

Radon Exposure and Canadian Homes

Information for REALTORS®



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CREA
THE CANADIAN REAL ESTATE ASSOCIATION

What is radon?

Radon is a colorless, odorless and tasteless gas formed by the natural breakdown of uranium in soil, rocks and water. It seeps from the ground, and small amounts of radon are always present in the air. If radon gas enters a closed space like a home, it can build to higher concentrations.

Potential impact on human health

Radon is radioactive, and potentially carcinogenic if enough of the gas builds up. It is estimated that radon exposure is responsible for about 10 per cent of lung cancer cases in Canada, second only to smoking. Health Canada estimates that 1,900 Canadians died in 2006 from lung cancer resulting from radon exposure.

Concerns about radon exposure in Canadian homes date back to the mid-1970s, when tests found high levels of radon in houses near uranium mines and processing centres. The Government of Canada then tested for radon in 18 cities across Canada, and a small minority of the 14,000 homes surveyed registered high concentrations.

The concentration of radon at residential levels that poses a significant risk to human health has been the topic of much debate since the 1970s. According to Health Canada, radon is not able to penetrate skin, and has no effect on the outer body or on a person's immediate health. Health Canada says the only known health hazard from elevated radon exposure for extended periods is an increased risk of developing lung cancer.

Although this connection is well known, researchers have had trouble tracking cumulative levels of radon exposure because most people change residences –and therefore exposure levels – several times over an entire lifetime.

Radon concentration is measured in units called “becquerels per cubic metre” (Bq/m³). The old radon guidelines in Canada, established in 1988, stated that annual average radon concentrations in a home should not exceed 800 Bq/m³. This guideline was based on studies of risk among uranium miners, however, recent research has shown that exposure to radon in a home with a level of concentration much lower than 800 Bq/m³ causes an increased lung cancer risk.

Most industrialized countries have had more stringent standards than Canada for some time, and the United States has the strictest at 150 Bq/m³.

Health Canada's June 2007 radon guidelines recommend a limit of 200 Bq/m³ on annual average radon concentration in Canadian homes. For newly built homes, the recommended limit is 100 Bq/m³. This standard will apply to other heavily occupied buildings as well, like schools, hospitals, long-term care residences and correctional facilities.

Health Canada projects that the implementation of the new guidelines should help to reduce the number of deaths from lung cancer due to radon exposure in this country by one-third.

- It's been shown that smoking in conjunction with radon exposure causes an enormous increase in lung cancer risk. A lifelong smoker who is not exposed to radon has a one in eight risk of getting lung cancer. If you add exposure to high radon levels, the risk becomes one in three. A non-smoker exposed to the same high radon level has a one in 20 lung cancer risk.

- Studies showing a conclusive link between radon levels above 200 Bq/m³ and an increased risk of developing lung cancer were conducted in Europe in 2004, and then in North America in 2005. Canada's June 2007 guidelines are identical to those already in place in Australia, Norway, Spain, Sweden and the United Kingdom.

Radon exposure in homes

The level of radon inside a home typically ranges from between 30 and 100 Bq/m³. The normal concentration of radon outdoors is about 10 Bq/m³. While indoor radon levels are higher than outdoor levels, most homes can be kept below 75 Bq/m³ – much lower than the new recommended maximum level of 200 Bq/m³.

Unfortunately it's impossible to tell which houses will have high radon levels without testing. According to the best estimate available from Health Canada, about 175,000 homes across Canada have radon concentrations above 200 Bq/m³.

Radon build-up in homes is more prevalent in some regions of the country – such as in and around the Canadian Shield and B.C.'s interior region. Health Canada is currently working to develop a map of where exposure levels could be higher.

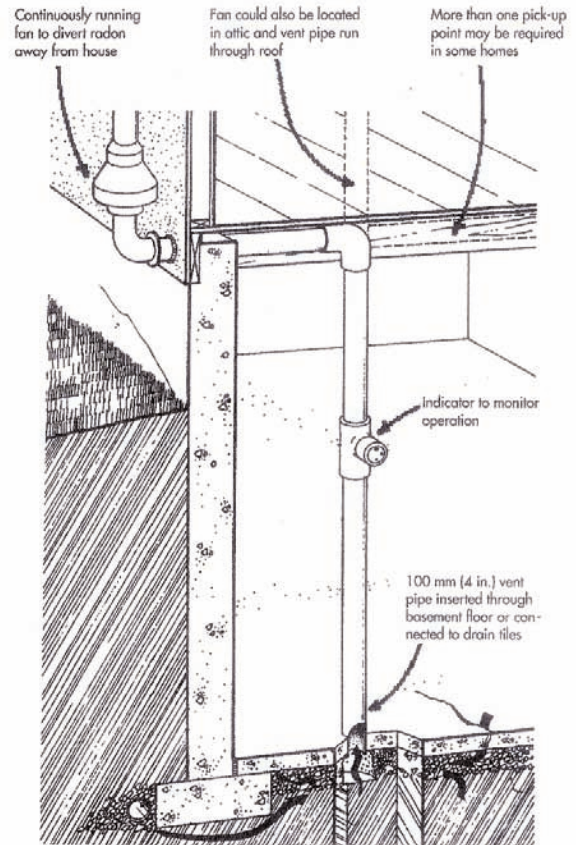
The type of soil under a home will influence potential radon exposure because different soils have different concentrations of uranium, and because radon flows more easily through some soils than others. The manner in which a home is constructed can also influence radon dissemination as some methods of construction have more contact with the soil, creating more or larger entry points for radon.

Radon concentrations can be startlingly variable on a house-by-house basis. Even next-door neighbors sometimes have wildly different radon levels in their homes. **It can never be assumed that any given house will have high radon levels, or that it will have low radon levels.**

Radon levels can also vary within a home. They can build up during winter, when houses are closed up tightly, to several times what they are in summer. Radon also tends to concentrate in basements, which are both closer to the source of radon (the soil) and less ventilated than other areas of a home. **Health Canada suggests that every house needs to be tested for radon.**

The guidelines recommend that remediation work should be carried out within a year in any home with radon concentrations above 600 Bq/m³. If a home has radon concentrations between 200 and 600 Bq/m³, remediation work should be carried out within two years.

Health Canada recommends carrying out as much remediation work in the home as is reasonable to bring radon concentrations below 200 Bq/m³. This remediation work usually costs somewhere between \$800 and \$2,500. If a home still has radon concentrations above the recommended limit after remediation work is done, Health Canada recommends that the situation be evaluated on a case-by-case basis – Health Canada doesn't recommend extensive repairs on a home if they would yield only minimal benefits.



Testing for radon

Canadian consumers are becoming more aware of the health risks associated with high levels of radon gas exposure, and Health Canada is planning public awareness campaigns that could lead to a heightened concern among the home buying public.

- Home buyers and renters may ask REALTORS® about radon gas levels in a home during the purchase or rental application process. It is also possible that some potential buyers will add radon clauses to contracts.
- The new Health Canada guidelines are not mandatory, and under current laws no one is obligated to test for radon in their homes, or to keep their home's radon concentration below 200 Bq/m³. The intent of the guidelines is to encourage people to do all they reasonably can to get their radon levels as low as practical, as quickly as possible. The new regulations recognize that homeowners usually do a much better job of both testing their homes and mitigating any radon problems when they do so to benefit their own health.
- The guidelines set down a model for any new regulations provincial or municipal governments may create, especially with regard to new building codes or standards. Some jurisdictions, like Port Hope, Ontario, have already implemented strict radon regulations for some time. REALTORS® have an obligation to be aware of local bylaws and provincial regulations in the areas where they do business.

Health Canada had considered making radon testing a mandatory part of real estate transactions but has abandoned this approach at the present time due to concerns raised by industry groups, including CREA.

The American experience with this kind of regulation has proven to be extremely problematic. In the U.S., 70 per cent of radon measurements occur at the time of sale. Radon mitigation has evolved from a health issue into a financial issue, with home owners just wanting to remove a contingency from their real estate sale. Some people with high radon concentrations in their homes have run into problems getting insurance or mortgages, even after having repair work done.

Testing for radon can usually be done reliably for about \$50. Different testing devices take anywhere from a few days to a few months to collect samples – the longer the term, the better and more conclusive the test. An initial short-term test usually gives an acceptable reading, but a longer-term test (or a later second test) would make for a more reliable result.

There are five types of radon testing devices on the market today:

Charcoal Detectors

These are the simplest devices on the market, and are basically containers filled with charcoal and covered by a filter. They are exposed to the air for a few days to a week, then sealed and sent to a laboratory. The tests cost between \$15 and \$30, including analysis.

Passive Alpha-Track Detectors

These detectors use a small sheet of film covered by a filter that is exposed to the air for several months, for as long as a year, before being sealed up and sent to the lab. These devices cost between \$30 and \$50, with analysis included.

Active Alpha-Track Detectors

These operate in the same manner as the Passive Alpha-Track Detectors, except a pump is used to push air through the device. It can therefore do the same job in less time, and goes back to the lab within two months. These devices cost about \$70, again including analysis.

Electret Ion Chamber Detectors

These contain a disk with an electrostatic charge that, when exposed to the air, measures changes in the charge to determine radon levels. Different versions of these detectors perform short-term tests of days or weeks, or long-term tests of weeks or months. These detectors cost about \$30 to \$50 and the results can be analyzed at home as well as in a lab.

Continuous Monitors

These are devices used by professionals to measure radon constantly, and report results hourly. This approach is considerably more expensive than other measurement methods, and it takes some expertise to use the device and interpret the test results. Continuous monitors are most useful for follow-up measurements, or to monitor the success of completed radon reduction work.

Testing for radon

Radon levels can vary over time, especially from season-to-season, so a longer-term test gives a better indication of annual average radon exposure. Passive Alpha-Track and long-term Electret devices are recommended by CMHC as the best products for extended measurement.

Building, hardware or health care retail stores may sell radon detectors. Other companies selling radon detectors are listed in your local Yellow Pages.

There are a number of factors that influence radon levels in a home. Although some of those factors are beyond the control of home owners, others can be remedied.

The most controllable factors affecting the penetration of radon into a home is the condition of the foundation. Foundations with cracks or openings allow more entry points for radon to seep indoors. The foundation can be repaired to reduce the level of radon concentration in a home.



Long-term Electret Ion detectors are reliable tools for radon testing. Generally, devices with longer testing periods give more conclusive results

Canada's Radon Capital

Some parts of Canada have unusually high concentrations of radon seeping out of the soil, and are therefore more likely to have problems with radon seeping into homes. Areas like the B.C. interior, Winnipeg, Manitoba and parts of Nova Scotia have higher radon levels. This may be because they have large uranium deposits underground, porous soils, or a combination of the two.

The region with the dubious distinction of being Canada's radon capital, however, is the area around Port Hope, Ontario. It was there that the first surveys of radon levels in the home were done after high levels of the gas were detected in several commercial buildings.

Roughly two million cubic metres of low-level radioactive waste and contaminated soil are located at various sites in the Municipality of Port Hope and at the Port Granby Waste Management Facility in eastern Clarington. The waste materials contain radium-226, uranium and arsenic in various proportions.

In 1976, after high radon levels were found in a local school, every house in Port Hope's Ward 1 was tested for the gas.

Port Hope's Low-Level Radioactive Waste Management Office (LLRW), established in 1982, has since lowered its action level for radon to 150 Bq/m³, making it the jurisdiction with the tightest standards in the country. Everyone who purchases a home in Port Hope is also sent a letter from the LLRW office providing them with information on the home's radon levels, and specifying when it was last tested.

Thanks to decades spent managing this gas, some Port Hope contractors have developed a great deal of experience as radon remediators. Among the things they've learned is that people's habits, and how well they take care of their homes, can influence radon levels. Opening windows and doors to control temperatures, rather than keeping the house shut up and relying on heating or air conditioning, can help reduce radon concentrations. Renovations, particularly add-ons, can cause a change in the amount of radon collecting in a home.

Encouragingly, experience from places like Port Hope and from the United States shows that radon concentrations can be brought below 200 Bq/m³ in practically any dwelling using current techniques – radon is a manageable problem.

Lowering radon levels

Some recommendations include:

- 1) Renovating existing basement floors, particularly earth floors.
- 2) Sealing cracks and openings in walls and floors, and around pipes and drains – sump pumps are a common source of radon infiltration, and sealing the sump can significantly reduce radon levels in a home.
- 3) Ventilating the sub-floor of basement floors – this is the most effective way to reduce radon concentrations.

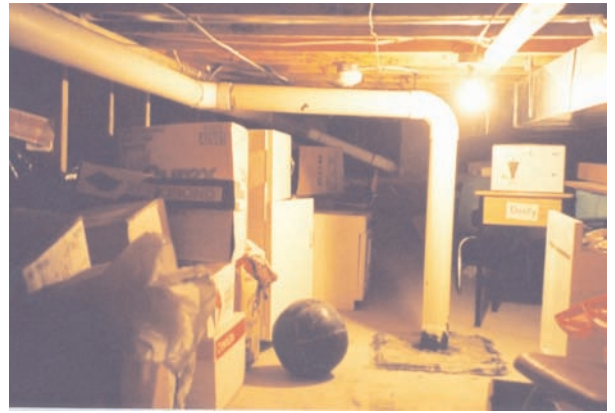
The cost of fixing high radon levels usually varies between a few hundred and several thousand dollars. Government surveys put the average cost at around \$1,200.

Radon risk increases with the duration of elevated radon exposure. If remediation is required, Health Canada recommends taking action as soon as possible. If radon concentrations are above 600 Bq/m³, Health Canada recommends starting work within one year. If concentrations are between 200 and 600 Bq/m³, the recommendation is to start repairs within two years.

If radon concentrations are only a little higher than they should be, however, some lifestyle changes may be enough to reduce them to acceptable levels.

Exhaust fans and fireplaces – or anything else that moves large amounts of air – increase the pressure difference between the house and the soil, causing more radon to be drawn into the house. Using these less often can reduce radon concentrations. Also, using windows to control temperature as much as possible, rather than relying on heating or air conditioning all the time, can help dissipate the gases.

After taking steps to remedy elevated radon levels, further testing can be done to evaluate success.



Sealing openings in the Foundation, and venting air up and out of the house can help reduce radon levels to acceptable levels.



If a "passive" vent isn't enough, a fan can be added to pull the air outside the house.

What REALTORS® need to know

Canadian consumers are becoming more aware of the health risks associated with high levels of radon gas exposure, and Health Canada is planning public awareness campaigns that could lead to a heightened concern among the home buying public.

Home buyers and renters may ask REALTORS® about radon gas levels in a home during the purchase or rental application process. It is also possible that some potential buyers will add radon clauses to contracts.

The new Health Canada guidelines are not mandatory, and under current laws no one is obligated to test for radon in their homes, or to keep their home's radon concentration below 200 Bq/m³. The intent of the guidelines is to encourage people to do all they reasonably can to get their radon levels as low as practical, as quickly as possible.

Although Health Canada had considered making radon testing a mandatory part of real estate transactions, concerns raised by CREA and other industry groups caused this approach to be abandoned. The American experience with this kind of regulation has shown that it encourages home owners to think of radon remediation as a financial, rather than a health issue. Some people with high radon concentrations in their homes have run into problems getting insurance or mortgages, even after having repair work done. The new Canadian regulations recognize that home owners usually do a much better job of both testing their homes and mitigating any radon problems when they do so to benefit their own health.

More Information

New Health Canada Guidelines:

<http://canadagazette.gc.ca/part1/2007/20070609/html/notice-e.htm#i12>

Health Canada's Radon FAQ:

http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/faq_fq_e.html

The report of the Radon Working Group on a New Radon Guideline for Canada:

http://www.hc-sc.gc.ca/ahc-asc/public-consult/consultations/col/radon/1_e.html

It's Your Health – Radon (Health Canada article):

http://www.hc-sc.gc.ca/iyh-vsv/environ/radon_e.html

Canadian Cancer Society – Radon:

http://www.cancer.ca/ccs/internet/standard/0,3182,3172_372166_272423_langId-en,00.html

The Low-Level Radioactive Waste Management Office:

<http://www.llrwm.o/en/home.html>

Radon - A guide for Canadian homeowners:

www.cmhc-schl.gc.ca/odpub/pdf/61945.pdf

For information on radon testing devices, call the Government of Canada at (613) 954-6647 and ask about Canadian testing service providers, or go to:

www.radongas.org

www.nrsb.org

Any questions or comments about the service or products CREA provides?
You can contact us on-line at info@crea.ca.

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