



**Building  
A New  
Home**

**Have You  
Considered  
Radon?**

 **EPA**  
United States  
Environmental Protection  
Agency

Indoor Environments Division  
Office of Radiation and  
Indoor Air

EPA 402F-98-001  
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# For More Information

To gain more information  
about building a radon-resistant  
house or testing an existing home,  
please contact the Radon Office in your State.

## LIST OF STATE RADON OFFICES AND PHONE NUMBERS

*(Please note that the "800" numbers listed below are for in-state use only).*

Alabama .....	1-800-862-1866	Montana .....	(406) 444-6697
Alaska .....	1-800-478-8324	Nebraska.....	1-800-334-9491
Arizona .....	(602) 255-4845	Nevada .....	(702) 687-5394 x275
Arkansas.....	(501) 661-2301	New Hampshire .....	(603) 271-4674
California.....	1-800-745-7236	New Jersey .....	1-800-648-0394
Colorado .....	1-800-846-3986	New Mexico .....	(505) 827-1557
Connecticut.....	(860) 509-7367	New York.....	1-800-458-1158
Delaware.....	(302) 739-4731	North Carolina.....	(919) 571-4141
Dist. of Col. ....	(202) 727-5728	North Dakota.....	(701) 328-5188
Florida .....	1-800-543-8279	Ohio .....	1-800-523-4439
Georgia .....	1-800-745-0037	Oklahoma .....	(405) 271-7634
Hawaii .....	(808) 586-4700	Oregon .....	(503) 731-4014
Idaho .....	1-800-445-8647	Pennsylvania.....	1-800-237-2366
Illinois.....	1-800-325-1245	Rhode Island.....	(401) 222-2438
Indiana .....	1-800-272-9723	South Carolina .....	1-800-768-0362
Iowa .....	1-800-383-5992	South Dakota .....	(605) 773-3351
Kansas .....	1-800-693-5343	Tennessee.....	1-800-232-1139
Kentucky .....	(502) 564-4856	Texas.....	(512) 834-6688
Louisiana.....	1-800-256-2494	Utah .....	1-800-458-0145
Maine .....	1-800-232-0842	Vermont.....	1-800-439-8550
Maryland .....	1-877-352-1973	Virginia .....	1-800-468-0138
Massachusetts .....	(413) 586-7525	Washington .....	(360) 236-3253
Michigan .....	1-800-723-6642	West Virginia.....	1-800-922-1255
Minnesota .....	1-800-798-9050	Wisconsin .....	1-888-569-7236
Mississippi.....	1-800-626-7739	Wyoming .....	1-800-458-5847
Missouri.....	1-800-669-7236		

## **Testing: The Final Word**

The only way to know if your new home has a radon problem is to test. The EPA recommends that average annual indoor radon levels do not exceed 4 pCi/L. If your home is built with a passive radon system, you should test it immediately after moving in to make sure that radon levels are below the EPA guideline. Remember: If your radon level is 4 pCi/L or above, a fan can be installed easily to lower radon levels well below this guideline.

Even if you must install a fan, adding a radon control system to a house under construction is much less expensive than installing one after the house is built. The average cost for a radon control system in an existing house is between \$500 and \$2,500. Adding radon-resistant construction now will save you unnecessary expense and worry later.

## **For Architectural Drawings and Technical Information**

Detailed model building standards, architectural drawings of radon systems, and fact sheets on alternative radon installations are available from EPA at no charge by phoning 800-55-RADON or by visiting the EPA website at <http://www.epa.gov/iaq/radon>.

Your builder can also obtain information on radon-resistant construction techniques from the National Association of Home Builders—"Building Radon Resistant Homes: A Builder's Independent Study Kit."

A growing number of municipalities located in areas known to have a high radon potential now require or recommend that passive radon systems be installed in all new houses. Contact your State Radon Office to determine if you are building your new home in such an area.

**CONCERNED  
ABOUT  
RADON?**

**TALK TO  
YOUR  
BUILDER  
TODAY**

There are so many things to consider when having a new home built—so many choices to make. How many bedrooms should you have? Is the kitchen large enough? Do you need a basement?

You may even be concerned about environmental issues, such as the fumes from new building materials and furnishings. But are you concerned about radon? You should be.

## **What You Should Know About Radon**

Radon is a radioactive gas that comes from the soil. Exposure to radon gas is the second-leading cause of lung cancer (after smoking) in the United States. About 14,000 people die each year from radon-related lung cancer.

Radon is produced from the natural breakdown of the uranium found in most rocks and soils. As it further breaks down, radon emits atomic particles. These particles are in the air we breathe. Once inhaled, they can be deposited in our lungs. The energy associated with these particles can alter cell DNA, thus increasing the risk of lung cancer.

Radon usually does not present a health risk outdoors because it is diluted in the open air. Radon can, however, build up to dangerous levels inside a house.

## **Radon Entry**

Radon can enter your new house through cracks or openings in the foundation. The differences in air pressure between the inside of a building and the soil around it also play an important role in radon entry. If the air pressure of a house is greater than the soil beneath it, radon will remain outside. However, if the air pressure of a house is lower than the surrounding soil (which is usually the case), the house will act as a vacuum, sucking radon gas inside.

Because radon comes from the soil, the geology of an area can help to predict the potential for elevated indoor radon levels. The U.S. Environmental Protection Agency (EPA) has worked with state and federal geologists to develop maps which predict the potential indoor radon levels for every county in the United States. Those counties with the highest potential are designated as Zone 1; those with the lowest comprise Zone 3.

Zone 1 areas have predicted average radon levels at or above the EPA's 4.0 pico-Curies per liter (pCi/L) action level. (pCi/L is a measure of the amount of radioactivity in a known quantity of air.) To determine in which radon zone your new house will be built, please contact your State radon office listed on the back of this

brochure. If you are building in a Zone 1 county, you should include a radon control system in your new home. It is an inexpensive addition to the total cost of your house and is an easy way to protect you and your family.

### **Talk to Your Builder**

You and your builder can design your new house to be radon resistant. For \$350 to \$500, on average, your builder can take the following four simple steps to deter radon from entering your home.

- Install a layer of clean gravel or aggregate beneath the slab or flooring system.
- Lay polyethylene sheeting on top of the gravel layer.
- Include a gas-tight venting pipe from the gravel layer through the building to the roof.
- Seal and caulk the foundation thoroughly.

These construction techniques will be familiar to your builder. There is no need to hire a special contractor or architect. Many builders already incorporate some of these steps into the construction of their houses to control moisture or increase energy efficiency. In fact, radon-resistant construction

techniques can be found in the 1995 version of the One-and-Two Family Dwelling Code published by the Council of American Building Officials.

### **Understanding a Radon System**

The radon-resistant construction techniques described in this brochure comprise a "passive" radon system. This system overcomes the vacuum effect experienced by most houses by creating a pressure barrier to radon entry. The system

also includes a pipe to vent radon gas safely to the outdoors.

Sometimes a passive radon system isn't enough to prevent radon from entering a house. In this case, a fan can be installed to pull the radon gas from the underlying soil into the vent pipe where it can be exhausted outside the house. The addition of a fan and its associated wiring creates an "active" radon system.