” means, (a) 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 them, that has or that is likely to have an adverse effect on the health of any person (s. 1(1)). In *Jorgensen v. Halton (Regional Municipality)*, 2000, the Ontario Health Services Appeal and Review Board has found that indoor air quality issues in a daycare (odour, water staining and mould growth) amounted to health hazards, and upheld inspectors’ orders to test and remediate.³⁸
- Alberta Health Services has ordered radon mitigation and developed a guidance document on radon in rental accommodation. Inspectors draw on general nuisance clauses in the *Public Health Act* RSA 2000, c P-37 (at s. 59 to 61) and the Nuisance and General Sanitation Regulation, Alta Reg 243/2003.³⁹ While BC’s Act does not have a similar nuisance clause, a comparison between provincial legislation indicates similarities between provisions. “Nuisance” is defined in the BC Act as “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” (*Public Health Act*, s. 1(ee)). The Act provides for inspections to determine the presence of a nuisance, with separate clauses for public spaces (s. 59) and private spaces (s. 60) and for orders to be issued to prevent or abate nuisances (s. 62).

Public health officials in BC have suggested to us that their working definition of “public health” is tied to problems that are obviously shared and collective—infectious diseases being the prime example. However, that is a more restrictive interpretation of the concept of ‘public health’ than is found in BC law, other parts of Canada and widely accepted scholarly and international approaches.

- BC’s *Public Health Act* does not define public health, but the Act gives some indication of what can count as public health in its description of public health plans. The broad purpose of public health plans is to “promote and protect health and well-being” (s. 3(1)). As well, the minister can specify further purposes, many of which clearly touch on radon: Identifying and addressing the health needs of particular groups within the population, monitoring and assessing the health status of the population, including surveillance and monitoring of factors influencing the

³⁸ *Jorgensen v. Halton (Regional Municipality)*, 2000 2000 CarswellOnt 8510

³⁹ see Quastel, N., Siersbaek, M., Cooper, K. and Nicol A-M. 2018. Environmental Scan of Radon Law and Policy: Best Practices in Canada and the European Union. Toronto and Burnaby: Canadian Environmental Law Association and CAREX Canada. Available at https://cela.ca/wp-content/uploads/2019/07/Radon-Policy-Scan-Full-Rept-with-Appendices_0.pdf accessed March 25, 2021, at p. 86

health of the population, preventing and mitigating the adverse effects of diseases (s. 3(2)).

- There is not much case law in Canada regarding what ‘public health characterizes. There are decisions by Ontario and British Columbia Information and Privacy Commissioner which hold that air quality and other environmental concerns fall within public health.⁴⁰
- More generally, in recent decades public health practitioners have shifted away from an idea of public health as only being concerned with infectious diseases or imminent threats. More current definitions, such as by the World Health Organization, state that public health is “the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society.” Activities to strengthen public health capacities and service aim to provide conditions under which people can maintain to be healthy, improve their health and wellbeing, or prevent the deterioration of their health. Public health focuses on the entire spectrum of health and wellbeing, not only the eradication of particular diseases. Many activities are targeted at populations such as health campaigns. This broader approach is at times describes as the “new public health” and as something that “we, as a society, do collectively.” It is a collective responsibility, geared toward improving the health and well-being of an entire community—or state, or country—as opposed to diagnosing or treating particular individuals. In addition, public health addresses the “conditions to be healthy” meaning that it is focused on “the prevention of disease and the promotion of health”, as opposed to medical care for those who are already ill. These wider approaches focused on disease prevention certainly support public health interventions concerning radon in the home.

It is our view that a legal basis does exist to support the involvement of public health officials and health authorities on the issue of radon. Prior research suggests, however, that health officers are unlikely to use this power. Typically, they are complaint driven and case specific, but few complaints are made about radon. Health officers may not have a mandate (or time allocation and budgets) to pursue radon.⁴¹ Daycare workers and parents would likely need to approach health officers about their concerns.

7. Other Places

Many countries have general workplace laws that explicitly cover radon, and extend to daycares, including Norway’s *Radiation Act*⁴² and the United Kingdom’s Ionising Radiation

⁴⁰ Ontario (Environment) (Re), 2004 CanLII 56158 (ON IPC) and cases reported therein; investigation Report F12-05 Public Body Disclosure of Information Under Section 25 of the Freedom of Information and Protection of Privacy Act December 2, 2013 2013 BCIPC No. 33

⁴¹ see Quastel et al. *ibid.* at p. 95

⁴² see Radiation safety in practices causing exposure to natural radiation, 2.2.2011 available at <https://www.stuklex.fi/en/ohje/ST12-1> accessed March 25, 2021

Regulations 2017.⁴³ Alberta's *Radon Awareness and Testing Act*, SA 2017, c R-2.5 (not yet in force) requires the results of a radon test as a precondition for day care licensing.

Testing in childcare facilities has been mandated in some U.S. States, as detailed in the following table.

Connecticut	Conn. Gen. Stat. Ann. § 19a-79-7a (17)
Colorado	6 Colo. Code Regs. 1010-7:7.14.2
Florida	Fla. Stat. Ann. § 404.056 (4)
Illinois	Ill. Ann. Stat. Ch. 225 § 10/5.8
Idaho	Idaho Admin. Code 16.06.02.726
Iowa	Iowa Admin. Code 441-109.11 (7)
Maryland	Md. Regs. 14.31.06.07(4)
Michigan	Mich. Admin. Code r. 400.1934
New Jersey,	N.J. Stat. Ann. § 30:5B-5.2
New York	18 N.Y. Code Rules & Regs. 416.2(a)(13) , and 418-1.2(a)(6) plus New York State Office and Children Family Services radon guidance
Rhode Island	216 R.I. Admin. Code 50-15-2.3.1 A(13) and 50-15-2.5

8. Conclusions: Who Can Take Action

a. Childcare Providers

Childcare providers have duties to keep indoor spaces safe, as provided in the *Community Care and Assisted Living Act*, the *Child Care Licensing Regulation*, the *Occupiers Liability Act*, the *Workers Compensation Act*. And *Occupational Health and Safety Regulation*. This applies to radon— Canada's Radon Guideline of 200 Bq/m³ proves a framework for when steps should be taken to reduce radon concentrations. These are current obligations under law and apply regardless of specific enforcement steps by WorksafeBC, Health Authorities or others.

Childcare providers should take steps to assess local radon risk and to test for radon, knowing that testing is easy to do with inexpensive Do it Yourself kits. The British Columbia Lung Association sells them online, as do some other non-profits and online retailers. If radon levels are high, mitigators can fix the problem at an affordable cost.

⁴³ pursuant to the Health and Safety at Work etc. Act 1974, c. 37, see also UK Health and Safety Executive, 2021. Radon in the workplace. Available at <https://www.hse.gov.uk/radiation/ionising/radon.htm> accessed March 25, 2021

b. Health Authorities

Health authorities in BC can follow the lead of Interior Health and begin a process of providing education on radon and testing a sample of daycares to determine radon levels. That said, many daycares are in homes—and especially in lower levels—and for many communities there is already sufficient testing to establish a significant risk of high radon in any particular daycare. The British Columbia Centre for Disease Control's Radon Repository holds accumulated data on radon tests by health area, and health authorities can apply to that agency to receive data. Current survey data, from the Cross-Canada Survey of Radon Concentrations in Homes and other sources, indicate many communities in BC have elevated indoor radon levels. The BC Building Standards Branch list of communities for which rough-ins are required (provided above in Figure 2) is also a good starting place.

Health authorities can issue guidelines for radon and daycares and attach radon testing (and any needed mitigation) to licensing requirements.

c. Public Health Officers

Health officers have the legal power to investigate and issue orders concerning elevated radon in childcare spaces under their powers concerning health hazards. This will likely proceed on a complaint basis. Further inspection powers will also arise once radon testing is worked into the licensing process.

d. Ministry of Health

The Ministry, through the Director of Licensing, can include radon testing and mitigation in education materials, guides, and practice standards, following examples from lead in water and COVID-19 protocols.

e. Childcare Workers

Childcare workers have legal rights under occupational health and safety laws. This extends to participating in inspections. Childcare workers can press for radon testing as part of the inspection process. For workplaces with more than 9 workers, there is a formalized process of consulting with WorksafeBC over disagreements between workers and employers around health and safety inspections. It should be noted that while our legal analysis points to radon protections in the workplace, WorksafeBC does not currently have strong policies in place.

For smaller workplaces, there is still the possibility of childcare workers making complaints to WorksafeBC officers. Childcare workers are, in theory, protected from employer repercussions if they notify WorksafeBC officers, but in fact may not feel comfortable making complaints. It is also unlikely that childcare workers would conduct

radon tests (for instance, by using digital monitors). The result is that they would not have firm proof of radon levels.

Childcare workers can also contact public health officers to initiate investigative processes under the *Public Health Act*. However, the sections of the *Workers Compensation Act* that offer protections from employer repercussions do not appear to extend to reporting to public health officers.

f. Parents

Parents can take a role in educating childcare providers about radon. There are now many materials available from Health Canada, public health agencies, the British Columbia Lung Association and other sources. Parents may be better positioned than childcare employees to make complaints to public health officers and WorksafeBC officers so as to initiate investigations. That said, many parents find sourcing childcare difficult and expensive and may not want to jeopardize in any way their relationship to childcare providers.

Likely the best strength of parents will be to get radon on the agenda of local health authorities. Well organized parent groups stand a good chance of convincing health authorities in high radon prone areas to impose licensing requirements.

g. Legislative and Policy Change

We stress that legislative change is not, strictly necessary, given the existing powers of the Ministry of Health and Director of Licensing for Childcares in BC. We have provided examples from Norway, the United Kingdom, Alberta, and some US states of how legislation can be written to mandate radon testing in childcare spaces. Ideally, legislative and policy change would have a broader scope than only childcares but involve a comprehensive framework for reducing radon in the built environment. Key elements of a provincial radon plan include

- Clear goals and timelines to eliminate elevated radon from the built environment
- Provincial commitment to follow Canada's radon guideline of 200 Bq/m³ or stricter
- Education and awareness
- Improving community testing and publicly available databases and maps
- Strong radon provisions for new construction, including coverage by New Home Warranty
- Clear rules setting out the need for testing and mitigation in rented homes and all workplaces
- Subsidies and incentives for homeowners, and a
- A clear mandate for health authorities to address radon

While addressing radon in daycares can be a good place to start broader radon action—given parents are rightfully worried about their young—all components of radon action will be stronger if part of a robust and well implemented plan.