Radon

What is radon?

Radon is a radioactive gas that is found in the earth's rock and soil. It is formed by the natural breakdown of radium, which is itself a decay product of uranium.

As radon decays, it forms radioactive by-products called either "progeny," "decay products" or "daughters" which, if inhaled, can damage lung tissue and cause lung cancer.

Invisible and odorless, radon is a health hazard when it accumulates to high levels inside homes or other structures. And it is deadly. Indoor radon exposure is estimated to be the second leading cause of lung cancer deaths each year in the United States. Cigarette smoking is responsible for the large majority (87 percent) of lung cancer deaths.

How serious of a problem is radon in the U.S.?

Radon problems have been identified in every state. The U.S. Environmental Protection Agency (EPA) estimates that nearly 1 out of every 15 homes in the U.S. has indoor radon levels at or above the EPA's recommended action guideline level of four picocuries per liter of air (pCi/L) on a yearly average. Radon can be a problem in schools and work places, too.

How does radon get indoors?

Radium, which releases radon, is common in the earth's crust. Soils and rocks containing high levels of uranium, such as granite, phosphate, shale and pitchblende are natural sources of radon.

High levels of radon in the soil are primarily responsible for radon problems. The radon gas percolates up through porous soils under the home or building and enters through gaps and cracks in the foundation or in the insulation and through pipes, sumps, drains, walls or other openings.

Water is another possible pathway for bringing radon into the home. Water, when in contact with rock containing uranium, absorbs the radon gas. The radon is then carried into the home and released into the air in household dishwashers, faucets, showers, or washing machines.

In some unusual situations, radon may be released from home construction materials such as stone used to build fireplaces or solar heating storage systems.

Radon is not a problem outdoors because it is quickly diluted to low levels by outdoor air.

What is the health risk associated with long-term exposure to radon indoors?
Radon is estimated to be the second leading cause of lung cancer in the U.S. today, causing thousands of deaths each year. Cigarette smoking remains the primary cause. According to a report by the National Academy of Sciences called "Biological Effects of Ionizing Radiation (BEIR) VI Report: The Health Effects of Exposure to Indoor Radon," radon causes between 15,000 and 22,000 lung cancer deaths each year in the United States and 12 percent of all cancer deaths are linked to radon.

**How do you determine whether radon is a problem in your home or building?**

While an area's geology may indicate the potential for radon problems, human senses cannot pick up any evidence of this odorless, colorless gas.

**THE ONLY WAY TO DETERMINE IF THERE IS A PROBLEM IN YOUR HOME OR BUILDING IS BY MEASURING THE RADON LEVEL.**

Measuring for radon can be done simply and relatively inexpensively.

The American Lung Association as well as the EPA and the Surgeon General recommend testing all homes below the third floor for radon. Testing in schools is also recommended.

There are many kinds of low-cost "do it yourself" radon test kits available through the mail and in hardware stores and other retail outlets. You can also order test kits by phone through the Radon Hotline, operated by the National Safety Council in partnership with the EPA, by calling 1-800-SOS-RADON.

If you prefer, or if you are buying or selling a home, you can hire a trained contractor to do the testing for you. Make certain you hire a radon tester who is certified by the National Environmental Health Association (NEHA). Their web site, [http://www.neha.org/](http://www.neha.org/) provides a list of certified radon testers arranged geographically. State radon offices also have this information.

There are two general ways to test for radon:

1. **Short-Term Testing**

The quickest way to test is with short-term tests. Short-term tests remain in your home for two days to 90 days, depending on the device. "Charcoal canisters," "alpha track," "electret ion chamber," "continuous monitors," and "charcoal liquid scintillation" detectors are most commonly used for short-term testing.

Because radon levels tend to vary from day to day and season to season, a short-term test is less likely than a long-term test to tell you your annual average radon level. If you need results quickly, however, a short-term test followed by a second short-term test may be used to decide whether to fix your home.

2. **Long-Term Testing**
Long-term tests remain in your home for more than 90 days. "Alpha track" and "electret" detectors are commonly used for this type of testing. A long-term test will give a more accurate annual average radon level than a short-term test for your home.

The average indoor level is estimated to be about 1.3 pCi/L; and 0.4 pCi/L of radon is found in the outside air. Action should be taken to reduce levels if the test results indicate an annual average radon level of 4 pCi/L or higher.

**What can you do to reduce high levels of indoor radon?**

Today's technology can reduce indoor radon levels to below 4 pCi/L; in most cases, to 2pCi/L or less.

A variety of methods are used to reduce indoor radon levels, from sealing cracks in floors and walls to changing the flow of air into the home. Simple systems, known as sub-slab depressurization, use pipes and fans to remove radon gas from beneath the concrete floor and foundation before it can enter the home. Radon is vented above the roof, where it safely disperses.

Other methods may also work in your home. The right system depends on the design of your home and other factors.

Lowering high radon levels requires technical knowledge and special skills. You should use a contractor who is trained to fix radon problems. The National Environmental Health Association (NEHA) runs a National Radon Proficiency Program. A trained NEHA contractor can study the radon problem in your home and help you choose the right treatment method. As with radon testers, you can find radon mitigators who can fix radon problems in your area by searching the NEHA web site ([http://www.neha.org/](http://www.neha.org/)). As when hiring a contractor for any other home repair, you may want to get more than one estimate.

The cost of making repairs to reduce radon depends on how your home was built and the extent of the radon problem. Most homes can be fixed for about the same cost as other common home repairs.

Today, homes can be built to reduce the amount of radon coming in by using radon-resistant construction features. Radon-resistant construction features usually keep radon levels in new homes below 2 pCi/L.

Radon is:

- Estimated to be the second leading cause of lung cancer in the U.S.
- A potential problem in every state.
- Detected only by measuring levels in your home.
Deadly, and its health risks grow dramatically with the length of exposure and with smoking.

This factsheet was adapted from the American Lung Association.
Last updated September 2002