



## RADON: Engineers and the Law

### What Is Radon Gas?

Radon occurs naturally when uranium breaks down in rock and soil. It is an invisible, odourless and tasteless gas. As radon leaves the ground, it dilutes in outdoor air and becomes harmless. However, radon can seep from the ground into homes through small cracks and openings. In some homes it can accumulate in higher concentrations, posing a health risk. About 7% of homes in Canada have radon over the [National Radon Guideline](#) of 200 Bq/m<sup>3</sup>. In some BC communities, more than half of homes have radon above this level.

### Radon and Human Health

Radon is naturally occurring radiation and when breathed in can cause lung cancer. Radon gas is the #1 cause of lung cancer in non-smokers. Radon causes approximately 3,360 deaths per year in Canada. Health Canada research estimates that with lifetime exposure at 800 Bq/m<sup>3</sup>, the lifetime lung cancer risk would be one in 20 for non-smokers, and one in three for smokers.

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### Why do Engineers Need to Know about radon?

Engineers' plans are an important part of building construction. Developers, builders, municipalities and homeowners often rely on engineers to ensure buildings are safe. Preventing elevated radon is an important part of safety. There are now radon provisions in the BC Building Code and good reason to think radon is covered by New Home Warranty.

If engineers overlook radon, they may face legal claims in contract or negligence by builders, contractors, or homeowners. Municipalities may also rely on Letters of Assurance from engineers that say buildings comply with the Building Code. If municipalities are sued over high radon, they may in turn make claims against engineers.

### Testing for Radon

Radon levels can vary significantly from building to building. The only way to know radon levels in a building is to test. Testing is simple and ideally done using long term "alpha trackers". These hockey-puck sized units cost \$20 to \$60 and are available at leading retailers or from the BC Lung Association at our [website](#), by email: [info@bc.lung.ca](mailto:info@bc.lung.ca) or by phone: 604.731.5864. Digital detectors are also available or a certified professional can test a home.

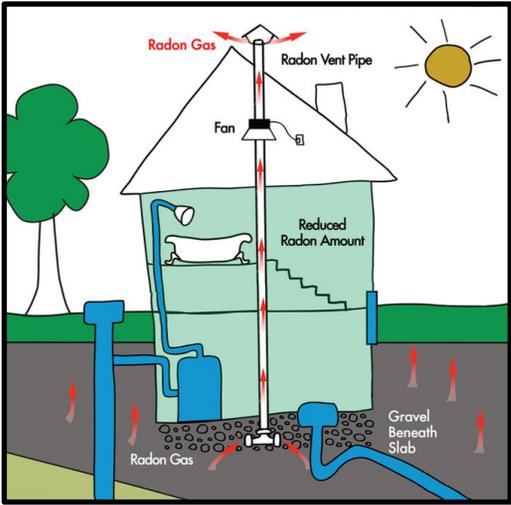
Health Canada recommends taking action to reduce levels within two years if radon levels are 200-600 Bq/m<sup>3</sup>. If results are greater than 600 Bq/m<sup>3</sup>, Health Canada recommends taking steps to reduce the level within one year.

### Mitigating High Radon

Elevated radon can be avoided in new construction by installing a radon mitigation system. The best systems use "sub-slab depressurization". A hole in the building foundation and a vent pipe ensures low pressure on the ground floor does not result in radon being sucked indoors. Best practices in radon mitigation are described in Canadian General Standards Board (CGSB) [Radon control options for new construction in low-rise residential buildings, CAN/CGSB-149.11-2019](#).

In older homes, if radon levels exceed 200 Bq/m<sup>3</sup>, professional radon mitigators can install systems in 1-2 days. The [Canadian National Radon Proficiency Program](#) (C-NRPP) lists certified radon mitigation professionals nationwide.

Energy efficiency improvements have been documented to increase radon levels. It is particularly important to test for radon after energy efficiency upgrades to make sure any improvements do not trap radon gas.



**Division B Appendix C Climatic and Seismic Information for Building Design in British Columbia. Table C-4 -Locations in British Columbia Requiring Radon Rough-Ins**

100 Mile House Abbotsford Ashcroft Atlin Barriere Burns Lake Cache Creek Castlegar Carmi Chetwynd Clearwater Cranbrook Crescent Valley Dawson Creek Dease Lake Dog Creek Duncan Elko Fernie Fort Nelson Fort St. John Genelle Glacier Golden Grand Forks Greenwood Hope Invermere Kamloops Kaslo Kelowna Kimberley Lillooet Little Fort Lytton Mackenzie McBride McLeod Lake Merritt Montrose Nakusp Nelson Osoyoos Penticton Prince George Princeton Quesnel Revelstoke Rossland Salmon Arm Sechelt Smith River Smithers Stewart Taylor Terrace Trail Valemont Vaverby Vernon Whistler Williams Lake

section 1.1.3.3 (2) allows other towns to be added if they choose

## BC Building Code

The BC Building Code has provisions for radon prevention in select municipalities, mostly east of the Coast Mountains (s. 9.13.4). Prescriptive standards calls for the foundation hole and vent pipe but not a complete system. To prevent high radon, it remains necessary to test the building. If radon levels remain high, the system can be completed by adding a fan.

Engineers need to ensure they understand the Building Code provisions. We also recommend that engineers advise their clients to use C-NRPP- certified mitigators to ensure radon protection in new buildings.

## New Home Warranty

New Home Warranty is an insurance policy that covers most new homes in BC. Homeowners may make claims under the New Home Warranty for high radon.

Courts would most likely find high radon to be a defect in materials or structure. In Ontario, Tarion (the province's only home warranty insurance provider) [agrees that high radon is a defect.](#)

Engineers need to make sure buildings are tested to ensure there is no high radon, even if the Building Code is followed. Builders who face New Home Warranty claims may in turn make claims in contract against engineers.

## Engineers' Duty of Care

Under the law of negligence, engineers need to ensure the homes they design or build are safe. In law, engineers owe a duty of care to building occupants if it is foreseeable that failure to take reasonable care could lead to defects (like radon) that pose danger to the occupants' health and safety.

If engineers don't take reasonable care, they may have to pay damages to the current or future occupants, including paying to repair high radon.

If a home is not designed to take radon into account, future residents may develop lung cancer, and then sue engineers, even if their negligence was only part of the problem.

## Professional Standards

Engineers need to follow Engineers and Geoscientists British Columbia's *Code of Ethics*. Principle 1 emphasizes the importance of human health and safety. Engineers should not complete, sign or seal plans or other documents that, in their professional opinion, would result in conditions detrimental to human welfare. Principle 2 says engineers should ensure they should only take on work for which they have sufficient training or experience. If radon problems can be traced back to engineers, members of the public can make complaints to Engineers and Geoscientists British Columbia, which in turn may hold disciplinary hearings.

## What Should Engineers Do?

Engineers should:

- Ensure radon mitigation systems are designed into buildings
- Advise their clients to use C-NRPP- certified mitigators for radon tests and systems.
- Ensure that homes are tested for radon after they are built.
- If it is not possible to fix radon issues before occupancy, engineers should ensure that new occupants have help to test for radon. If high radon is found, it must be mitigated.

## Further Information

This is an abridged version of a more detailed legal opinion, titled **RADON: Rights and Liabilities in Construction Law** which includes further information, resources, and legal analysis. To learn more please visit our website on [Radon: Rights and Duties](#) or contact us at [healthyindoor@bc.lung.ca](mailto:healthyindoor@bc.lung.ca)



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