



# Radon

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## What is Radon?

Radon is a naturally occurring radioactive gas that is present in outdoor and indoor air. The gas is a byproduct of the breakdown of uranium in rock or soil that moves up through the ground and into your home through cracks and porous portions of the foundation and into the air you breathe. Levels will vary depending on the geology under a home.

People who have lived for many years in a house with elevated levels of radon gas have a higher than average chance of getting lung cancer. The U.S. EPA and the National Cancer Institute estimate that about 20,000 lung cancer deaths each year in the U.S. are related to breathing the decay products (alpha particles) from Radon gas. Not everyone exposed to radon will develop lung cancer. There are many environmental factors that may affect your health. The amount of risk depends on: the *level of radon* in the home (rate of air exchange affects radon levels), the *amount or length of time* in the home, as well as genetics (family medical history), and behavior. Your chance of getting lung cancer from radon depends most strongly on whether or not you smoke cigarettes. Nonsmokers have a much lower level of risk compared to smokers.

Some Radon gas is always present in outside air (about 0.4 picocuries per liter). The national average indoor radon level is estimated to be about 1.3 pCi/L, average levels in your area may be much higher. Even when found in very high levels, indoor radon levels can be reduced to 2.0 pCi/L or below.

The EPA recommends remedial action if testing indicate indoor Radon gas exposure level is above **4.0 pCi/L**.

## Radon Levels Will Vary

There is always some uncertainty in Radon measurement due to natural daily and seasonal fluctuations in radon concentration, severe weather changes, statistical limitations, and other factors. Periodic test results may vary by 15%, or more in some testing conditions. Remedial action may include further testing to more accurately determine whether a home may contain concentrations of radon that are high enough to warrant the expense of Radon reduction. If an initial short-term test result is marginally over 4.0 pCi/L, mitigation to reduce radon levels is recommended if the average of the first test and a second short term test is above 4.0 pCi/L, or a long term follow up test is above 4.0 pCi/L. The EPA recommends long-term testing.

## Radon Testing Protocol

Short term two-day Radon testing should be made under closed-building conditions to stabilize radon and radon decay product concentrations. Protocol for short-term test as set by the EPA requires a closed house state to mimic winter conditions (all windows closed, only normal brief exit and entry through doors). There are also restrictions on the use of some heating and cooling systems such as fireplaces, and whole house fans (central heating and cooling are ok). Sampling is done at the lowest finished level of the home currently suitable for occupancy (basement bedrooms, family rooms). Upper floors will tend to have lower readings. Testing unfinished basements is allowed for real estate transaction purposes, but may not be an accurate prediction of exposure levels in daily living.

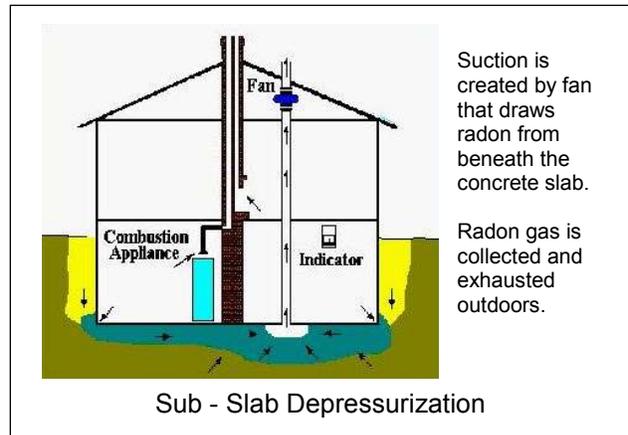
Long-term tests are done under normal living conditions (windows are not required to be closed). Long-term testing takes at least 90 days; we suggest this period include portions of a cold and warm season.

## Radon Levels in Western Montana

Radon levels tend to be high in Western Montana in general, but levels vary tremendously. Montana State University compiled studies in 1997, 2005, and 2011 of Radon testing done across the state. The test results in Missoula and Ravalli counties ranged as high as 104.4 pCi/L, with the average of highs and lows around 7.0 pCi/L. While the national average is 1 in 15 homes will have elevated levels of Radon, about half (45-54%) of the test results in these counties were above 4.0 pCi/L. Our testing experience consists of slightly lower average levels, fewer homes that have results above the EPA recommended action level, and many homes that are only marginally over or under 4.0 pCi/L. This difference may be due to testing equipment and method of sampling.

## Radon Mitigation

Radon mitigation is sealing the foundation and installation of a ventilation system to re-route ground gases from below the house. Typical cost should range from \$800 to \$2000 (sometimes higher) depending on home design. If mitigation is being considered, we strongly suggest home owners or buyers review the EPA publication, “*Consumer’s Guide to Radon Reduction*”.



## Radon Information

National information sites include the **US Environmental Protection Agency** (<http://www.epa.gov/radon/pubs/index.html>) The EPA website offers brochures such as “*EPA Home Buyers Guide*”, and “*Guide to Radon Reduction*”. Information about Radon in Montana is available at [www.deq.mt.gov/energy/radon](http://www.deq.mt.gov/energy/radon), with a link to a 2011 updated study about Radon in Missoula County.

### Sources:

- U.S. EPA “Protocols for Radon and Radon Decay Product Measurement in Homes” EPP 402 R-92-DO3
- Montana State Department of Public Health & Human Services, [www.dphhs.mt.gov/epht/mtradonstudy.pdf](http://www.dphhs.mt.gov/epht/mtradonstudy.pdf)
- “Seasonal Radon Variations in Utah Testing Results”, Division of Radiation Control, Salt Lake City, Utah

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