Healthy Environments

Radon

What is radon?

Radon is an odourless, radioactive gas formed from the breakdown of uranium. It has no odour, colour or taste.

Exposure to high levels of radium over a lifetime results in an increased risk of developing lung cancer, especially if the person who is exposed is a smoker.

Radon is found naturally in the environment and is common in New Brunswick. It moves freely through the soil and can seep into buildings through cracks in foundation walls and floors or gaps around pipes and cables.

In a poorly ventilated space, radon can accumulate to high levels and can be addressed by improving a building's ventilation and closing entry points.

The current Canadian guideline for radon in indoor air for dwellings is 200 Becquerels per cubic metre (200 Bq/m3). Please refer to the frequency asked questions or links provided for more information on the radon.

Resources

Radon FAQs

Related Links

New Brunswick Lung Association
About Radon (Health Canada)
WorkSafeNB
Frequently Asked Questions about Radon

What is radon?

Radon is a radioactive gas that is formed when uranium breaks down naturally. It has no colour, odour, or taste. Radon is slowly released from the ground, water, and some building materials that contain very small amounts of uranium, such as concrete, bricks, tiles and gyproc. When radon is released to outdoor air, it is dispersed into the atmosphere and is not a concern. However, in enclosed spaces like houses or other buildings, it can sometimes accumulate to high levels.

What is the current Canadian guideline for radon in indoor air?

The current Canadian guideline for radon in indoor air for dwellings is 200 Becquerels per cubic metre (200 Bq/m3).

The Becquerel is a unit that describes the radiation caused by 1 disintegration per second or radon. Individual dwelling owners may wish to reduce radon levels as much as they reasonably can, using methods they find affordable and practical. However, the level in a dwelling should not be above the Canadian guideline of 200 Bq/m3.

Radon in indoor air is a concern especially if it accumulates in enclosed spaces.

Examples of dwellings are residential homes, or public buildings such as schools, hospitals, long-term-care residences and correctional facilities. Workplaces are also subject to guidelines for radon. In New Brunswick, workplaces are covered under the regulations set by WorkSafeNB. For more information about radon levels in the workplace, please contact WorkSafeNB.

Are there certain parts of New Brunswick that have higher levels of radon than others?

Within the province, areas that have certain types of rock (shale and granite) and soil can have higher levels of uranium in the ground and likely more radon. This is also true of most other Canadian provinces. A radon test for an individual building is the only way to tell for certain whether radon is present. For information related to geology in your area, please contact the Department of Natural Resources.

What are the health effects of radon?

The main health risk associated with exposure to high levels of radon in indoor air is an increased lifetime risk of developing lung cancer. This is because radiation from inhaled radon gas can damage cells in the lungs. The effects depend on the levels of radon and how long a person is exposed to these levels. The Canadian guideline is based on an exposure period of about 70 years spent in a dwelling that contains elevated levels of radon 75% of that time. Exposure to radon and tobacco use together can significantly increase your risk of lung cancer, however, not using tobacco products remains the most effective way to reduce the risk of lung cancer.

How does radon enter the dwelling?

Because radon is a soil gas it can enter a dwelling through any opening that contacts the soil around or underneath the building. For example, it can seep in through cracks or holes in basement floors or walls, including openings for utility connections, and through hollow support posts. If there is radon in the dwelling's water supply, radon can also
enter the space via running tap water. However, radon in water is considered a minor exposure pathway to radon. As a result, there is no Health Canada guideline value for radon in water. Both old and newer structures can have elevated levels of radon.

**How can a building be tested for radon?**

There are several methods that can be used to test a dwelling for radon. Here are some of the more common devices. Please note that the costs are approximate and may vary.

- **Charcoal Detectors:** These detectors are exposed to the air in your dwelling for a period of up to seven days, then are sealed and sent for analysis. The cost of the detector and analysis is approximately $35 – $100.

- **Passive Alpha-Track Detectors:** These devices are exposed to the air in a dwelling for periods of up to one year after which they must be returned to the laboratory for analysis. Cost of the detector and analysis is approximately $75 – $100.

- **Active Alpha-Track Detectors:** Similar to the passive alpha-track detector this device provides a more accurate measurement for periods of one to four weeks. These units must also be returned to a laboratory for analysis at a total cost of about $75 – $100.

- **Electret Ion Chamber (E-perm):** These units come in two variations; one for short term tests (typically a few weeks) or long term (several weeks or months). These units are returned to a laboratory for analysis. Cost of these units is approximately $75 – $100.

- **Continuous Monitors:** As the name implies these devices will measure radon over a period and report the results per hour. The results can be available in the home and the cost is usually more expensive than the other units.

**How can I decide whether my house should be tested?**

House construction methods and materials can affect the radon level, however, radon will be present in varying amounts in all types of houses. Because radon enters a building from the ground, the upper floors of a multi-story building usually have lower radon levels than the ground floor. Radon levels vary from house to house, so your neighbour’s test results should not be used to make decisions about your house. The only way of knowing the radon level in your house is to have it tested, whether your house is new or old. It is possible to perform an instant radon test, but the result will not give a reliable indication of the average radon level. Due to the variation in radon levels from day to day, the longer the test period, the more reliable the results of the test.

**Are the radon detectors themselves dangerous or do they contain toxic substances?**

No. Radon detectors do not pose a health risk.

**After completing work to reduce radon levels in a dwelling should the air be retested?**

Yes. To ensure that the radon levels in the dwelling have been lowered and meet the guideline a retest must carried out.

**Where in the building should I perform the test?**

The highest radon concentration is most likely to occur in basements and lower floors, especially if those areas have poor ventilation. A radon test should be carried out in lower level rooms of dwellings where the occupants spend the most time, such as bedrooms or living rooms. The instructions included with your testing unit will help you place it properly.

**Where can radon detectors be obtained?**
Contact your local retailer of home safety equipment for information. You can find test units through the Air or Water Quality listings in your local Yellow Pages. Tests are available for order on the Internet. Test kits are also available through the New Brunswick Lung Association.

How long should a radon test be conducted?

Because there are so many variables that affect radon, including weather, local soil and rock type, building type and construction materials, the longer the radon test is carried out the more accurate the result. The New Brunswick Department of Health has adopted Health Canada’s recommendation which suggest that testing be carried out over a period of at least three months and, if possible, in the coolest months of the year. During the heating season ventilation is lowest and radon levels are usually at their highest. For accurate results, carefully follow the instructions included with your test unit.

Who pays for radon testing in New Brunswick?

Testing is the responsibility of the building owner. Homeowners are responsible for the cost of radon testing in their own homes. Prices may vary, so it’s best to shop around. Contact your local home safety equipment retailer for information about testing units. Be sure to follow the instructions carefully for accurate results.

Are the cheaper methods of measuring radon as good as the more expensive ones?

All of these devices will tell you whether you have radon in your home but you must follow the instructions that come with the detector. Because radon levels vary considerably over time, the longer the test period the more accurate the result.

What methods can be used to reduce the radon levels in a dwelling?

The methods used to reduce radon levels in a dwelling can vary considerably depending on the characteristics of the dwelling, the radon level and the radon entry points. Increasing the ventilation and closing entry points, especially on the ground floor, may reduce the indoor radon levels. However, the reduction may only be small and additional methods of radon reduction may be required, particularly if the initial radon level was very high. More comprehensive measures may be required that need the services of a qualified contractor. Health Canada and the Canada Mortgage and Housing Corporation have produced a booklet called Radon - A Guide for Canadian Homeowners.

Who pays to reduce radon in a home or dwelling if radon levels exceed the guideline?

Building owners are responsible for fixing their home or dwelling if they are found to have radon levels above the Canadian guideline. It is recommended that the radon level in a home or dwelling be reduced to the guideline, and lower if practical.

Is anything being done to prevent radon problems in new houses?

Yes. In 1995, the National Building Code introduced measures to prevent soil gas from entering homes. This building code was updated in 2005. Radon is considered a soil gas. Increasing the ventilation and closing entry points, especially on the ground floor, may reduce the indoor radon levels. However, the reduction may only be small and alternative methods of radon reduction may be required, particularly if the initial radon level was very high.

Will high levels of radon affect the value of my house?

Where a high radon level is detected, it can most often be successfully reduced at a cost which is usually small when compared to the value of the house.

I am building a new house, can I have the site tested for radon?

Although techniques are available for measuring radon levels in soil, it is difficult to determine what the radon level in a new house will be from the results of soil measurements. For this reason, site radon measurements are not a reliable means of predicting, before construction, whether a building will have a high radon level.
Individual dwelling owners may wish to reduce radon levels as much as they reasonably can, using methods they find affordable and practical. However, the level in a dwelling should not be above the Canadian guideline of 200 Bq/m³.

**I am interested in buying a house. How can I find out if the radon level has been measured?**

You can ask if the house has been tested for radon. If you cannot be sure then you can request that it be tested.

**Can radon be found in drinking water?**

Yes, radon can be found in drinking water.

**What about radon in drinking water? Should I have my water checked?**

There is no Canadian guideline for radon in drinking water. It has generally been concluded that the risk from radon in drinking water is insignificant compared with the risk from radon in indoor air.

**Can radon be removed from drinking water?**

Yes, radon can be removed from your drinking water supply. There are three ways to do it in New Brunswick: aeration, distillation, and granular activated carbon. To learn more about these methods, contact a water treatment dealer.

**Related Links**

- New Brunswick Lung Association
- Radon - A Guide for Canadian Homeowners
- WorkSafeNB
Radon in the workplace

A 2012 Health Canada (http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/survey-sondage-eng.php) study found almost 25% of homes tested in New Brunswick were above the recommended levels for radon.

While the study did not evaluate the levels of radon in New Brunswick workplaces, it is expected that radon exposure could be an issue in some workplaces. The map of New Brunswick below provides an overview of Health Canada's test results for our province.

While some areas of the province were found to have a higher percentage of some homes with levels above the current guideline, all regions had homes with high levels. Therefore, this map should not be used as a guide to deciding
which areas of the province require testing and which do not. All areas of the province should be considered at risk for elevated levels of radon. The only way to know if your workplace has high levels is to test.

Health Canada has prepared information on radon to guide home owners and workplaces in determining whether radon is a concern, including proposed corrective measures to limit exposures. Outlined below is a question/answer summary of the information prepared by Health Canada. Other questions and answers can be found on the Health Canada (http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/faq_fq-eng.php) or the New Brunswick Department of Health (http://www2.gnb.ca/content/gnb/en/departments/ocmoh/healthy_environments/content/radon/faq.html) website.

Q. What is radon?

A. Radon is a radioactive gas that is formed naturally by the breakdown of uranium in soil, rock and water. As a gas, radon is slowly released from the ground, water, and some building materials that contain very small amounts of uranium, such as concrete, bricks, tiles and drywall. Radon gas breaks down further to form additional radioactive particles called radon daughters, or "progeny," that can be breathed into the lungs.

Radon is colourless, odourless and tasteless and cannot be detected by the senses. It can be detected with special instruments. When radon is released from the ground outside, it mixes with fresh air and gets diluted, resulting in concentrations too low to be of concern. However, when radon enters an enclosed space, it can accumulate to high concentrations and become a health risk.

Radon concentrations fluctuate seasonally, but are usually higher in winter.

Q. How can radon affect my health?

A. Inhaled radon gas and radon progeny can breakdown further in the lungs and emit "alpha particles." Alpha particles release small bursts of energy absorbed by nearby lung tissue. This results in lung cell death or damage. When lung cells are damaged, they have the potential to result in cancer when they reproduce.

The only known health risk associated with exposure to high levels of radon in indoor air is an increased risk of lung cancer. Radon is the second leading cause of lung cancer after smoking. The risk from radon exposure is long-term and depends on the level of radon, how long a person is exposed and their smoking habits. If you are a smoker and are exposed to elevated levels of radon, your risk of developing lung cancer increases significantly.

Other than lung cancer, there is no evidence that radon exposure causes other harmful health effects such as any other form of cancer, respiratory diseases such as asthma, or symptoms such as persistent coughing or headaches.

Q. What is the Canadian guideline for radon in indoor air?

A. Following a risk assessment and a public consultation, the revised guideline was approved by the Federal Provincial Territorial Radiation Protection Committee (http://www.hc-sc.gc.ca/ewh-semt/radiation/fpt-radprotect/index-eng.php) in October 2006. The new guideline of 200 Bq/m³ makes Canada's guidelines lower than or equal to most every other major industrialized country.

"Remedial measures should be undertaken in a dwelling whenever the average annual radon concentration exceeds 200 becquerels per cubic metre (200 Bq/m³) in the normal occupancy area. The higher the radon concentration, the sooner remedial measures should be undertaken. When remedial
action is taken, the radon levels should be reduced to a value as low as practicable. The construction of new dwellings should employ techniques that will minimize radon entry and will facilitate post-construction radon removal, should this subsequently prove necessary.

**Note:** The Province of New Brunswick does not regulate radon exposures in workplaces, except for underground mines (http://laws.gnb.ca/en/ShowPdf/cr/96-105.pdf). As with the practice at provincially operated workplaces (schools, health care facilities, etc.), WorkSafeNB recommends Health Canada’s guidelines be followed in workplaces where non-radiation workers conduct work.

**Q. How do I test for radon?**

**A.** Health Canada recommends dwellings be tested for a minimum of three months, ideally between September and April when windows and doors are typically kept closed.

Long-term radon detectors commonly used are:

- Alpha track detection
- Electret ion chamber

There are two options for testing for radon: one is to purchase a do-it-yourself radon test kit and the other is to hire a radon measurement professional. If you choose to perform the test yourself, radon detectors can be purchased over the phone, from the Internet or from some home improvement retailers. The radon test kits will include instructions on how to set up the test and send it back to a lab for analysis. In some cases, the lab analysis fees and postage are additional.

**Note:** There is no legal requirement for employers to test for radon except in an underground mine (http://laws.gnb.ca/en/ShowPdf/cr/96-105.pdf). However, the only way for an employer to know if they are compliant with the guideline is to test.

If you choose to hire a service provider to perform the radon test, Health Canada suggests you ask the service provider the questions outlined below.

<table>
<thead>
<tr>
<th>Questions to consider asking the service provider</th>
<th>Health Canada recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>What type of radon test device do you provide (short-term or long-term)?</td>
<td>Long-term (min. three months)</td>
</tr>
<tr>
<td>Are you certified or trained to provide radon measurement services?</td>
<td>Certified under the Canadian National Radon Proficiency Program (C-NRPP) (<a href="http://www.neha-nrpp.org/cnrpp.shtml">http://www.neha-nrpp.org/cnrpp.shtml</a>)</td>
</tr>
<tr>
<td>Are you familiar with Health Canada's measurement protocols*?</td>
<td>Yes</td>
</tr>
</tbody>
</table>
* A guide (http://www.hc-sc.gc.ca/ewh-smt/pubs/radiation/radon_building-edifices/index-eng.php) is available for assessing radon in residential public buildings, such as hospitals, schools and long-term care facilities. This guide can be used for measuring radon in other types of workplaces. Additional information on sampling procedures can be obtained by contacting the New Brunswick Department of Health. (http://www2.gnb.ca/content/gnb/en/contacts/dept_renderer.141.2281.201121.html)

Q. Where in the building should I perform the test?

A. To provide a realistic estimate of the radon exposure of the occupants, all measurements should be made in the normal occupancy area of the lowest lived-in level of the building. The normal occupancy area is defined as any area occupied by an individual for more than four hours per day.

Q. How can I reduce the amount of radon in my building?

A. If your home or building tests above the guideline, you should hire a certified radon professional to determine the best and most cost effective way to reduce the radon level in your home. The most common radon reduction method is called sub-slab depressurization. With this solution, a pipe is installed through the basement sub-flooring to an outside wall or up through to the roof line with a small fan attached that draws the radon from below the house to the outside before it can enter your home. This type of system can reduce the radon level in a home by more than 90%. Increasing ventilation and sealing major entry routes can also help reduce radon levels, but their effectiveness will be limited depending on how high the radon level is and the unique characteristics of each building.

Contact the Canadian National Radon Proficiency Program (C-NRPP) at 1 800 269-4174 or visit the website (http://c-nrpp.ca/) for a list of certified service providers who can help reduce radon levels in your home or building.

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