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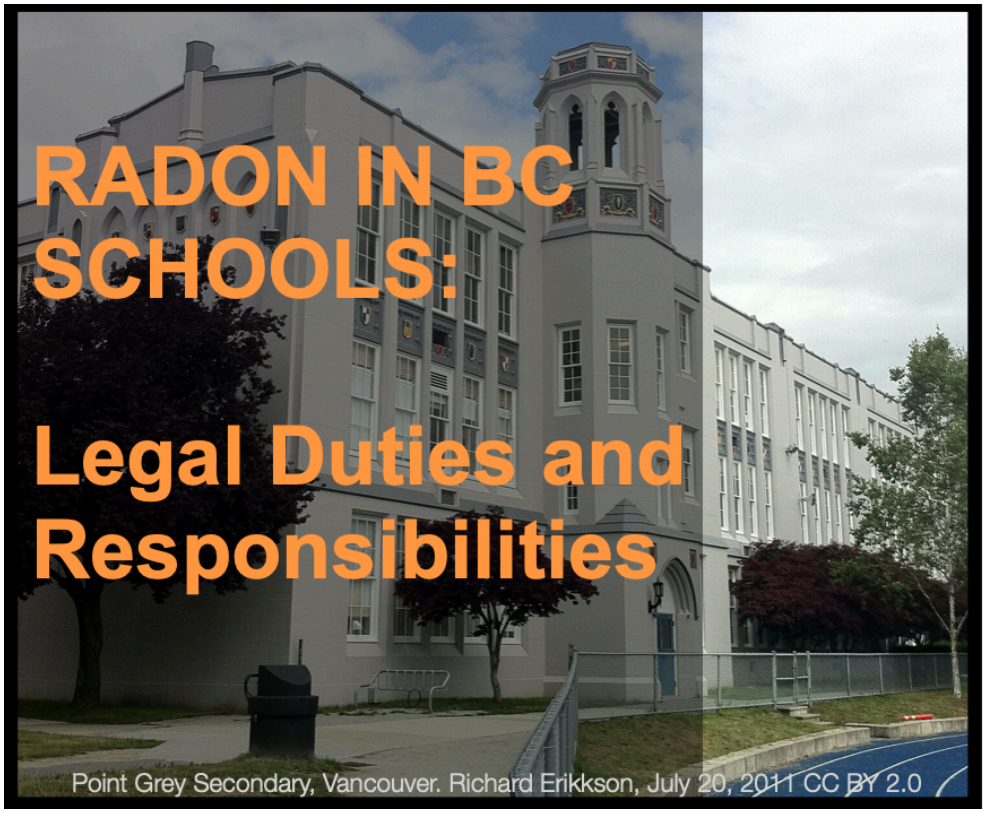

Healthy Indoor Environments. Legal Brief No. 8

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Author: Noah Quastel LLB LLM PhD
Director, Law and Policy,
Health Indoor Environments,
British Columbia Lung Foundation

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Summary

Radon gas is a naturally occurring radioactive gas, emanating from the ground and often entering and accumulating in buildings. Radon exposure is the leading cause of lung cancer after smoking, and accounts for an estimated 16% of lung cancer deaths in Canada. Elevated radon levels are relatively easy to address through testing and mitigation through certified professional radon mitigators. Health Canada has released guides to testing radon in schools and there are widely accepted standards for how to reduce radon in buildings. From a public health perspective, radon in schools is particularly important given that children spend so much time indoors while at school. Also, children exposed to radon are twice as likely to develop lung cancer compared to adults when exposed to the same concentrations. Children's smaller lungs, faster breathing rates, and lower proximity to the ground results in higher levels of radon exposure and, therefore, a higher risk of developing lung cancer.

Previous research has shown that British Columbia has no clear policies concerning radon in schools and that most schools have not tested for radon. However, as this brief analyzes, there is a clear legal basis for action on radon in schools in British Columbia and clear steps that school districts, teachers, parents and students can take. School districts have a clear duty to test and mitigate for radon, given broad duties to comply with workplace regulation and to keep students safe.

Schools are workplaces, and workers in schools are covered by protections in the Occupational Health and Safety Regulation. There are general duties on employers to keep workspaces healthy and safe, and more specific regulations concerning ionizing radiation. Teachers can make use of Joint Occupational Safety and Health Committees to ensure radon testing. Parents and students can make use of provisions in the *Schools Act* to raise complaints about a lack of radon testing. School medical officers have the power to test for radon and report results to school boards. Ultimately, the Ministry of Education has an oversight role, and the provincial government has clear powers to make specific orders for testing and mitigation in schools and update guidance on healthy schools to specify indoor air concerns, including radon.

Ideally, radon action for schools would be part of a broader radon action plan by the province which would seek to ensure all buildings are under Canada's Radon Guideline of 200 Bq/m^3. This would involve clarifying rules around radon for workers, renters, building professionals, real estate agents, and daycares, among others, and provide subsidies and incentives as part of a proactive health intervention.

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About our program. The BC Lung Foundation'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://bclung.ca/programs-initiatives/healthy-indoor-environments-program

1. Introduction

Radon gas is a naturally occurring radioactive gas, emanating from the ground and often entering and accumulating in buildings. Radon exposure is the leading cause of lung cancer after smoking, and accounts for an estimated 16% of lung cancer deaths in Canada.[1] According to Health Canada, an estimated 7% of homes in Canada have high radon levels above Government of Canada Guidelines of 200 Bq/m^3.[2] Elevated radon levels are relatively easy to address. First there is a need for testing using inexpensive monitors. If elevated levels are found, professional mitigators 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 schools[3] and there are widely accepted standards for how to reduce radon in buildings.[4]

Because radon affects indoor spaces, its regulation largely falls on the provinces.[5] British Columbia has generally not created specific laws or policies to address radon. There are some exceptions however. The BC Building Code has been updated to create stricter standards for radon in new construction in some regions of the province, generally east of the Coast Mountains.[6] Interior Health Authority has made radon-testing mandatory for licensed childcare facilities in its jurisdiction. [7] As well many areas of BC law create general requirements to ensure health and safety of indoor spaces, such as Residential Tenancies law[8] and Occupational Health and Safety Regulations.[9] These have not yet been updated to specifically mention radon, but legal decision-makers will likely find these

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[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] 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.

[4] 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; 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. 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 slightly differ from standards designed for residential buildings.

[5] 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.

[6] BC Building Code, Division B Section 9.13.4. Soil Gas Control,

[7] 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

[8] Residential Tenancies Act SBC 2002, c 78, s. 32

[9] Occupational Health and Safety Regulation, BC Reg 296/97, Part 4 – General Conditions – 267/97 at s. 4.1, and Division 3—Radiation Exposure, s. 7.18 to 7.25

laws do apply to provide protection from radon. One important example where this has happened is in real estate transactions, where the Real Estate Council of British Columbia (now incorporated into the BC Financial Services Authority) has issued guidance to real estate licensees to the effect that radon is a latent defect in homes and that the matter should be discussed with clients.[10] Ideally, the province would engage in proactive radon planning, which would ensure all building are below Canada's Radon Guideline, and have specific rules mandating testing and mitigation for workplaces, renters, daycares, schools and other areas, and provide subsidies and incentives as part of proactive preventative health measures.

This brief concerns the legal basis for radon action in British Columbia schools. Canada lacks national level requirements on radon in schools, with the issue falling under the jurisdiction of the provinces and territories. British Columbia does not have explicit guidance on radon testing in schools, nor does it have a province-wide program for testing in schools. CAREX Canada researched testing of radon in BC schools in 2017 and 2018 and found that only 239 of BC's 1,566 schools had been tested (15%).[11] Many US states and other countries specifically mandate testing in schools,[12] and some provinces have policies to test all schools (including Saskatchewan, New Brunswick, Nova Scotia, Prince Edward Island, and Yukon).[13] This brief canvasses existing laws which show that there are strong legal obligations on schools in BC to ensure low radon environments. It canvasses laws on occupational health and safety, the *Building Code*, the *School Act*, common law and other sources. It indicates legal obligations and potential avenues for taking action by school districts, teachers, students, parents and public health officers. While this legal brief focuses primarily on public schools (governed by the ***School Act***), it also indicates where independent schools also have responsibilities.

From a public health perspective, radon in schools is particularly important given that children spend so much time indoors while at school. Also, children exposed to radon are twice as likely to develop lung cancer compared to adults when exposed to the same concentrations. Children's smaller lungs, faster breathing rates, and lower proximity to the ground results in higher levels of radon exposure and, therefore, a higher risk of developing

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[10] Real Estate Council of British Columbia, 2020. Radon Precautions for Real Estate Professionals. Now revised as British Columbia Financial Services Authority, 2020. Radon Precautions Guidelines. Available at https://www.bcfsa.ca/industry-resources/real-estate-professional-resources/knowledge-base/guidelines/radon-precautions-guidelines?hits=radon accessed November 16, 2021

[11]CAREX Canada, 2018. Radon in schools: A summary of testing efforts across Canada. available at https://www.carexcanada.ca/radon_in_schools/ accessed November 12, 2020.

[12] Colorado, Colo. Rev. Stat. § 6.8.1 (2); Connecticut Conn. Gen. Stat. Ann. § 19a-37b. Conn. Gen. Stat. Ann. § 10-220 (2). Conn. Gen. Stat. Ann. § 10-291 (1).; Florida Fla. Stat. Ann. § 404.056 (4); Illinois , Il. Ann. Stat. Ch. 105 § 10-20.48; Maryland Family Law Code §§ 5-506, 508; N.J. Stat. Ann. § 18A:20-40; N.Y. Real Prop. Law § 155.5 (m).; Ohio, Omo. Rev. Code Ann. § 3701.931; Rhode Island General Laws §§ 23-61 et seq. R.I. Gen. Laws. § 1.04-3; Tennessee Tenn. Code Ann. § 49-2-121; Virginia VA. Code Ann. § 22.1-138; West Virginia, W. VA. Code §18-9E-3 (d); Minnesota Statutes § 123B.5711 Norway Forskrift 16. desember 2016 nr. 1659 om strålevern og bruk av stråling, Section 6 and the explanatory notes to Section 6, online: https://lovdata.no/dokument/SF/forskrift/2016-12-16-1659.

[13] CAREX Canada ibid.

lung cancer.[14] School testing and mitigation are also ways to protect the rights to health and safety of school staff. As well, schools are a good conduit in communicating with parents about the risks of radon and to encourage testing at home.

2. Who is Responsible?

In British Columbia, public education has evolved as a joint provincial and local function. For public schools, the *School Act* RSBC 1996, c. 412*,* and its regulations govern the election of trustees, appointment of statutory officials, curriculum requirements, class size, and financial matters. Almost all financing is in the form of provincial grants. Boards of education set local education policies and supervise the administration of public schools.[15]

The *School Act* provides for school boards and the appointment of superintendents of schools.[16] A general responsibility for maintaining school properties will fall on the superintendents as part of their general duties to oversee the operations of schools.[17] Boards are also responsible for the management of school in its school district, including the maintenance and safekeeping of all property owned or leased by the board.[18]

The *School Act* also permits the BC government to take steps to maintain and management all provincial schools.[19] As well, the BC government can make orders to effectively administer the *School Act* or its regulations.[20] A number of specific orders have been issued that relate to health issues in schools, concerning testing lead content in drinking water,[21] allergies,[22] and provision of menstrual products.[23]

While the provincial government clearly has the power to issue direct orders relating to radon, it has not done so. A broad initiative around “Safe and Caring School Communities” includes details on creating safe schools. However, the initiative’s main

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[14] Agency for Toxic Substances and Disease Registry. Toxicological Profile for Radon; U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry: Atlanta, GA, USA, 2012. Available online: https://www.atsdr.cdc.gov/toxprofiles/tp145.pdf (accessed on Dec 1 2020), see also National Council on Radiation Protection and Measurements (NCRP). Evaluation of Occupational and Environmental Exposures to Radon and radon daughters in the United States. NCRP Report No. 78. 1984; Gordon, K., Terry, P.D., Liu, X., Harris, T., Vowell, D., Yard, B. and Chen, J., 2018. Radon in schools: A brief review of state laws and regulations in the United States. *International journal of environmental research and public health*, *15*(10), p.2149.

[15] Bish, R. and Clemens, E. 2008. Local Government in British Columbia. Union of BC Municipalities. At p. 65.

[16] *School Act*, s. 22.

[17] *School Act,* s. 22(1)(iii)).

[18] *School Act*, s. 74(1).

[19] *School Act*, s. 168 (1)(a).

[20] *School Act*, s. 168(2)t).

[21] Ministry of Education, 2019. Testing Lead Content in Drinking Water of School Facilities available at https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/legislation-policy/public-schools/testing-lead-content-in-drinking-water

[22] Ministry of Education, 2009. Anaphylaxis Protection Order.https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/legislation-policy/public-schools/anaphylaxis-protection.

[23] Ministry of Education, 2019. Provision of Menstrual Products.https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/legislation-policy/public-schools/provision-of-menstrual-products; see also Support Services for Schools Order,(M149/ 89).

focus is on avoiding violence, bullying and discrimination. The initiative does include instructions concerning indoor environments and health, which are to meet or exceed Workers' Compensation Board Occupational Health and Safety regulations, and to ensure staff members know these standards.[24] While this can be interpreted as including radon, there are clearer routes to taking action, as detailed below.

For independent schools there is a much looser structure of oversight, with individual schools bearing responsibility as private organizations. Independent schools are discussed below in section 7.

3. Schools As Workplaces

Schools are workplaces, and the rights of the teachers, janitors, administrators, clerical workers and others need to be respected. The people who work in schools are covered by the *Workers Compensation Act,* RSBC 2019, c. 1 *(WCA)* and the Occupational Health and Safety Regulation, BC Reg 296/97 (OHSR*).* While existing workplace regulations in British Columbia cover radon, the issue has been overlooked for many years. The British Columbia Lung Foundation has produced a specific document on workplace radon law— *Radon in BC: Employers Duties, Worker Strategies, and WorkSafeBCBC Policies.* This section offers a shorter summary of the issue and explains the two most important ways that radon is covered in the OHSR. It also outlines steps that workers in schools might take to have radon addressed.

Ionizing radiation. International standards have been developed for protection from ionizing radiation,[25] which are incorporated into federal laws covering the nuclear fuel chain[26] and in BC directly into the OHSR.[27] 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, this is generally set at 100 mSv over 5 years, and 4 mSv for the balance of

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[24] (Ministry of Education, 2017. Safe and Caring School Communities. available at, see specifically Ministry of Education, 2008 Safe, Caring and Orderly Schools: A Guide. available at https://www2.gov.bc.ca/assets/gov/education/kindergarten-to-grade-12/teach/teaching-tools/student-saftey/scoguide.pdf at p. 26 and p. 28).

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

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

[27] OHSR s. 7.18

pregnancy.[28] The sections of the OHSR that covering ionizing radiation do not particular mention radon, however, radon ***is*** widely understood to produce ionizing radiation.[29]

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/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.[30]

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).[31] 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.[32] 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.

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[28] Radiation Protection Regulations SOR/2000-203 s. 13(1)

[29] OHSR s. 7.18

[30] 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 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.

[31] 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

[32] NORM Guidelines, 4.2.3

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" [33] 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 *WCA* and OHSR which point to requiring radon testing in the workplace. The OHSR mandates that employers have an occupational health and safety program for workplaces with 20 or more workers and a moderate or high risk of injury, and otherwise if there are 50 or more workers.[34] Smaller operations require a less formal program.[35] The program must be designed to prevent injuries and occupational diseases.[36] Generally, employers are expected to design the health and safety program to fit their particular workplaces.[37] Testing for radon should be an important component of this program.

Employers must also ensure regular inspections are conducted to prevent development of unsafe working conditions.[38] Unsafe or harmful conditions need to be remedied without delay.[39] Employers, in designing health and safety programs should give direction to persons conducting inspections, preferably with checklists to ensure consistent and comprehensive inspections.[40] There are also specific provisions on investigating indoor air quality when there is a complaint.[41] The investigation should include sampling for airborne contaminants suspected to be present in concentrations associated with the reported complaints.[42]

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33 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

[34] OHSR s. 3.1 (1).

[35] OHSR s. 3.2.

[36] OHSR s. 3.3.

[37] 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.

[38] OHSR s. 3.5.

[39] OHSR s. 3.9.

[40] 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.

[41] OHSR s. 4.79(1)(a).

[42] OHSR s. 4.79(2)(c).

The *WCA* also has detailed provisions for joint health and safety committees.[43] These are required for workplaces with more than 20 workers. The joint committee brings together representatives of the employer and the workers to identify and help resolve health and safety issues in the workplace. The *WCA* specifies duties and functions of the joint committee which point to the need for radon testing (and if necessary, mitigation). These include identifying situations that may be unhealthy or unsafe for workers, and advising on effective systems for responding to those situations; to make recommendations to the employer and the workers for the improvement of the occupational health and safety and occupational environment of workers; to make recommendations to the employer on educational programs promoting the health and safety of workers; compliance with the OHS provisions and the regulations and to monitor their effectiveness. Employers are required to respond to committee recommendations, either accepting them or giving written reasons for rejection. A committee chair can then report the matter to WorksafeBC leading to an investigation and possible order.[44] As well, the OHSR provides that Joint Occupational Health and Safety Committee members should participate in health and safety inspections.[45] Teachers may also be able to pursue greivances under the collective agreement.

The British Columbia Teachers Federation has a detailed Health and Safety Handbook which describes how teachers can take up health, safety and indoor air quality issues with the employer.[46] Teachers can participate on site-based joint and health and safety committees and raise radon with their supervisors or school principal. Collective agreements can also provide for district level joint health and safety committees which may be more appropriate where radon is known to be a problem in the wider area.

4. Building Code

The *BC Building Code 2018* now has mandatory provisions for radon 'rough-ins' for "Part 9" buildings— typically single family houses. This comprises the first stages of a sub-slab depressurization system which, if high radon is found after the building is constructed, can easily be converted to a full system.[47] There is, however, language which indicates that radon should be attended to in all buildings— including schools. All buildings should have "Air Barrier Systems" that prevent radon (and other gases such as methane) from entering from below the building.[48] Notes to the relevant sections refer to Health Canada radon guides and to the US Environmental Protection Agency's *Radon Prevention in the Design*

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[43] *WCA* s. 31 to 46.

[44] WCA ss. 38 and 39

[45] OHSR s. 3.8.

[46] BCTF, 2020. BCTF Health and Safety Handbook, 2020 avaialable at https://bctf.ca/uploadedFiles/Public/HealthSafety/BCTFHealthAndSafetyHandbook.pdf

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

[48] BC Building Code s,. 5.4.1.

and Construction of Schools and Other Large Buildings.[49] As well, heating, ventilating 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*.[50] 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.[51]

BC is in the process of rebuilding many of its schools. Since launching the Seismic Mitigation Program (SMP), the Ministry of Education has spent over $1.8 billion to complete high-risk seismic projects. The Ministry of Education currently has another $925 million allocated for high-risk seismic projects in BC's three-year capital plan.[52] There are 491 different seismic upgrading projects.[53] Seismic upgrading is primarily a concern on Vancouver Island and the Lower Mainland, where radon is less of a concern. However, school upgrades are occurring in areas of the province that have been singled out as radon prone— at least given the geographic designations in the BC Building Code. These areas include Abbotsford, Sunshine Coast (Sechelt), Sea to Sky (Whistler), Fraser-Cascade (Hope), Cowichan valley (Duncan). At the time of writing we have not been able to ascertain whether radon has been addressed in new schools.

5. Special Protections for Students

Students in schools are not covered by the workers' compensation system. However, courts have applied the laws of occupiers' liability and negligence to award damages to students who are hurt at school. 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.[54] School districts are routinely named as 'occupiers' in virtue of being in control of school grounds. Schools will be held to the "careful and prudent parent standard" when determining what

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[49] (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.").

[50] BC Building Code, 2018 s 6.2.1.5.

[51] BC Building Code, 2018, Notes to Part 6,A-6.2.1.1. Good Engineering Practice).....Radon Control.

[52] British Columbia Government, 2020. Seismic Mitigation Program available at https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/capital/seismic-mitigation.

[53] British Columbia Government, 2020. Seismic Mitigation Program, Progress Report, December 2020. available at https://www2.gov.bc.ca/assets/gov/education/administration/resource-management/capital-planning/seismic-mitigation/smp_online_report.pdf accessed December 10, 2020.

[54] *Occupiers Liability Act,* R.S.B.C. 1996, c. 337, s. 3(1).

is reasonable in all the circumstances of this particular case.[55] Claims under the laws of negligence may also succeed if the plaintiff can show that the defendant (school district) 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.[56] Schools should address radon both because it is a legal duty, and also to avoid risks of litigation. There is likely to be a long-time lapse between childhood exposure and later development of lung cancer which will reduce the occurrence of lawsuits.

Courts have also found that a fiduciary relationship exists between a school board and students. A school district has a duty to nurture, care for and protect the lives and the best interests of students and to provide a safe, non-threatening learning environment.[57] Breaches of fiduciary duty rest on specific conduct that causes harm to children in a manner involving disloyalty, self-interest, or abuse of power. There is not a 'justiciable standard' of what counts as child's best interest. Fiduciary obligations are not obligations to guarantee a certain outcome for the vulnerable party, regardless of fault. As such, the law on fiduciary obligations is likely too general to specify details of environmental conditions within schools. A breach of fiduciary duty might apply where a district (and its employees) clearly act self-interestedly rather than take steps to disclose and repair obvious dangers to health.[58] This could occur where elevated radon levels are known, but the results hidden and no steps taken to repair the situation.

There are few explicit protections for students' indoor environmental quality in the *School Act*, beyond the broad duties of school districts and superintendents to maintain school properties. However, there is one provisions that is particularly important to keep in mind. The *School Act* (at s. 11) provides a unique complaint mechanism that students and parents might take: If a decision of an employee of a board significantly affects the education, health or safety of a student, the parent of the student or the student may, within a reasonable time from the date that the parent or student was informed of the decision, appeal that decision to the board.[59] This applies not only to active decision-making, but also the failure to act.[60] Boards need to have a hearing process in place which typically involves the complainant appearing before the board. The Ministry of Education website on Student Disputes & Appeals recommends that complainants begin

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[55] *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.

[56] *Hussack v. Chilliwack School District No. 33*, 2011 BCCA 258.

[57] *E.D.G. v. Hammer,* 1998 CanLII 15064 (BC SC), affirmed in *D.G. (E.) v. Hammer*, 2001 BCCA 226 (CanLII)

[58] In *Grant v. Canada* (Attorney General), 2005 CanLII 50882 (ON SC). The Court held that a claim could proceed by a First Nation to the effect that mould in housing breached fiduciary duty.

[59] *School Act*, s. 11(2).

[60] *School Act*, s. 11(1).

with informal dispute resolution.[61] The person most directly involved can then consider speaking with the school principal, and after that staff in the school district office. Many board of education appeal policies require that people try to resolve concerns informally before making an appeal to a board of education. The ***School Act*** sets out a further procedure for appeals from board decisions.[62] A specific Appeals Regulation governs this, creating a limited list of topics, but safety and indoor environmental concerns are not included in this list.[63]

6. School Medical Officers

The *School Act* provides that regional health boards must designate a "school medical officer" for each school district.[64] School medical officers are also health officers within the meaning of the *Public Health Act* SBC 2008, c. 28.[65]

The Public Health Act provides medical health officers with general powers to inspect schools. Medical health officers have powers of inspection (s. 73(2)). The Act provides that health officers (including medical health officers) can enter places to perform inspections for the purposes of determining whether a health hazard exists or likely exists (s. s. 23 (a) (iv). For private dwelling there is a need to obtain either consent or a warrant (s. 25(2)(b) but for public spaces, such as schools, all that is requires is reasonable steps to notify the owner or occupier (s. 25(2). Health officers can make orders to prevent a health hazard (s. 30-31).

Much turns, then, on what counts as a "health hazard." The *Act* provides that this can be prescribed by regulation and the *Health Hazards Regulation* has a section which covers inadequate rental accommodation and describes conditions that make up a health hazard. However, it is restricted to requiring potable water, minimum limits on air space per unit, and a window that can open.[66] These provisions do not extend to radon. That said, the *Public Health Act* provides a very general definitions of "health hazard" as "a condition, a thing or an activity that endangers, or is likely to endanger, public health."[67] However, we found no cases in BC that indicate the scope of this general provision.

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

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[61] Ministry of Education, 2020. Student Disputes & Appeals, https://www2.gov.bc.ca/gov/content/education-training/k-12/support/student-disputes-and-appeals.

[62] *School Act*, s. 11.1.

[63]Appeals Regulation, BC Reg 24/2008.

[64] School Act, s. 89(1).

[65] School Act, s. 87.1, Public Health Act, s. 1.

[66] *The Health Hazards Regulation*, BC Reg 216/2011 at s. 7.

[67] Public Health Act, SBC 2008, c 28 s. 1.

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 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 is a decision by the Ontario Information and Privacy Commissioner which held that air quality and other environmental concerns fall within public health.[68]

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.[69] 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 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. [70]

These wider approaches focused on disease prevention certainly support public health interventions concerning radon in the home. Indeed, BC's Interior Health has already taken steps to address radon in daycares.[71] In Ontario, Public Health Ontario undertook specific studies on the Environmental Burden of Cancer which showed that

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[68] *Ontario (Natural Resources) (Re),* 2001 CanLII 26150 (ON IPC).

[69] World Health Organization, Europe. 2020. Public Health Services. Available at https://www.euro.who.int/en/health-topics/Health-systems/public-health-services.

[70] Burris, S., Berman, M. Penn, M. and Holiday, T. 2018 The New Public Health Law: A Transdisciplinary Approach to Practice and Advocacy. Oxford University Press, at p. 4.

[71] Interior Health, 2017. News and Resources from Licensing – May 2017. Available at https://carst.ca/resources/Documents/May%20News%202017%20-%20Interior%20Health.pdf accessed March 14, 2022, see also Canadian Environmental Law Association, 2018. Policy Measures to Address Radon in the Child Care Sector
Briefing Note for Child Care Sector Leaders. Available at https://cela.ca/wp-content/uploads/2019/07/Policy-Radon-Child-Care-Sector-EN-Mar2018-Update.pdf, accessed March 14, 2022, see also Phipps, E., Nicol, A.M., Giesbrecht, D., Cooper, K., Baytalan, G. and Bush, K., 2017. Call for action on radon in child care settings. Environmental Health Review, 60(3), pp.77-81.

radon was one of the most significant causes of cancer in the province.[72] These health studies were a key step that led Public Health Ontario to include radon education and awareness into the Public Health Standards, guiding documents for local health authorities in the province.[73]

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. While BC does not have a 'nuisance' clause, a comparison between provincial legislation indicates similarities between provisions for nuisance (in Alberta's legislation) and health hazard (in BC legislation). "Nuisance" is defined in the Alberta legislation 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" (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). In one case in Calgary, inspectors responded to a renter's complaint concerning radon, worked with the renter to complete tests and ordered the landlord to mitigate. Out of this process a Standard Operating Procedure (SOP) has been drafted but it remains unavailable to the public. Interviews with the public health official involved indicate that the SOP drafting was spurred by the fact the official had taken specific radon mitigation training.[74] In principle, similar procedures could be created in BC, given the similarities in the legislation.

The School Act also provides specific responsibilities for medical health officers in relation to schools. It is clear that various duties and powers of medical health officers assume the ability to inspect schools. As one school board states in an administrative procedure manual, the school medical officer "is responsible for ensuring the district's school buildings do not put the health or safety of students at risk".[75] For instance, s. 90 (2) allows a school medical officer to require a board to close a school when he or she considers that the health or safety of students is at risk.[76] They can also examine students' health and if necessary report to the board.[77] A good argument can be

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[72] Public Health Ontario, 2021. Environmental Burder of Cancer. Available at https://www.publichealthontario.ca/en/data-and-analysis/chronic-disease/environmental-burden-of-cancer, accessed November 2, 2021

[73] Ontario Ministry of Health and Long Term Care, 2018. Protecting and Promoting the Health of Ontarians, Ontario Public Health Standards: Requirements for Programs, Services, and Accountability. Available at https://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/protocols_guidelines/Ontario_Public_Health_Standards_2018_en.pdf accessed November 2, 2021.

[74] Interview with Ryan Lau, the inspector who oversaw the process, April 18, 2018.

[75] Vancouver School Board, 2018. VSB Administrative Procedure 314: Student Health Services and Requirements. available at https://www.vsb.bc.ca/District/Departments/Office_of_the_Superintendent/Administrative-Procedures-Manual/Administrative%20Procedures%20Manual%20Library/Section%20300/AP_314_Student_Health_Services_and_Requirements.pdf

[76] School Act, s. 90(2).

[77] *School Act* (s. 91(1).

made that examining health implies also examining risk factors, such as the presence of radon in schools. There are also provisions requiring health officers to make inspections when requested by the Minister responsible. Vancouver Coastal Health has interpreted this provision as supporting a School Inspection Guideline, which includes attention to indoor air quality issues.[78] Northern Health has policies for inspections being routinely done once every two or three years.[79] As well, high level initiatives such as "Healthy Schools BC" do provide performance standards and school assessment tools.[80] These mention the physical environment as well as holistic assessments of eating, social relationships, active living and healthy practices.

7. Independent Schools

Most of the radon protections that apply to public schools will also apply to independent schools—the *Occupational Health and Safety Regulation*, the *Building Code,* the *Occupiers Liability Act,* and the common law of negligence.

However, independent schools have a different governance system than public schools with the key legislation being the *Independent School Act*, RSBC 1996, c. 216 (ISA). This provides for a unique system of inspection. The *ISA* requires the Minister of Education to create an Inspector of Independent Schools[81] with the power to enter school buildings.[82] The Ministry conducts independent school inspections in regular cycles, and reviews facilities (meeting safety standards and municipal/regional codes and by-laws), educational programs (meeting curriculum requirements), and school administrative compliance. Each year the Ministry of Education conducts more than 200 independent school inspections.[83] Guidelines for external evaluation indicate that one important aspect is compliance with health and safety regulations generally. However, policy statements are given at a very high level, and radon is not specifically mentioned.[84] One component of the

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[78] Vancouver Coastal Health, 2011. School Inspection Guideline.available at https://fisabc.ca/wp-content/uploads/pdf/School%20Inspection%20Guideline%20-%20Final-1.pdf

[79] Northern Health, 2019. To: Superintendents of Public Schools and Independent School Authorities Re: Supports provided to schools by Northern Health. Available at https://www.northernhealth.ca/sites/northern_health/files/health-information/health-topics/school-youth-health/documents/mho-letter-schools.pdf accessed December 1, 2020.

[80] Dedicated Action for School Health, 2020. Healthy Schools, BC. Available at https://healthyschoolsbc.ca accessed December 1, 2020.

[81] *Independent School Act*, s. 2(1.

[82] *Independent School Act* s. 2(3)(a).

[83] Ministry of Education, 2020. Independent Schools Inspection Process available at . https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/independent-schools/inspection-process-for-independent-schools

[84] Ministry of Environment, 2020. External Evaluation and Inspection for Independent Schools. https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/legislation-policy/independent-schools/external-evaluation-and-inspection-for-independent-schools

evaluation is requirements for a municipal compliance letter for new schools, which includes compliance with building bylaws and public health requirements.[85]

8. Conclusions: Who Can Take Action and How

a. School Districts

The primary responsibility for managing radon risk falls on school districts, and the superintendents and boards who oversee them. School districts should address radon because it is a legal duty (given general obligations around safety of students and staff, and to comply with the *Occupational Health and Safety Regulation*). Addressing radon is also a way to avoid risks of litigation. School districts should have radon be included in safety programs, and test for radon where there is a significant likelihood that radon levels may be elevated. This will be so in parts of the province which have been identified as having a potential radon problem such the East Kootenays, Kootenay-Boundary, Okanagan, Northern Interior and Northeast health regions. [86] The British Columbia Centre for Disease Control now has an excellent map showing results of available radon testing across the province, with infographics by municipality, and diverse health boundaries.[87]

b. Parents

Parents can take action to make sure schools test for radon, and if necessary mitigate. Parents can make use of complaint mechanisms in the *School* Act section 11. Individual school boards will have policies for complaints, which should allow for hearings at a school board.

c. Teachers

As employees of school districts, teachers have a right to safe environments. Teachers can participate on joint health and safety committees to ensure testing and, if necessary, mitigation of their workplaces. They can ensure that employers (school districts)

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[85] See Ministry of Education, 2020. Sample Municipal Compliance Letter available at https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/independent-schools/documents.

[86] Health Canada, 2012. Cross-Canada Survey of Radon Concentrations in Homes - Final Report. 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#a10 accessed April 20, 2021

[87] British Columbia Centre for Disease Control, 2021. Radon. Available at http://www.bccdc.ca/health-info/prevention-public-health/radon accessed November 16, 2021

respond to recommendations, and if not they can take the issue up with WorkSafe BC and the collective agreement's grievance process.

d. School Medical Officers

School medical officers have the power to test for radon and report results to school boards.

e. Ministry of Education

The provincial government has clear powers to make specific orders for testing and mitigation in schools under the *School Act.* It can also update guidance on healthy schools to specify indoor air concerns, including radon.

Utlimately the issue in radon in schools is only part of the broader issue of radon action. Ideally, the province would engage in proactive radon planning, which would ensure all building are below Canada's Radon Guideline, and have specific rules mandating testing and mitigation for workplaces, renters, daycares, schools and other areas, and provide subsidies and incentives as part of proactive preventative health measures.