

# Radon

You have most likely heard about radon, unless you live under a rock. And if that's case, you're probably dying from it. As a local home inspector, I find most homeowners and home purchasers are aware of it, but are not sure how, or if it affects them or their family. It's a case of "since I don't see it, it doesn't exist".

In reality, radon is a radioactive gas that naturally occurs in the earth. Radon has no odor, is invisible and you cannot taste it. Radon is a problem because it can cause cancer. In fact, it is the second leading cause of lung cancer in the United States. The good news is radon is measurable and can be remediated moderately inexpensively.

Just as not every smoker gets cancer, not everyone who is exposed to elevated levels of radon will develop lung cancer.

How radon gets into our homes is interesting. In the earth is uranium. Some areas have higher concentrations or veins of uranium than others. While the major source of radon is soil, other sources include rocks, shale, water, phosphates and even granite.

Uranium breaks down in a natural process called radioactive decay. In the process it eventually ends up as radon.

Radon “percolates” (for lack of a better word) up from the rocks, soil, etc. and when it reaches the outdoor atmosphere it is safely diluted to low concentrations. It is evaluated using equipment that measures the “Pico Curies per liter of air” or pCi/L. The most common methods of measuring radon are using passive devices such as alpha-track detectors, charcoal canisters, or electret ionization chambers. After a specified time the collector needs to be sent to an analytical laboratory to evaluate and “read” the amount of radon. That number will be reported back to the client.

Another prevalent method of measuring radon is with continuous radon monitors. They use pumps to pull in air and measure the amount of radon in that air. Some continuous radon monitors can also tell if the equipment was tampered with, which would negate the results in a Real Estate transaction.

Several years ago congress passed Radon Act 51, which briefly stated they would like to target indoor air in homes at 0.4 pCi/L. That level is the average annual concentration of radon outdoors. The average annual concentration level for indoor living spaces is 1.3 pCi/L. Basically two-thirds of all houses exceed what congress deems the target level.

Due to the cost of remediation an arbitrary number of 4 pCi/L was established as an action level or limit. At 4.0 or above you should remediate the problem.

Scientists, along with the World Health Organization have recently lowered the actual level to 2 pCi/L.

According to [www.radonseal.com](http://www.radonseal.com), “The societal cost of mitigating all homes to a 4 pCi/L level was estimated at 44 billion dollars, but that would rise to 101 billion dollars if the action level was set at 2 pCi/L. Most radon-attributed deaths (70%) are caused by radon levels lower than 4 pCi/L (BEIR VI.1998). Setting the limit at 4 pCi/L benefits (but does not necessarily save) only 30-percent of the 21,000 people that die each year of radon-attributed lung cancer, while a lower limit of 2 pCi/L would benefit 50-percent.”

As I stated earlier in this article, not everyone exposed to elevated levels of radon get lung cancer. The risk of actually getting cancer from radon is related to three things:

1. The cumulative length of exposure.
2. The concentration or level of radon and radon decay products.
3. Compounding factors such as smoking.

According to the Midwest University Radon Consortium, “About 85-percent of lung cancers attributed to smoking also involve radon”.

The arbitrary action level of 4 pCi/L according to the EPA is the equivalent of smoking 10 cigarettes each day.

In reality, there is no safe level of radon.

## **How Do You Find Out How Much Radon is in Your House?**

Hardware stores and box stores sell passive devices you can inexpensively purchase. A better alternative is to obtain a charcoal collector from the Oakland County Health Department (OCHD) for ten dollars.

If the test results show radon near or slightly above 4pCi/L you should re-do the test using a \$25.00 long-term Alpha-Treck detector (also available at OCHD). It is a small round plastic disc, which you leave in the lowest living space of your house. It stays for a minimum of three months and up to one year. It will give you the most accurate and true radon reading. It is the same test you would use if you are a homeowner who is not selling their home and wants to learn if the radon level is at an acceptable level.

The 48-hour test performed for Real Estate transactions are minimally accurate. Long-term radon tests are certainly better but Real Estate sales cannot wait three months to determine the amount of radon within a house so the government decided 48 hours would provide a reasonable enough evaluation.

The Oakland County Health Department has three locations:

- Southfield 248-424-7190
- Pontiac 248-858-1312
- Walled Lake 248-926-3305

You can visit their websites:

- [www.oakgov.com/health](http://www.oakgov.com/health)
- [www.epa.gov/radon](http://www.epa.gov/radon)

Indoor radon concentrations vary for a multitude of reasons, a few of which are:

- Levels are usually higher in the winter. Wind, rainfall, snow and barometric pressure can affect indoor radon levels.
- Use of exhaust fans, dryers, fireplaces and other appliances can cause a stack effect, which could increase the amount of radon in the house.

If you are testing for a Real Estate sale you will be installing a short-term test. The test needs to be done under a worse case scenario, which means, closed house conditions. All windows, vents and exterior doors should be kept closed except for normal entry and exiting.

If there is a whole-house fan, attic fan or window fans, they need to be turned off and not in use during the test period. Windows and doors in the house should actually be kept closed for a few days even prior to the test to allow the house to come to dynamic equilibrium.

Whatever testing method you choose, the device needs to be installed in the lowest level suitable for occupancy. That means if the house has a basement, and it is not, cannot or will not be finished, and then the detector should be placed on the first floor.

The testing device should never be placed in a closet, crawl space, hallway, kitchen, bathroom, laundry or garage. Also, the testing equipment should be at least twenty inches off the floor and not within three feet of any exterior door or window. It should also be at least one foot away from an exterior wall.

Finally, when placing the testing equipment, never put it close to a floor drain, sump pump or near drafts caused by heating, air conditioning, vents and registers.

Mitigation:

Where levels are elevated the most common source is the soil around and under the house.

Homeowners can attempt to reduce the radon gas by sealing all cracks in walls, floors and openings in block walls at the sill plates. They can install a gas-tight seal over the sump pump. Installing a 30-mil vapor barrier or pouring concrete on crawl space dirt floors should also help.

If those measures don't work, or if they are done improperly, the level could actually increase. That's the time to call in a professional mitigator if you haven't done so previously.

Any home inspector who is a member of the American Society of Home Inspectors (ASHI) or the National Association of Home Inspectors will be able to direct you to a radon mitigator in your area.