Radon in Montana Homes

Radon is a naturally-occurring radioactive gas that you can't see or smell. It is produced by the natural breakdown of uranium in soil, rock, and groundwater.

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As a gas, radon can seep through soil and cracks in rock into the air. Outdoors, radon is diluted quickly and poses little threat, but when it migrates into a building foundation and accumulates to unsafe levels, it can become a health hazard. New or old, any building constructed in contact with the earth (basement, slab, or crawlspace) can have excessive radon levels. Although generally not a major source, building materials brought into the house and groundwater (from sinks and showers) can also contribute to home radon levels.

As we breathe, radon and radon decay products enter our lungs. As radon decays, it releases small bursts of energy called alpha particles. These energy bursts can damage lung tissue and, over time, lead to lung cancer. As exposure to radon increases, the greater the risk of developing lung cancer. According to the Environmental Protection Agency (EPA), radon is the leading cause of lung cancer among non-smokers, claiming approximately 21,000 lives annually in the U.S. Because children have smaller lungs and, therefore, higher breathing rates and also spend up to 70 percent more time indoors than adults, radon poses a greater health risk to children.

Radon is measured in picoCuries per liter of air (pCi/L). A picoCurie is one-trillionth of a Curie, which measures radioactivity in disintegrations per second. The EPA recommends radon levels be addressed in homes if the level is 4 pCi/L (picoCuries per liter) or more. Because there is no known safe level of exposure to radon, the EPA also recommends that homeowners consider the issue for radon levels between 2 pCi/L and 4 pCi/L.

Because radon comes from non-uniform geology, rock, and soil, and due to the many variables in house construction and occupancy patterns, radon levels can vary greatly from house to house. The only way to determine if excessive radon levels are present is to test a home.

Radon test kits for do-it-yourself consumer testing may be available at home improvement stores. Depending on the kit, they typically cost between $15 and $25, which will include the cost of mailing to the laboratory and the analysis. Test kits also can be ordered from online retailers, as well as many county Extension offices throughout Montana. When purchasing kits, look for an EPA-approved detector and one that will not expire during the testing and analysis period.

There are two common do-it-yourself test kits. "Short-term" charcoal kits are used to test for radon for short periods (2-7 days), and "long-term" alpha track detectors measure radon over 3 months to one year. Since radon levels vary, a long-term test provides the best measure of year-round radon levels. However, if levels need to be determined quickly, short-term tests can be conducted. For real estate transactions, it is recommended by the EPA that two short-term tests be used to obtain an average. When using a radon test kit, to obtain accurate results, it is critical to follow the placement directions of the kit manufacturer and not to disturb the test kit until testing is finished.

Often, it is wise to hire an independent/third-party professional to provide radon testing services. When choosing a testing service, consumers should seek individuals/companies that have had specialized training using EPA testing protocols and proficiency standards. While professional testing services may use alpha track and charcoal test kits for testing, they are also trained to use more sophisticated and calibrated monitoring devices such as a continuous monitor. When using a continuous monitor for at least three days, results of the test are recorded and printed out for the consumer. From this type of test, radon fluctuations influenced by wind, operation of mechanical systems (e.g., furnace), and other factors are shown and an average radon result is provided.

In Montana, just over 47 percent of homes tested have radon levels above 4pCi/L, with the average number of homes above 4pCi/L in some Montana counties ranging from 50-53 percent. Montana is ranked third in the nation with homes with levels above 20 pCi/L and is ranked fifth in the nation with homes with levels above 4 pCi/L.

While testing for radon is not required in Montana, in 1993 the Montana Legislature required "radon disclosure information be provided prior to the execution of any contract for the purchase and sale of inhabitable real property." Further, "whenever a seller knows that a building has been tested for radon gas …, the seller shall provide to the buyer, with the contract of sale, a copy of the result of that test and evidence of any subsequent mitigation or treatment…"

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Sub-slab radon system installation.

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Sub-membrane radon system installation.

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Fixing a radon problem is referred to as mitigation. "Sub-slab depressurization features" are used to mitigate radon in homes with slab and basement foundation systems. In this system, suction is created by a natural chimney-effect or with a powerful fan used to draw the radon from beneath the concrete slab and safely vent it through PVC pipe to the outdoors. Depending on access to a qualified radon mitigation contractor in your area, house size, and foundation complexity, this type of system may cost $1,200 to $3,500, or more.

"Sub-membrane depressurization system features" are used to mitigate radon in homes with a crawl-space type foundation. It is similar to the sub-slab depressurization, however, since there is not a concrete slab, the floor of the crawl space is first covered and sealed with heavy plastic or a rubber membrane to trap the radon gas underneath it. The PVC pipe is installed and sealed below the membrane and the pipe runs through the home and exits out the roof.

For new construction, it is neither practical nor feasible to test the soil before constructing a home to predict what the radon level might be. When building a new home in Montana, where there is a high chance of having excessive radon levels, installing the foundation and framing provisions for a radon system is a wise and cost-saving thing to do. While the system may not be needed until the home is complete and tested, should high radon level be present, the components are ready to be connected and activated to complete the mitigation system – at a fraction of the cost of installing a retrofit system. ■

Blower fan in attic space to vent air in a radon mitigation system.

PHOTO BY ADAM SIGLER

Radon Resources

- MSU Extension Housing and Environmental Health Program, 406-994-3451
- Environmental Protection Agency (EPA) – www.epa.gov/radon
- For an overview of radon mitigation options you can obtain a copy of the EPA publication, *Consumer's Guide to Radon Reduction: How to Fix Your Home.* http://www.epa.gov/radon/pubs/consguid.html or http://www.cpe.rutgers.edu/ct-radon/downloads/consumers-guide-to-radon-reduction.pdf
- To provide guidance for consumers buying or selling a home, you can obtain a copy of the EPA publication: *Home Buyer's and Seller's Guide to Radon.* This booklet is intended for anyone who is buying or selling a home, real estate and relocation professionals, home inspectors and others. http://www.epa.gov/radon/pubs/hmbyguid.html or http://www.epa.gov/radon/pdfs/hmbuygud.pdf