

RADON ACTION GUIDE APPENDIX: Municipal Tools and Resources

Prepared by: National Radon Program, Health Canada

DRAFT

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1. Education and Awareness

A key component of addressing radon is ensuring that people know that it is a health risk and have the tools to act to remedy it. Many government agencies in Canada and around the world have radon education programs, information portals and outreach resources, including municipalities.

1.1. Web Pages

Canada (Federal)

- [Take Action on Radon Resources for Stakeholders](#)
- [Health Canada Materials to Share or Print](#)

Canada (Provincial and Territorial)

- [Public Health Ontario](#)
- [Cancer Care Ontario, Risk of Residential Radon Varies Geographically](#)
- [Health Link BC](#)
- [Manitoba, Health, Seniors and Active Living](#)
- [Nova Scotia Environmental Health](#)

Canada (Municipal and Regional)

- [Peterborough Public Health](#)
- [Algoma Public Health](#)
- [Grey Bruce Public Health](#)
- [Toronto, Ontario](#)
- [Edmonton, Alberta](#)
- [Guelph, Ontario](#)
- [Chelsea, Quebec](#)

International

- [European Radon Association](#)
- [Ireland Environmental Protection Agency](#)
- [US Environmental Protection Agency](#)
- [Public Health England](#)

1.2. Local Government Resolutions on Radon

Educational programs can be strengthened by broad resolutions, such as legislation and declarations recognizing November as Radon Action Month in Canada.

- [Health Canada Radon Action Month and Lung Cancer Awareness Month](#)
- [Legislative Gazette Part I, November 1, 2019, No. 44, 2577-2624](#)
(Saskatchewan)
- [Edmonton, AB](#)

- [Chelsea, QC](#)

1.3. Canadian Guidance and Protocols on Testing and Mitigation

Health Canada

- [Government of Canada Radon Guideline](#)
- [Radon - Reduction Guide for Canadians](#)
- [Guide for Radon Measurements in Residential Dwellings \(Homes\)](#)
- [Summary Report on Active Soil Depressurization \(ASD\) Field Study](#)
- [Cross-Canada Survey of Radon Concentrations in Homes - Final Report](#)
- [Residential Radon Mitigation Actions Follow-Up Study: Public Summary](#)
- [Reducing Radon Levels in Existing Homes: A Canadian Guide for Professional Contractors](#)
- [Guide for Radon Measurements in Public Buildings \(Schools, Hospitals, Care Facilities, Detention Centres\)](#)

Canadian General Standards Board

- [Radon mitigation options for existing low-rise residential buildings. CAN/CGSB-149.12-2017 \(for purchase\)](#)
- [Radon control options for new construction in low-rise residential buildings. CAN/CGSB-149.11-2019](#)

2. Testing, Databases, and Mapping

2.1. Testing as Awareness

- [Take Action on Radon 100 Test Kit Challenge](#). This Health Canada supported campaign distributes 100 test kits to approximately 20 communities per year.
- [Yukon Radon Awareness Campaign](#). The Yukon Housing Corporation, in partnership with Yukon Lung Association, Health Canada, and Yukon Health and Social Services delivered a radon awareness campaign that included free radon kits and testing in remote communities.
- [Donna Schmidt Lung Cancer Prevention Society](#). In British Columbia, this non-profit, volunteer driven society provides radon test kits through the library offices of the Regional District of Central Kootenay in Creston, Nakusp, and Nelson.

2.2. Community Testing Initiatives

These initiatives aim to assess radon prevalence in a community through sample testing of homes and other buildings (ranging from approximately 400 to 1100 tests depending on community characteristics). They also improve awareness.

- Ontario Health Units, in support of policy changes related to building codes. Examples include:
 - [Thunder Bay District Health Unit](#)
 - [Kingston, Frontenac and Lennox & Addington Public Health](#)
 - [Windsor-Essex Health Unit](#)
 - [York Region Public Health](#)
 - [BC Lung Association, Radon Community Testing: BC Municipalities and Regional Districts](#)

2.3. Citizen Science Projects

- [Evict Radon](#). This includes significant public education and outreach materials.
- [Simon Fraser University Citizen Science Project for Radon Gas](#)

2.4. Database and Mapping Initiatives

Public maps in Canada

- [Health Canada Radon Map](#)
- [Nova Scotia Radon Map](#)
- [C-NRPP Radon Database and Map](#)

International Examples

- [EPA Map of Radon Zones](#)
- [United Kingdom Maps of Radon](#)
- [Connaître le potentiel radon de ma commune](#) (République Française. Institut de Radioprotection et de sûreté nucléaire)
- [Radon in the soil and air in Germany](#) (German Federal Office for Radiation Protection)
- [WHO Existence of National Radon Map](#)

Other Maps, Data Sets and Working Groups

- [Radon and Thoron Data from Canadian Homes](#)
- [British Columbia Centre for Disease Control BC Radon Data Repository](#)
- [Canadian Radon Mapping Working Group](#)
- [Radon Environmental: Mapping Radon Risk](#) (for purchase)
- [United Kingdom Radon Data: Radon Potential Dataset](#)

2.5. Library Lending Programs

Ontario

- [Thunder Bay Public Library](#)
- [Saul Ste. Marie Public Library](#)

- [Essex County Public Library](#)
- [Hamilton Public Library](#)

Alberta

- [Edmonton Public Library](#)
- [Red Deer Public Library](#)
- [Parkland Regional Public Library](#)
- [Marigold Library System](#)
- [Strathmore Municipal Library](#)

Nova Scotia

- [Nova Scotia Library Service](#)

Prince Edward Island

- [PEI Library Service](#)

British Columbia

- [North Shore and Sunshine Coast Libraries](#)
- [Kootenay's Library Federation](#)

Health Canada has a Radon Library Lending Program Guide. Available on request, send email to hc.radon.sc@canada.ca

3. Government Operations and Social Housing

3.2. Testing of Government Occupied Buildings

The federal government has completed a report on [Radon Testing in Federal Buildings](#).

Examples of radon testing of government buildings at the provincial level:

- [Environment and Labour Annual Accountability Report for the Fiscal Year 2007-2008](#) p. 12 (Nova Scotia)
- [Prince Edward Island](#)
- [Alberta](#)
- [British Columbia](#)

CARcinogen EXposure (CAREX) Canada's, 2017 [Radon in schools: A summary of testing efforts across Canada](#) documents radon testing across Canada. All public schools have been tested in Nova Scotia, Prince Edward Island, New Brunswick, Saskatchewan, Quebec, and the [Yukon](#). Some schools have been tested in British Columbia, Alberta, Ontario, and Northwest Territories.

3.3. Testing and Mitigation in Social Housing

- [Société d'habitation du Québec](#)
- [Annual Report of the Department of Housing and Community Development for the Province of Manitoba 2014/15](#) p. 55 (Manitoba Housing and Renewal Corporation)
- [Yukon Housing Corporation Annual Report 2018-19](#) p. 24 (Yukon Housing Corporation)
- [Kingston Social Housing](#)

4. Building Codes

4.1. Varying Building Code Provisions across Canada

There are radon provisions in the (model) National Building Code (with the radon provisions last updated in 2010), and many provinces have incorporated some radon provisions in their Code.

To unpack the variety of codes in Canada it may be useful to analyze different radon reduction strategies, ranging from the most rudimentary to the most effective.

- **Soil gas barriers:** This involves placing a membrane between the slab and the ground below. **Soil gas barriers are not considered an effective stand-alone radon reduction strategy.**
- **Radon rough-in with stub:** This involves the sealing of radon (and other soil gas) entry points, granular material below the slab, and a radon rough-in 'stub'- a short vent pipe which rises from the floor and is capped. This was added to Canada's National Building Code in 2010 and has been adopted into several provincial and territorial Building Codes. There is a significant risk that high radon environments remain untested and unmitigated. Current best practices require more complete systems.
- **Passive sub-slab depressurization:** This involves a pipe installed through the foundation that runs upwards through the inside of the building and vents to the outside at the roofline. British Columbia's Building Code started with the rough-in stub (following the National Building Code). A study found the radon rough-in stub was generally insufficient ([A Comparison of Three Radon Systems in British Columbia Homes: Conclusions and Recommendations for the British Columbia Building Code](#)). This led to [changes to the BC Code to require an outside venting pipe](#). While often effective at reducing radon, these systems cannot be relied on to reduce high radon concentrations to below the guideline level. Homes with these systems should still have the radon level tested.

- **Active sub-slab depressurization:** This involves adding a fan to passive sub-slab depressurization systems to further increase the reduction of radon. Québec’s Construction Code now requires the radon rough in with stub, with the additional need for radon test results to be submitted to the authority having jurisdiction (generally municipal building officials) and the addition of sub-slab depressurization sufficient to reduce levels to within Health Canada’s Guidelines.¹

| Building Code | If Limited Area of Application | Soil Gas Barrier | Radon rough-in with stub | Passive sub-slab depressurization |
|---|--|------------------|--|-----------------------------------|
| National Building Code of Canada, 2015 | | | Explained here | |
| <u>Provinces and territories that follow the National Building Code:</u> Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Newfoundland and Labrador, Northwest Territories, Yukon, Nunavut. PEI in major municipalities. | | | Explained here | |
| British Columbia Building Code, 2018 | Select municipalities predominantly east of Coast Mountains, see Table C-4 Locations in British Columbia Requiring Radon Rough-Ins | | | s. 9.13.4 |
| National Building Code – 2019 Alberta Edition | | | Explained here , to be augmented with testing and other design as per 6.2.1.1 and “good | |

¹ chapter B-1.1, r. 2, Construction Code, s. 9.13.4.6. available at <https://www.quebec.ca/en/homes-and-housing/healthy-living-environment/residential-radon/#c4360> accessed March 4, 2021

| | | | | |
|--|---|--|---|---|
| | | | engineering practice' | |
| Ontario Building Code, 2017 in Conjunction with Supplementary Standard SB-9, providing three options | Areas of Ontario with known radon problem | s.9.13.4.2.4(a) and Supplementary Standard SB-9, explained here (with Voluntary radon gas testing) | Supplementary Standard SB-9, explained here | 9.13.4.2. 4(b) and Supplementary Standard SB-9, explained here |
| Quebec Construction Code | | Quebec Construction Code A-9.13.2.1.(3) (prior to Sept 2020) | Quebec Construction Code, 9.13.4.6. (as of September 2020), | Quebec Construction Code, 9.13.4.6. (as of September 2020), if test results show need |

Current best practices in mitigation are outlined in the [Canadian General Standard Board's 2019 "Radon control options for new construction in low-rise residential buildings"](#) and should be referenced in building codes. The standard provides detailed technical prescriptions for radon mitigation strategies.

There are significant benefits to targeting radon prone areas and requiring new homes to have operational systems (i.e., at least a passive sub-slab system), ensuring that homes are built with less radon in them and reducing the incidence of radon-induced lung cancer in higher risk regions.

If Building Codes continue to require forms of 'rough-ins' that are incomplete, provinces and territories should consider requiring clear labelling on these systems stating that they are incomplete, and that further radon testing is required by homeowners once they occupy the home. Provinces and territories can consider requiring builders to leave radon test kits and informational guides with new homeowners and requiring occupants of new homes to test for radon.

4.2. Radon in Municipal Building Codes

In some provinces (Quebec, Newfoundland and Prince Edward Island), there are possibilities for municipalities to put more stringent requirements in place that go beyond provincial building code requirements.

- [Municipalities Act, 1999, SNL 1999, c M-24 s.414\(1\)\(d\)](#), and [s. 414\(3\)](#);
- [Building Codes Act, RSPEI 1988, c B-5.1 s. 16\(5\)](#); s. 26;
- [Act respecting land use planning and development, RSQ, c. A-19.1, s. 118](#)

Some municipalities independently enact codes that meet the National Building Code (including for radon).

- [City of St. Johns, Building By-Law, By-Law No. 1438](#), s. 46

Municipalities that have implemented their own radon standards include:

- Muncipalité de L' Ascension, [Règlement numéro 2000-350 relatif à la construction s. 2.17.2](#) (This calls for a rough-in stub similar to the National Building Code requirements).
- Muncipalité de Chelsea. [Règlement de construction numéro 638-05 s. 9.5](#) (These provide technical specifications for a 'rough in stub' similar to the National Building Code provisions, plus requirements for testing and if over Canada's Radon Guideline, the connecting of a sub-slab depressurization system).

In Ontario, the radon provisions only apply in "known radon areas". The following municipalities have taken steps to implement the Building Code provisions and provide explicit direction to builders:

- [Radon Gas Mitigation Program](#) (Guelph, ON)
- [Soil Gas Mitigation Strategy](#) (Kingston, ON)
- [Soil Gas Mitigation Program](#) (Central Elgin, ON)
- [Residential Construction Requirements for Radon Gas Mitigation](#) (Hamilton, ON)

In British Columbia, the [BC Building Code, 2018](#) lists specific municipalities where radon mitigation systems are needed (at [Division B Appendix C Table C-4. Locations in British Columbia Requiring Radon Rough-Ins](#)). Municipal governments can take steps to be added to this list if they have evidence of elevated radon in their area.

4.3. Building Code Enforcement

Municipal building inspectors are encouraged to make use of Canadian- National Radon Proficiency Program (C-NRPP) Training for Building Professionals: [Controlling Radon in New Canadian Homes \(CRNCH\): CNRPP-EL-9](#)

Hamilton, Ontario's [radon inspection process](#) can serve as an important example. The web page clearly indicates builders' and owners' responsibilities. For new construction and/or additions, the property owner or builder is required to arrange for inspections relating to:

- Installation of the rough-in soil gas pipe and granular material prior to pouring the basement slab.
- Installation of soil gas barrier on foundation wall and under floor slab.
- Sealing of the perimeter of the slab.

- Pipe cap and labelling and inline fan (where required) prior to occupancy.

As well, depending on the radon gas mitigation option chosen by the builder, it is the property owner's responsibility to conduct radon gas testing (following specified procedures) and submit the results to the City. Where mandatory radon gas testing results come back above 200 Bq/m³ (becquerels per cubic metre), the property owner is to install an active subsoil depressurization system and ensure any resultant decrease in soil temperature will not adversely affect the foundation using documentation provided by a qualified person.

5. Standards of Maintenance Bylaws

5.1. Housing and Maintenance Standards

Many provinces have specific wording in municipal law allowing local governments to make standards of maintenance bylaws. For examples see:

- [Local Government Act, RSBC 2015, c 1 s. 298\(1\)\(n\)](#) (British Columbia)
- [Municipal Act, CCSM c M225 s. 232\(1\)\(c\) and 233\(a\)](#) (Manitoba)
- [Building Code Act, S.O. 1992, c.23, s. 15.1](#) (Ontario)
- [Act respecting land use planning and development, CQLR c A-19.1 s. 145.41](#) (Quebec)
- [Local Government Act, SNB 2017, c. 18 s. 10\(1\)\(e\)](#) (New Brunswick)
- [Municipal Government Act, RSPEI 1988, c M-12.1 s. 180\(i\)](#) (Prince Edward Island)

In some cases, there is a process for approval of standards of maintenance bylaws:

- [Local Governance Act, SNB 2017, c 18 s. 17\(b\)](#) (New Brunswick)

Provinces also at times provide specific language directing municipalities to receive complaints, make investigations and issue orders against landlords.

- [Residential Tenancies Act, 2006, SO 2006, c. 17 s. 224 to 225](#) (Ontario)
- [Act respecting land use planning and development, CQLR c A-19.1 s. 145.41](#) (Quebec)
- [Residential Properties Maintenance and Occupancy Code Approval Regulation, NB Reg 84-86, s. 3](#) (New Brunswick)
- [Occupancy and Maintenance Regulations, CNLR 1021/96, s. 41](#) (Newfoundland and Labrador)

Municipalities are encouraged to have standard of maintenance bylaws that protect renters indoor air quality, including from radon. Radon specific provisions can specify that:

- Canada's Radon Guideline applies to rental accommodation in the municipality.

- Landlords are required to test for radon following Health Canada approved procedures.
- Tenants and prospective tenants must be notified by right of test results.
- Tenants have the right to conduct their own tests and a procedure established in case of disagreement.
- For average long-term results over Canada's Radon Guideline mitigation must be performed by a C-NRPP certified radon professional to as low as reasonably achievable.
- For average long-term results over 600 Bq/m³ mitigation must be completed within one year.
- That testing be repeated every five years.

5.2. Enforcement of Bylaws

Municipalities should take steps to enforce standards of maintenance bylaws.

An example of an enforcement bylaw is the City of Waterloo's [Rental Licensing Bylaw 2011-047](#). This has a number of provisions that could be used to enforce standards of maintenance.

- Requires landlords to have a license to conduct a Residential Rental Business.
- Allows the Director of Municipal Enforcement Services for the City (or his/her staff or designates) to require information and documentation as part of issuing or renewing a license, including that the landlord have a property maintenance plan to ensure compliance with the City's Property Standards bylaw.
- Allows city officials to enter on land to carry out inspections.
- Provides for the city to make orders to ensure compliance with the bylaw.
- If a landlord does not comply with an order, the city can make a order work and charge the landlord.
- Allows for a license to not be renewed in cases of non-compliance with the law, or where there are outstanding orders pursuant to the City's Property Standards By-Law, to comply with the Building Code, or by the Medical Officer of Health.

Iowa City, Iowa has instituted [Radon Testing Requirements](#) for rental properties. This plans for a two-year inspection cycle whereby all single family detached and duplex units that become rentals will need to be tested and come into compliance with the regulation.

6. Radon Requirements in Public Spaces

6.1. Radon Provisions for Clean Air and Health Bylaws

Municipalities can regulate radon in indoor spaces, including for businesses, recreation centres and other areas accessible to the general public. Similar to smoking regulations, these can be made a part of general health or clean air bylaws. Details can include:

- Indoor spaces open to the public should have radon levels below Canada's Radon Guideline of 200 Bq/m³.
- Business owners, governments and other occupiers of buildings are required to test for radon following Health Canada approved procedures.
- Test results should be clearly identifiable, posted, and visible to the public.
- For average long-term results over Canada's Radon Guideline mitigation must be performed by a C-NRPP certified radon professional to as low as reasonably achievable.
- For average long-term results over 600 Bq/m³ mitigation be completed within one year.
- Testing be repeated every five years.
- The municipal government creates an inspection process to verify testing and mitigation has occurred.
- Enforcement through business licensing and permitting.

7. Subsidies and Incentives for Radon Testing and Mitigation Prizes

- [Radon Reduction Sweepstakes](#) – Take Action on Radon and the Canadian Association of Radon Scientists and Technologists offered a \$1,000 prize (in 10 regions) towards the cost of mitigation.

Distribution of Free or Subsidized Test Kits

- Take Action on radon's [100 Test Kit Challenge](#) distributes 100 free test kits to 10 or more Canadian municipalities a year.
- [The Donna Schmidt Lung Cancer Prevention Society](#) (charity in the Kootenays Region of British Columbia).
- Ontario health boards have distributed free test kits as part of community testing ([Appendix, section 4](#)).
- [State of Pennsylvania and the American Lung Association](#) -- targeted free distribution for high-risk zones.
- The [Wyoming Department of Health](#) offers free home radon test kits.
- The Canadian municipalities of [Chelsea, QC](#) and [Saint Joseph du Lac, QC](#) sell subsidized test kits.

Free Air Quality Inspections

- The City of Fort Collins, Colorado has a [Healthy Homes](#) program, which offers free indoor air quality testing in resident homes, including for radon, as well as self-assessment tools.

Tax Credits for Mitigation

- [Saskatchewan's renovation tax credit](#) [now includes radon mitigation](#).

Loan Programs

- [Manitoba Hydro's Energy Finance Plan](#) provides an on-bill financing loan for upgrades to gas and electrical systems and includes radon mitigation.

Direct Subsidies

- The [Habitation Durable](#) program in Quebec offers financial subsidies to home renovations, including radon, and applies in Dixville, Piessisville, Ham-Sud, Dixville, Petite-Rivière-St-François, St-Valérien, Varennes and Victoriaville.
- After participating in Take Action on Radon's 100 Test Kit Challenge, the [City of Vaudreuil-Dorion](#) began selling radon detectors for just \$5, including analysis and shipping. It will reimburse 50 per cent of the cost of installing a radon mitigation system to a maximum of \$500 per residence.

8. Energy Efficiency

The following guides, standards and programs include radon.

8.1. Energy Efficiency Guides

- [Keeping the Heat In, s. 1.4.3](#) (Natural Resources Canada, 2018.)
- [BC Housing Design Guidelines and Construction Standards](#)

8.2. Home Renovation Subsidies and Incentives

- The Saskatchewan Provincial Government's [Home Renovation Tax Credit](#) allows homeowners to claim a 10.5% tax credit on up to \$20,000 of eligible home renovation expenses. The eligible expenses include the cost of labour, professional services, and the building materials required for radon reduction measures.
- [Habitation Durable](#) provides financial incentives for residents of Victoriaville, Dixville, Piessisville, Ham-Sud, Dixville, Petite-Rivière-St-François, St-Valérien, and Varennes. It includes both a range of energy efficiency upgrades as well as radon.

8.3. Financing for Energy Efficiency and Home Repairs

- [Yukon Housing Corporation Home Repair Loan](#) program with reduced interest up to \$50,000 at interest rates of prime + 1% amortized over 15 years.
- [Manitoba Hydro Energy Finance Plan](#) is an 'on bill' financing program for upgrades to energy systems in homes. It includes financing for radon mitigation.

8.4. Green Certification Standards

- Natural Resources Canada, 2012. [R-2000 Standard](#).
- LEED. See [Direction on Radon Resistant Construction Techniques to Meet Prerequisite EQ 9.1 in LEED Canada for Homes](#) and [Reference Guide for Homes Design and Construction](#), page 364
- [Exigences Techniques, Colets, Maison et Petit Bâtiment Multilogement](#) (Novoclimat)
- [BOMA BEST Sustainable Buildings 3.0 Universal Questionnaire](#) (BOMA BEST Building Environmental Standards)