JANUARY IS NATIONAL


RADON


ACTION MONTH

Test Your Home. Protect Your Health.

By Bob Wood

Radon causes 21,000 lung cancer deaths in the U.S. and 3,200 lung cancer deaths every year in Canada. If I were to tell you that scientists in Canada and the U.S. have developed inexpensive methods to test for radon, that building scientists have developed methods to fix a building with elevated levels, and that the fix for a building would take most trained professionals under a day to complete…wouldn't that be wonderful news? This is in fact the case. I would think that this would be front page news in every newspaper. We could save thousands of lives every year just by encouraging you and your neighbors to have a simple test done and if that test showed elevated levels…get it fixed.

Dr. Maria Neira of the World Health Organization said that **"Most radon-induced lung cancers occur from low and medium dose exposures in people's homes. Radon is the second most important cause of lung cancer after smoking in many countries."**

In a Dec 30, 2013 publication by Bill Field PhD, MSa* and Brian Withers, DOb on Occupational and Environmental Causes of Lung Cancer, they said, **"Because of the large population at risk and the widespread potential for protracted exposures, residential radon decay products are likely the leading environmental cause of cancer mortality in the United States."**

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. Radon gas breaks down further to form additional radioactive particles called radon daughters, or "progeny" that can be inhaled into the lungs.

"Radon is hidden and dangerous. We can't see or smell it. The only way to know it's around is to test for it."

— Henry Slack, Indoor Air Coordinator
EPA Southeastern Office, Atlanta, GA
https://blog.epa.gov/blog/2015/01/radon-risk-you-dont-know-until-you-test/

Radon cannot be detected by the senses; it is colorless, odorless and tasteless. However, 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 low concentrations. However, when radon enters an enclosed space, such as a house or basement, it can accumulate to high concentrations and become a health risk.

Although radon gas is naturally occurring in the outdoors it is not naturally occurring in our homes and workplaces. It comes into buildings because of how we design, build and use these structures.

Radon is measured by using special testing devices. Depending on the device a method is used to calculate and report in the amount of radiation determined to be in the air. In the U.S. that measurement is reported in Picocuries per liter (pCi/l). In Canada and Europe it is reported in

Becquerel's per cubic meter (Bq/m³). Yes, we use different measurement systems in the two countries but they have a mathematical relationship 1 pCi/l = 37 Bq/m³.

Radon gas is responsible for 37–50 percent of the average North American's exposure to radiation. This is based on average indoor levels of radiation from radon of 1.3 pCi/l or 48 Bq/m³ in Canada. If the radiation caused by radon in your home/workplace measured about 4 pCi/l or 150 Bq/m³ you would be at a significantly higher exposure to radiation than the general population. That's what the fuss is all about.

"Radon is the #1 cause of lung cancer for non-smokers. Elevated radon is found in one out of 15 homes nationally, and the only way to know if a home has high levels is *to test it.*"

— Henry Slack, Indoor Air Coordinator
EPA Southeastern Office, Atlanta, GA
https://blog.epa.gov/blog/tag/cancer/

Action levels recommended in the U.S. by the Environmental Protection Agency (EPA), in Canada by Health Canada, and by the World Health Organization (WHO) all suggest different action or reference levels. In the U.S. the EPA action level is 4 pCi/l (148 Bq/m³). The EPA also recommends that Americans consider fixing their home for radon levels between 2 pCi/l (74 Bq/m³) and 4 pCi/l (148 Bq/m³). In Canada, Health Canada recommends mitigation at 200 Bq/m³ (5.3 pCi/l). The WHO recommends that a decision to mitigate should be made at 100 Bq/m³.

Whether a home or building has radon in it is dependent on three things: a radon source, a pathway into the home, and a negative pressure differential from the inside of the building to the soil. Radon is an equal opportunity pollutant, so every home has the potential to be a high radon home. What your neighbor's radon level is has no bearing on what your radon level is.

Most North American soils and rocks have some trace amounts of uranium in them; it is the strength of that source that is variable. Pathways into the home are almost too many to list but some major ones are exposed soil crawlspaces, sump pits, curtain drains from basement to soil, untrapped floor drains, box outs for HVAC system drains, cold joints between basement slab and basement walls, hollow block walls, and plumbing and electrical piping that has not been sealed. It only takes an aggregate 1 square cm opening to the soil if you have high source strength to have elevated radon levels in your home.

Radon seeps into buildings because there is a pressure differential between the building and the soil that surrounds it. To explain this in non-technical terms, I often ask people to think about a soda pop cup. I ask them to imagine them taking a hold of the top of the cup with the lid off and then imagine it being pushed down into a bucket of water without letting the rim of the cup go under the water. I then ask, why is the water trying to get into the cup? Because there is more pressure in the water surrounding the cup than there is in the air inside the cup. What would happen if there were a couple of tiny holes in the soda cup? Yes, it would fill up. What happens when we stick a house with a basement into the soil? Yes, the soil gas will seep in.

You might ask: ***My home is slab on grade so I am safe, right?*** The next thing we must consider is the stack effect, when the warm air in a home comes up against the underside of the ceiling, it migrates through pulling on the whole building and the soil and creating a stack effect on the whole building. So, sorry, no, you are not safe. The only way to know your radiation exposure from radon is to test your home or workplace for radon.

Testing for radon is simple: bring in a certified radon testing professional, have a proper test conducted and then you will know. If you are more frugally minded and can follow detailed instructions you can buy a test kit from the internet, or even your local big box store. Remember to

follow the directions completely, as a radon test that is improperly conducted and gives you a false low result would be worse than not knowing.

I got my test back and my reading is elevated —what now? Who do I call? How do I know they are reliable?

First you should use a Certified Radon Mitigator; they have had the classroom and field training experience and have passed a very comprehensive exam.

In the U.S. there are two certifying agencies for radon mitigators, and in some states the state certifies mitigators as well.
http://www.nrpp.info/radon_mitigation_service.shtml
http://www.nrsb.org/find_a_professional.asp

Pick your state from the drop down menu and find a few local mitigators; you may want to check an adjoining state as well, if you are close to a state line.

In Canada:

http://www.nrpp.info/C-NRPP_List/cnrpp_crmt.html

Scroll down through the list to your province and find local mitigators.

Before you settle on a mitigator, make a few calls to get references, ask for a copy of their contract, and ask if they are insured. Check out their websites. Who are you most comfortable with? Lowest price will quite often result in lowest quality workmanship and materials.

This is a very good checklist for comparing contractors.
http://www.nrpp.info/how_to_select_a_professional.shtml

Most mitigators will recommend an Active Soil Depressurization (ASD) system, unless you have marginally elevated radon and other air quality issues in the home. In that case, they may recommend a Heat Recovery Ventilator (HRV) that is specially designed for radon reduction. These HRV systems designed for radon reduction come with an energy penalty and ongoing maintenance costs.

By far the most economical and commonly recommended ASD system (about 90%) is a Sub Slab Depressurization (SSD) system. SSD systems depressurize the soil under your slab, stopping the radon from coming into your home and putting it outside where the radon was trying to go anyway.

Acceptable design of SSD radon mitigation methods in Canada and the US are very different, so be careful of whether you are getting U.S. or Canadian information off the internet if you are researching what design is acceptable for your building.

Bob Wood *is the Past-President of the Canadian Association of Radon Scientists and Technologists (CARST). He is a U.S. (NRPP) and Canadian (C-NRPP) Certified Radon Testing Specialist and a Mitigation Specialist. He owns and operates Mr. Radon Inc. He is also the lead instructor for Mr. Radon®'s online training program for Canadians who want to become certified Radon Measurement Technicians.*

Share YOUR comments about this article on our LinkedIn discussion by clicking the button below!