



A Citizen's Guide To Radon

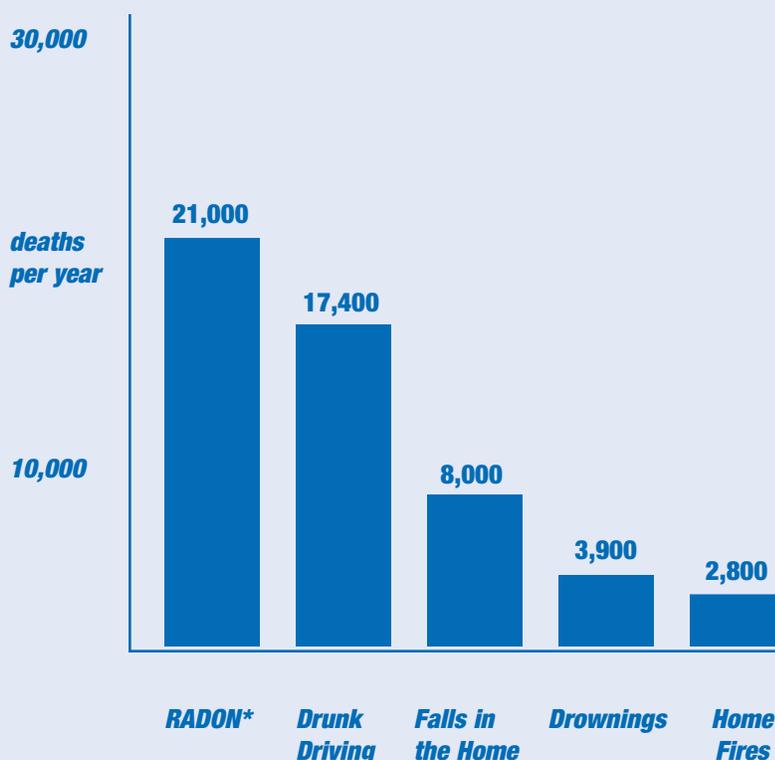
The Guide To Protecting
Yourself And Your Family From
Radon



EPA Recommends:

- ▼ **Test your home for radon—it's easy and inexpensive.**
- ▼ **Fix your home if your radon level is 4 picocuries per liter (pCi/L) or higher.**
- ▼ **Radon levels less than 4 pCi/L still pose a risk, and in many cases may be reduced.**

Radon is estimated to cause thousands of lung cancer deaths in the U.S. each year.



**Radon is estimated to cause about 21,000 lung cancer deaths per year, according to EPA's 2003 Assessment of Risks from Radon in Homes (EPA 402-R-03-003). The numbers of deaths from other causes are taken from the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Report and 2002 National Safety Council Reports.*

OVERVIEW

Radon is a cancer-causing, radioactive gas.

You can't see radon. And you can't smell it or taste it. But it may be a problem in your home.

Radon is estimated to cause many thousands of deaths each year. That's because when you breathe air containing radon, you can get lung cancer. In fact, the Surgeon General has warned that radon is the second leading cause of lung cancer in the United States today. Only smoking causes more lung cancer deaths. **If you smoke and your home has high radon levels, your risk of lung cancer is especially high.**

Radon can be found all over the U.S.

Radon comes from the natural (radioactive) breakdown of uranium in soil, rock and water and gets into the air you breathe. Radon can be found all over the U.S. It can get into any type of building—homes, offices, and schools—and result in a high indoor radon level. But you and your family are most likely to get your greatest exposure at home, where you spend most of your time.

You should test for radon.

Testing is the only way to know if you and your family are at risk from radon. EPA and the Surgeon General recommend testing all homes below the third floor for radon. EPA also recommends testing in schools.

Testing is inexpensive and easy—it should only take a few minutes of your time. Millions of Americans have already tested their homes for radon (see page 5).

You can fix a radon problem.

Radon reduction systems work and they are not too costly. Some radon reduction systems can reduce radon levels in your home by up to 99%. Even very high levels can be reduced to acceptable levels.

New homes can be built with radon-resistant features.

Radon-resistant construction techniques can be effective in preventing radon entry. When installed properly and completely, these simple and inexpensive techniques can help reduce indoor radon levels in homes. In addition, installing them at the time of construction makes it easier and less expensive to reduce radon levels further if these passive techniques don't reduce radon levels to below 4 pCi/L.

Every new home should be tested after occupancy, even if it was built radon-resistant. If radon levels are still in excess of 4 pCi/L, the passive system should be activated by having a qualified mitigator install a vent fan. For more explanation of radon resistant construction techniques, refer to EPA publication, *Building Radon Out: A Step-by-Step Guide on How to Build Radon-Resistant Homes* (see page 15).

HOW DOES RADON GET INTO YOUR HOME?

Any home may have a radon problem.

Radon is a radioactive gas. It comes from the natural decay of uranium that is found in nearly all soils. It typically moves up through the ground to the air above and into your home through cracks and other holes in the foundation. Your home traps radon inside, where it can build up. Any home may have a radon problem. This means new and old homes, well-sealed and drafty homes, and homes with or without basements.

Radon from soil gas is the main cause of radon problems. Sometimes radon enters the home through well water (see page 8). In a small number of homes, the building materials can give off radon, too. However, building

RADON GETS IN THROUGH:

- 1. Cracks in solid floors.**
- 2. Construction joints.**
- 3. Cracks in walls.**
- 4. Gaps in suspended floors.**
- 5. Gaps around service pipes.**
- 6. Cavities inside walls.**
- 7. The water supply.**



materials rarely cause radon problems by themselves.

Nearly 1 out of every 15 homes in the U.S. is estimated to have elevated radon levels. Elevated levels of radon gas have been found in homes in your state. Contact your state radon office (www.epa.gov/radon/wherelive.html) for general information about radon in your area. While radon problems may be more common in some areas, any home may have a problem. The only way to know about your home is to test.

Radon can also be a problem in schools and workplaces. Ask your state radon office (www.epa.gov/radon/wherelive.html) about radon problems in schools, daycare and childcare facilities, and workplaces in your area (also visit www.epa.gov/radon).

HOW TO TEST YOUR HOME

You can't see radon, but it's not hard to find out if you have a radon problem in your home. All you need to do is test for radon. Testing is easy and should only take a few minutes of your time.

The amount of radon in the air is measured in "picocuries per liter of air," or "pCi/L." There are many kinds of low-cost "do it yourself" radon test kits you can get through the mail and in some hardware stores and other retail outlets. If you prefer, or if you are buying or selling a home, you can hire a qualified tester to do the testing for you. You should first contact your state radon office about obtaining a list of qualified testers. You can also contact a private radon proficiency program for lists of privately certified radon professionals serving your area. For links and more information, visit www.epa.gov/radon/radontest.html.

There are Two General Ways to Test for Radon:

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 year-round 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 (see also page 7 under Home Sales).

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 you a reading that is more likely to tell you your home's year-round average radon level than a short-term test.

How To Use a Test Kit:

Follow the instructions that come with your test kit. If you are doing a short-term test, close your windows and outside doors and keep them closed as much as possible during the test. Heating and air conditioning system fans that re-circulate air may be operated. Do not operate fans or other machines which bring in air from outside. Fans that are part of a radon-reduction system or small exhaust fans operating only for short periods of time may run during the test. If you are doing a short-term test lasting just 2 or 3 days, be sure to close your windows and outside doors at least 12 hours **before** beginning the test, too. You should not conduct

**Testing is easy
and should only
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your time.**

HOW TO TEST YOUR HOME *continued*

short-term tests lasting just 2 or 3 days during unusually severe storms or periods of unusually high winds. The test kit should be placed in the lowest lived-in level of the home (for example, the basement if it is frequently used, otherwise the first floor). It should be put in a room that is used regularly (like a living room, playroom, den, or bedroom) but **not** your kitchen or bathroom. Place the kit at least 20 inches above the floor in a location where it won't be disturbed—away from drafts, high heat, high humidity, and exterior walls. Leave the kit in place for as long as the package says. Once you've finished the test, reseal the package and send it to the lab specified on the package right away for analysis. You should receive your test results within a few weeks.

EPA Recommends the Following Testing Steps:

Step 1. Take a short-term test. If your result is 4 pCi/L or higher, take a follow-up test (Step 2) to be sure.

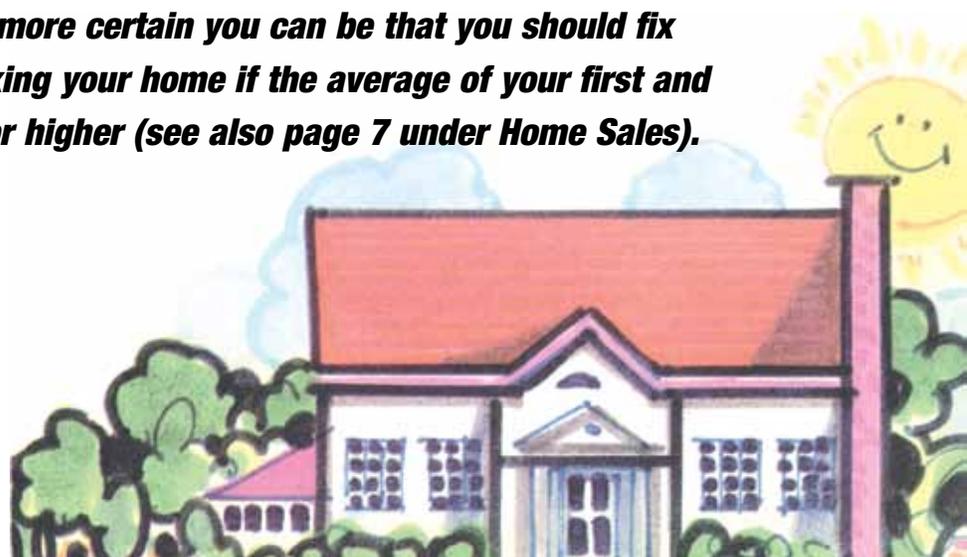
Step 2. Follow up with either a long-term test or a second short-term test:

- ***For a better understanding of your year-round average radon level, take a long-term test.***
- ***If you need results quickly, take a second short-term test.***

The higher your initial short-term test result, the more certain you can be that you should take a short-term rather than a long-term follow up test. If your first short-term test result is more than twice EPA's 4 pCi/L action level, you should take a second short-term test immediately.

Step 3. • If you followed up with a long-term test: Fix your home if your long-term test result is 4 pCi/L or more.

- ***If you followed up with a second short-term test: The higher your short-term results, the more certain you can be that you should fix your home. Consider fixing your home if the average of your first and second test is 4 pCi/L or higher (see also page 7 under Home Sales).***



WHAT YOUR TEST RESULTS MEAN

The average indoor radon level is estimated to be about 1.3 pCi/L, and about 0.4 pCi/L of radon is normally found in the outside air. The U.S. Congress has set a long-term goal that indoor radon levels be no more than outdoor levels. While this goal is not yet technologically achievable in all cases, most homes today *can* be reduced to 2 pCi/L or below.

Sometimes short-term tests are less definitive about whether or not your home is above 4 pCi/L. This can happen when your results are close to 4 pCi/L. For example, if the average of your two short-term test results is 4.1 pCi/L, there is about a 50% chance that your year-round average is somewhat below 4 pCi/L. However, EPA believes that any radon exposure carries some risk—no level of radon is safe. Even radon levels below 4 pCi/L pose some risk, and you can reduce your risk of lung cancer by lowering your radon level.

If your living patterns change and you begin occupying a lower level of your home (such as a basement) you should retest your home on that level.

Even if your test result is below 4 pCi/L, you may want to test again sometime in the future.

Test your home now and save your results. If you find high radon levels, fix your home before you decide to sell it.

RADON AND HOME SALES

More and more, home buyers and renters are asking about radon levels before they buy or rent a home. Because real estate sales happen quickly, there is often little time to deal with radon and other issues. The best thing to do is to test for radon NOW and save the results in case the buyer is interested in them. Fix a problem if it exists so it won't complicate your home sale. If you are planning to move, review EPA's pamphlet "Home Buyer's and Seller's Guide to Radon," which addresses some common questions (www.epa.gov/radon/pubs/realstate.html). You can also use the results of two short-term tests done side-by-side (four inches apart) to decide whether to fix your home.

During home sales:

- *Buyers often ask if a home has been tested, and if elevated levels were reduced.*
- *Buyers frequently want tests made by someone who is not involved in the home sale. Your state radon office (www.epa.gov/radon/wherelive.html) can assist you in identifying a qualified tester.*
- *Buyers might want to know the radon levels in areas of the home (like a basement they plan to finish) that the seller might not otherwise test.*

Today many homes are built to help prevent radon from coming in. Building codes in your state or local area may require these radon-resistant construction features. If you are buying or renting a new home, ask the owner or builder if it has radon-resistant features. The EPA recommends building new homes with radon-resistant features in high radon potential (Zone 1) areas. Even if built radon-resistant, every new home should be tested for radon after occupancy. If you have a test result of 4 pCi/L or more, consult a qualified mitigator (<http://www.epa.gov/radon/fixyourhome.html>) to estimate the cost of upgrading to an active system by adding a vent fan to reduce the radon level. In an existing home, the cost to install a radon mitigation system is about the same as for other common home repairs.

RADON IN WATER

There are two main sources for the radon in your home's indoor air, the soil and the water supply. Compared to radon entering the home through water, radon entering your home through the soil is usually a much larger risk.

The radon in your water supply poses an inhalation risk and an ingestion risk. Research has shown that your risk of lung cancer from breathing radon in air is much larger than your risk of stomach cancer from swallowing water with radon in it. Most of your risk from radon in water comes from radon released into the air when water is used for showering and other household purposes.

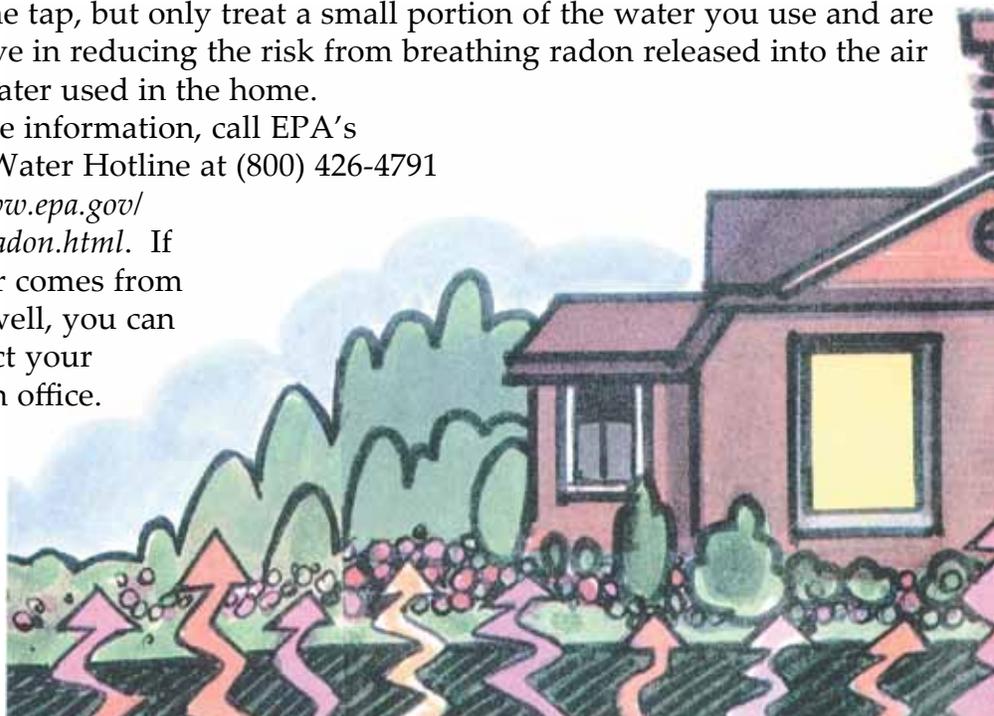
Radon in your home's water is not usually a problem when its source is surface water. A radon in water problem is more likely when its source is ground water, e.g., a private well or a public water supply system that uses ground water. If you are concerned that radon may be entering your home through the water and your water comes from a public water supply, contact your water supplier.

If you've tested your private well and have a radon in water problem, it can be fixed. Your home's water supply can be treated in two ways. Point-of-entry treatment can effectively remove radon from the water before it enters your home. Point-of-use treatment devices remove radon from your water at the tap, but only treat a small portion of the water you use and are not effective in reducing the risk from breathing radon released into the air from all water used in the home.

For more information, call EPA's Drinking Water Hotline at (800) 426-4791 or visit www.epa.gov/safewater/radon.html. If your water comes from a private well, you can also contact your state radon office.



If you've tested the air in your home and found a radon problem, and your water comes from a well, have your water tested.



HOW TO LOWER THE RADON LEVEL IN YOUR HOME

Since there is no known safe level of radon, there can always be some risk. But the risk can be reduced by lowering the radon level in your home.

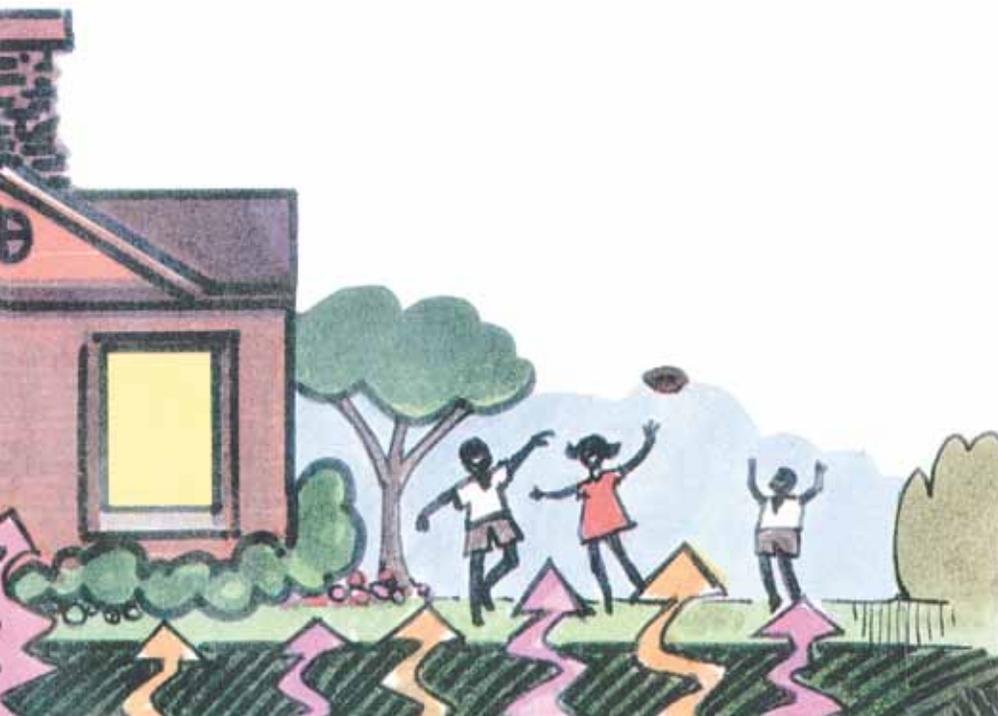
There are several proven methods to reduce radon in your home, but the one primarily used is a vent pipe system and fan, which pulls radon from beneath the house and vents it to the outside. This system, known as a soil suction radon reduction system, does not require major changes to your home. Sealing foundation cracks and other openings makes this kind of system more effective and cost-efficient. Similar systems can also be installed in houses with crawl spaces. Radon contractors can use other methods that may also work in your home. The right system depends on the design of your home and other factors.

Ways to reduce radon in your home are discussed in EPA's *Consumer's Guide to Radon Reduction*. You can get a copy at www.epa.gov/radon/pubs.

The cost of reducing radon in your home 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. The cost to fix can vary widely; consult with your state radon office or get one or more estimates from qualified mitigators. The cost is much less if a passive system was installed during construction.

RADON AND HOME RENOVATIONS

If you are planning any major structural renovation, such as converting an unfinished basement area into living space, it is especially important to test the area for radon before you begin the renovation. If your test results indicate a radon problem, radon-resistant techniques can be inexpensively included as part of the renovation. Because major renovations can change the level of radon in any home, always test again after work is completed.



HOW TO LOWER THE RADON LEVEL IN YOUR HOME *continued*

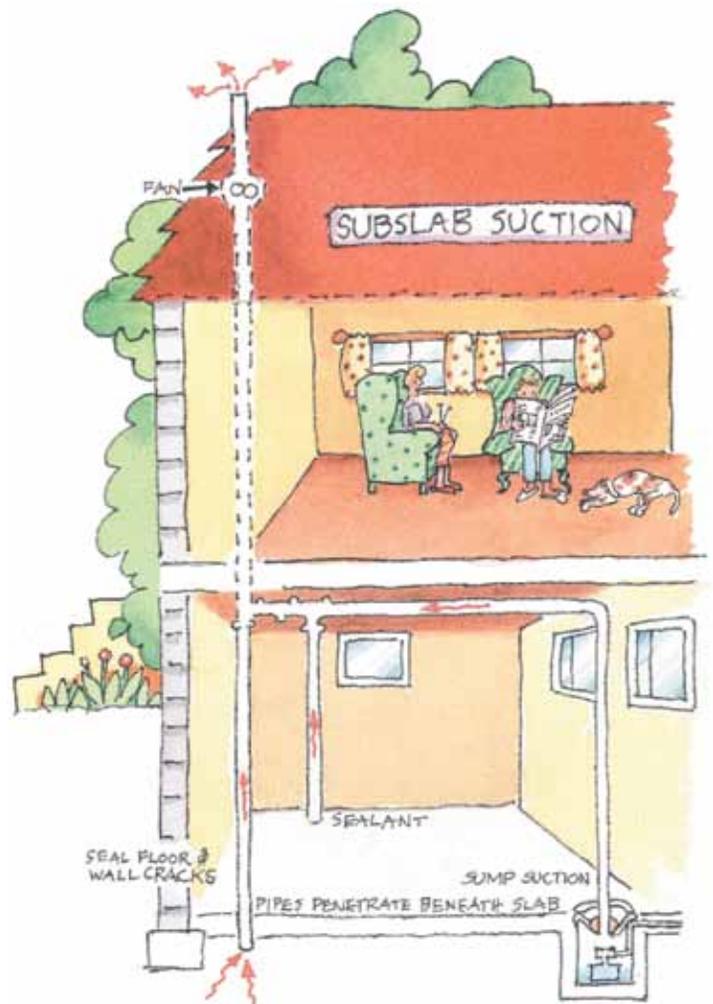
Most homes can be fixed for about the same cost as other common home repairs.

Lowering high radon levels requires technical knowledge and special skills. You should use a contractor who is trained to fix radon problems. A qualified contractor can study the radon problem in your home and help you pick the right treatment method.

Check with your state radon office for names of qualified or state certified radon contractors in your area. You can also contact private radon proficiency programs for lists of privately certified radon professionals in your area. For more information on private radon proficiency programs, visit www.epa.gov/radon/radontest.html. Picking someone to fix your radon problem is much like choosing a contractor for other home repairs—you may want to get references and more than one estimate.

If you are considering fixing your home's radon problem yourself, you should first contact your state radon office for guidance and assistance (www.epa.gov/radon/wherelive.html).

You should also test your home again after it is fixed to be sure that radon levels have been reduced. Most soil suction radon reduction systems include a monitor that will indicate whether the system is operating properly. In addition, it's a good idea to retest your home every two years to be sure radon levels remain low.



Note: This diagram is a composite view of several mitigation options. The typical mitigation system usually has only one pipe penetration through the basement floor; the pipe may also be installed on the outside of the house.

THE RISK OF LIVING WITH RADON

Radon gas decays into radioactive particles that can get trapped in your lungs when you breathe. As they break down further, these particles release small bursts of energy. This can damage lung tissue and lead to lung cancer over the course of your lifetime. Not everyone exposed to elevated levels of radon will develop lung cancer. And the amount of time between exposure and the onset of the disease may be many years.

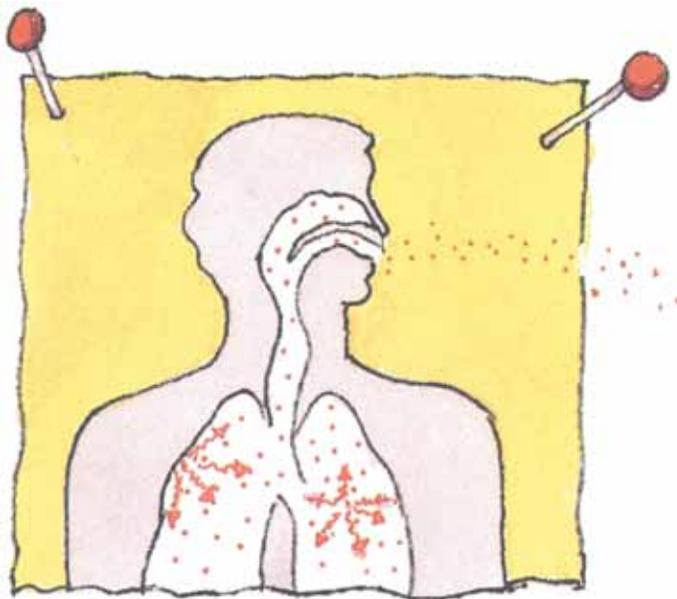
Like other environmental pollutants, there is some uncertainty about the magnitude of radon health risks. However, we know more about radon risks than risks from most other cancer-causing substances. This is because estimates of radon risks are based on studies of cancer in humans (underground miners).

Smoking combined with radon is an especially serious health risk. Stop smoking and lower your radon level to reduce your lung cancer risk.

Children have been reported to have greater risk than adults of certain types of cancer from radiation, but there are currently no conclusive data on whether children are at greater risk than adults from radon.

Your chances of getting lung cancer from radon depend mostly on:

- **How much radon is in your home**
- **The amount of time you spend in your home**
- **Whether you are a smoker or have ever smoked**



Scientists are more certain about radon risks than risks from most other cancer-causing substances.

RADON RISK IF YOU SMOKE

Radon Level	If 1,000 people who smoked were exposed to this level over a lifetime* . . .	The risk of cancer from radon exposure compares to** . . .	WHAT TO DO: Stop Smoking and . . .
20 pCi/L	About 260 people could get lung cancer	↳ 250 times the risk of drowning	Fix your home
10 pCi/L	About 150 people could get lung cancer	↳ 200 times the risk of dying in a home fire	Fix your home
8 pCi/L	About 120 people could get lung cancer	↳ 30 times the risk of dying in a fall	Fix your home
4 pCi/L	About 62 people could get lung cancer	↳ 5 times the risk of dying in a car crash	Fix your home
2 pCi/L	About 32 people could get lung cancer	↳ 6 times the risk of dying from poison	Consider fixing between 2 and 4 pCi/L
1.3 pCi/L	About 20 people could get lung cancer	(Average indoor radon level)	(Reducing radon levels below 2 pCi/L is difficult)
0.4 pCi/L		(Average outdoor radon level)	

Note: If you are a former smoker, your risk may be lower.

It's never too late to reduce your risk of lung cancer. Don't wait to test and fix a radon problem. If you are a smoker, stop smoking.

RADON RISK IF YOU'VE NEVER SMOKED

Radon Level	If 1,000 people who never smoked were exposed to this level over a lifetime* . . .	The risk of cancer from radon exposure compares to** . . .	WHAT TO DO:
20 pCi/L	About 36 people could get lung cancer	↳ 35 times the risk of drowning	Fix your home
10 pCi/L	About 18 people could get lung cancer	↳ 20 times the risk of dying in a home fire	Fix your home
8 pCi/L	About 15 people could get lung cancer	↳ 4 times the risk of dying in a fall	Fix your home
4 pCi/L	About 7 people could get lung cancer	↳ The risk of dying in a car crash	Fix your home
2 pCi/L	About 4 people could get lung cancer	↳ The risk of dying from poison	Consider fixing between 2 and 4 pCi/L
1.3 pCi/L	About 2 people could get lung cancer	(Average indoor radon level)	(Reducing radon levels below 2 pCi/L is difficult)
0.4 pCi/L		(Average outdoor radon level)	

Note: If you are a former smoker, your risk may be higher.

*Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).

**Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.

RADON MYTHS AND FACTS

MYTH: Scientists aren't sure radon really is a problem.

FACT: Although some scientists dispute the precise number of deaths due to radon, all major health organizations (like the Centers for Disease Control, the American Lung Association and the American Medical Association) agree with estimates that radon causes thousands of preventable lung cancer deaths every year. This is especially true among smokers, since the risk to smokers is much greater than to non-smokers.

MYTH: Radon testing is difficult, time consuming and expensive.

FACT: Radon testing is easy. You can test your home yourself or hire a qualified radon test company. Either approach takes only a small amount of time and effort.

MYTH: Homes with radon problems can't be fixed.

FACT: There are simple solutions to radon problems in homes. Hundreds of thousands of homeowners have already fixed radon problems in their homes. Most homes can be fixed for about the same cost as other common home repairs; check with one or more qualified mitigators. Call your state radon office (www.epa.gov/radon/whereyoulive.html) for help in identifying qualified mitigation contractors.

MYTH: Radon only affects certain kinds of homes.

FACT: House construction can affect radon levels. However, radon can be a problem in homes of all types: old homes, new homes, drafty homes, insulated homes, homes with basements, homes without basements. Local geology, construction materials, and how the home was built are among the factors that can affect radon levels in homes.

MYTH: Radon is only a problem in certain parts of the country.

FACT: High radon levels have been found in every state. Radon problems do vary from area to area, but the only way to know your radon level is to test.

MYTH: A neighbor's test result is a good indication of whether your home has a problem.

FACT: It's not. Radon levels can vary greatly from home to home. The only way to know if your home has a radon problem is to test it.

RADON MYTHS AND FACTS *continued*

MYTH: Everyone should test their water for radon.

FACT: Although radon gets into some homes through water, it is important to first test the air in the home for radon. If your water comes from a public water system that uses ground water, call your water supplier. If high radon levels are found and the home has a private well, call the Safe Drinking Water Hotline at (800) 426-4791 for information on testing your water.

MYTH: It's difficult to sell homes where radon problems have been discovered.

FACT: Where radon problems have been fixed, home sales have not been blocked or frustrated. The added protection is sometimes a good selling point.

MYTH: I've lived in my home for so long, it doesn't make sense to take action now.

FACT: You will reduce your risk of lung cancer when you reduce radon levels, even if you've lived with a radon problem for a long time.

MYTH: Short-term tests can't be used for making a decision about whether to fix your home.

FACT: A short-term test followed by a second short-term test* can be used to decide whether to fix your home. However, the closer the average of your two short-term tests is to 4 pCi/L, the less certain you can be about whether your year-round average is above or below that level. Keep in mind that radon levels below 4 pCi/L still pose some risk. Radon levels can be reduced in most homes to 2 pCi/L or below.

**If the radon test is part of a real estate transaction, the result of two short-term tests can be used in deciding whether to mitigate. For more information, see EPA's "Home Buyer's and Seller's Guide to Radon."*

FOR FURTHER INFORMATION

EPA Radon Website

www.epa.gov/radon

EPA's radon page includes links to publications, hotlines, private proficiency programs and more.

Frequent Questions:

<http://iaq.supportportal.com>

Radon Hotlines

1-800-SOS-RADON (767-7236)*

Purchase radon test kits by phone.

1-800-55RADON (557-2366)*

Get live help for your radon questions.

1-800-644-6999*

Radon Fix-It Hotline. For general information on fixing or reducing the radon level in your home.

1-866-528-3187*

Línea Directa de Información sobre Radón en Español. Hay operadores disponibles desde las 9:00 AM hasta las 5:00 PM para darle información sobre radón y como ordenar un kit para hacer la prueba de radón en su hogar.

1-800-426-4791

Safe Drinking Water Hotline. For general information on drinking water, radon in water, testing and treatment, and standards for radon in drinking water. Operated under a contract with EPA.

*Operated by Kansas State University in partnership with EPA.

EPA Regional Offices

www.epa.gov/radon/whereyoulive.html

Check the above website for a listing of your EPA regional office.

Ordering Radon Publications

Many EPA radon publications are available from www.epa.gov/radon/pubs

Radon publications may be ordered through the National Service Center for Environmental Publications (NSCEP) by calling 1-800-490-9198, by visiting the NSCEP website at www.epa.gov/ncepihom, or by email at nscep@bps-lmit.com



Surgeon General Health Advisory

“Indoor radon is the second-leading cause of lung cancer in the United States and breathing it over prolonged periods can present a significant health risk to families all over the country. It’s important to know that this threat is completely preventable. Radon can be detected with a simple test and fixed through well-established venting techniques.”

January 2005

U.S. EPA Assessment of Risks from Radon in Homes

In June 2003, the EPA revised its risk estimates for radon exposure in homes. EPA estimates that about 21,000 annual lung cancer deaths are radon related. EPA also concluded that the effects of radon and cigarette smoking are synergistic, so that smokers are at higher risk from radon. EPA’s revised estimates are based on the National Academy of Sciences 1998 BEIR VI (Biological Effects of Ionizing Radiation) Report which concluded that radon is the second leading cause of lung cancer after smoking.



Indoor Environments Division (6609J)
EP 402/K-12/002 | May 2012 | www.epa.gov/radon

RADON MITIGATION TECHNIQUES

Any home can have a radon problem. This means new and old homes, well-sealed and drafty homes, and homes with or without basements. The EPA estimates that 1 out of every 15 homes in the United States have elevated radon levels above 4 pCi/L. Radon mitigation systems are highly effective in reducing radon concentrations to below 4 pCi/L. In New Jersey, sixty percent of the homes mitigated have been brought down to below 1 pCi/L.

Homeowners should consult a certified radon mitigation contractor to discuss the best method for reducing radon in their home. Homeowners may choose to do their own mitigation, but should be aware that significant home repair experience is required, and that there is potential danger from backdrafting of exhaust systems if the mitigation is not done correctly. Following are the most common techniques, with several often combined in one mitigation:

1. ACTIVE SOIL DEPRESSURIZATION (ASD)

reduces the amount of radon accumulating underneath a building's foundation. Pipes are inserted into holes drilled through the foundation floor. The pipes are connected to an exhaust fan, which vents radon outdoors, preventing it from entering the interior of the home. In addition, possible entry points for radon are sealed which include sump pits, openings around utility pipes, gaps between floors and walls, and large cracks in basement floors.



THE PIPE PICTURED ABOVE IS PART OF AN ASD SYSTEM.

2. BLOCK-WALL DEPRESSURIZATION

is effective in cases where radon enters through hollow concrete block walls. This method depressurizes the air space in the walls by means of an exhaust fan. Sealing cracks in basement walls will increase the effectiveness of this method.

3. DRAIN-TILE SUCTION

involves the use of a continuous loop of perforated tiles along the perimeter of the house. An exhaust fan is installed into the network of tiles that is then vented above the house eave.

The suction created by the fan pulls radon away from the surrounding soil and reduces the entry of radon into the home.

4. SUBMEMBRANE SUCTION

reduces levels in crawlspace homes. This method involves covering the earth floor with a high-density plastic sheet. A vent pipe and fan are used to draw the radon from under the sheet and vent it to the outdoors.

A post-mitigation test should be performed upon completion of the mitigation system, regardless of whether the mitigation work was performed by a certified contractor or a homeowner, to determine if radon levels have been reduced to less than 4 pCi/L. New Jersey offers a free post-mitigation test to confirm these results which can be obtained by submitting a copy of the mitigation contract and the initial post-mitigation results. A retest should be performed every two years to ensure that the mitigation system is working properly.

CERTIFICATION IN NEW JERSEY

New Jersey law requires that only certified individuals or the homeowner can conduct radon testing and mitigation in a home. New Jersey's certification program requires that certified individuals demonstrate required education and experience, take DEP-approved courses, and pass a written examination. Certified businesses must report test and mitigation data to the DEP, and comply with quality assurance and recordkeeping requirements.

New Jersey residents should check to make sure that businesses and individuals are certified, by asking to see proof of certification and checking the certification's expiration date. Even test devices sold in stores must be from companies certified in New Jersey, as evidenced by the New Jersey certification number ('MEB9', followed by four digits). To obtain a list of certified businesses in New Jersey or to request further information, please contact the DEP Radon Section at (800) 648-0394, or visit www.njradon.org

RADON: THE BASICS

- ❖ Radon is the second leading cause of lung cancer, after cigarette smoking.
- ❖ Testing is easy and inexpensive.
- ❖ The DEP recommends all New Jersey homeowners test for radon.
- ❖ If levels are elevated, homes can be mitigated to reduce radon levels.
- ❖ In New Jersey, all radon testing and mitigation businesses and professionals must be certified.

RADON

Information You Should Know



New Jersey Department of
Environmental Protection

Radon Section
(800) 648-0394

www.njradon.org



INTRODUCTION

Radon is a naturally occurring radioactive gas formed by the decay of uranium in rock, soil, and water. Radon is invisible, odorless, and tasteless and can only be detected through specialized tests. The U.S. Environmental Protection Agency (EPA) ranks indoor radon among today's most serious environmental health problems.

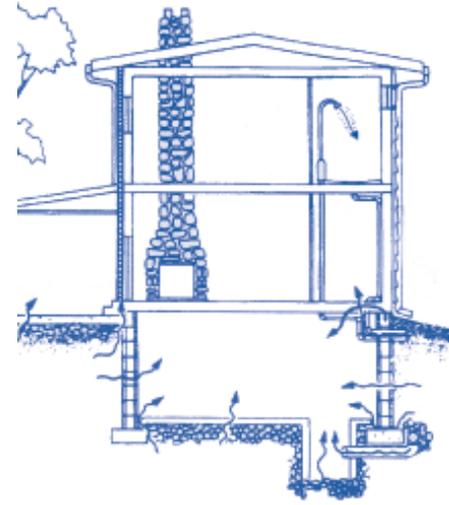
While radon disperses quickly in the outdoor environment, it can accumulate in the home. Long-term exposure to radon has been linked to increased risk of lung cancer. The greater the concentration and the longer the exposure, the greater the risk of developing lung cancer.

The New Jersey Department of Environmental Protection (DEP) recommends that all homeowners test their homes for radon, and mitigate (fix) their home if tests reveal levels of 4 pCi/L or more. Even in areas that generally have

a low radon potential, elevated levels of radon have been found.

Radon can seep from soil into homes with the concentration affected by the following factors: the amount of uranium in the soil beneath the home; the ease with which radon moves through the soil; and the number and size of openings into the home (such as cracks in flooring, openings around pipes, and sump pits).

In addition, slight differences between indoor and outdoor air pressure will affect the rate at which radon enters the home. Reduced indoor air pressure draws radon gas into the house from underlying soil. Since warm air rises, and air in a house is often warmer than the outside air, this "stack effect" causes lower indoor air pressure. Lower indoor air pressure also results from exhaust fans, venting of air by furnaces, clothes dryers and other appliances, and opening the downwind windows in a home. Lower indoor air pressure increases radon concentrations.



COMMON ENTRY POINTS FOR RADON.

Radon may also be present in well water and can be released into the air in your home when water is used for showering and other household uses.

All these factors vary greatly from home to home, and the lifestyle of a particular family can affect these factors as well (for example, how much the family uses vented appliances and heating systems). As a result, one home may have a high level of radon while the home next door may have a low level.

Radon undergoes a radioactive decay process which produces other radioactive materials which further decay and form solids. These solids can attach to particles in the air, such as dust or cigarette smoke, where they can be inhaled and become trapped in the lungs. As these particles further decay, they release small bursts of energy which continue to emit radiation that can damage DNA and harm sensitive lung tissue resulting in the possible formation of lung cancer.

The National Academy of Sciences estimates that between 15,000 to 22,000 deaths from lung cancer are caused by radon each year in the United States. Radon is the leading cause of lung cancer, second only to cigarette smoking. Approximately 2,900 of those diagnosed with radon-induced lung cancer have never smoked. Exposure to radon in combination with smoking greatly increases the risk of lung cancer. More people die from radon than from drunk driving, falls in the home, fires, and drownings. Radon exposure is easily preventable by testing.

TESTING FOR RADON

The first step in determining if a home has elevated radon levels is to perform a radon test. Radon is most commonly measured in picoCuries per liter (pCi/L) of air, which is about one quart. The EPA and the DEP have established a guideline that homes with 4 pCi/L or more of radon should be mitigated. It is important to note that this action level was set because it was technologically achievable, not because it entirely eliminates risk from exposure to radon. There is no truly "safe" level of radon since lung cancer can result from very low exposures to radon; however the risk decreases as the concentration decreases.

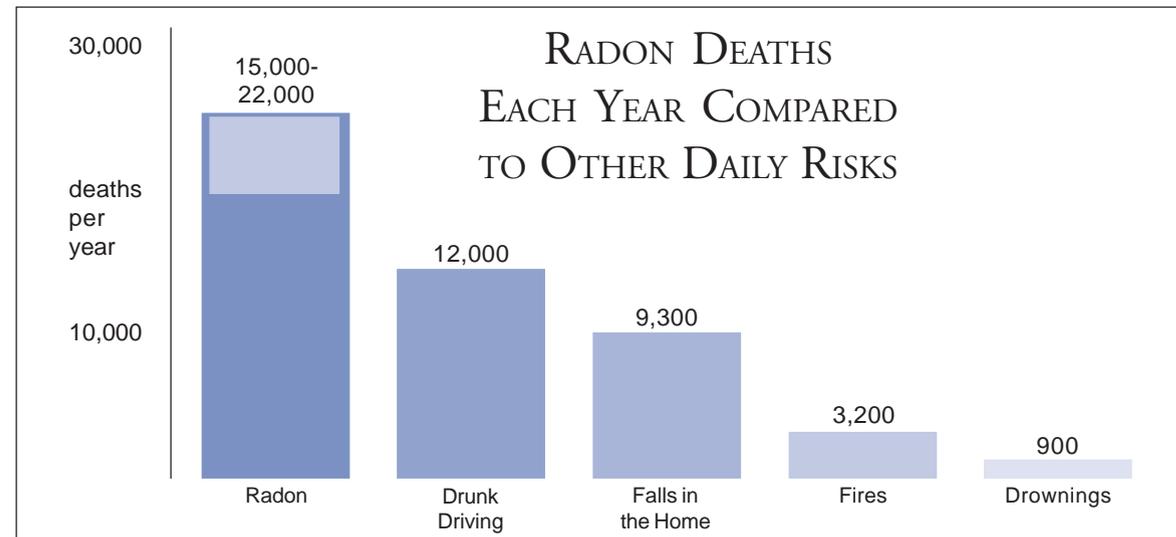
The four most common radon test devices are the charcoal canister, continuous radon monitor, alpha track detector, and electret ion chamber. The charcoal canister and continuous radon monitor are used for short-term tests (2-7 days), the alpha track is for long-term

tests (3-12 months), and the electret can be used for either short-term or long-term tests. Testing is easy and inexpensive.

Homeowners typically begin with a short-term test in the lowest livable level of the home; that is, the lowest level that is used or could be used as a living space. This would include the first floor in a home without a basement and a finished or unfinished basement, but not a crawl space. If a single short-term test reveals levels of 4 pCi/L or more, DEP data indicate that subsequent testing would confirm that levels in the home are 4 pCi/L or more in 80 percent of cases.

If a second short-term test is conducted in the same location, either at the same time or a later time, the average of the two tests will provide a slightly more accurate estimate of radon levels. Long-term tests of 3-12 months provide the best estimate of exposure, since radon levels fluctuate daily and seasonally.

"Closed house" conditions must be maintained during the test, meaning that windows and doors that could let in outside air must be kept closed, except for routine entrances and exits. For tests lasting less than 4 days, closed house conditions must be initiated 12 hours before the start of the test.



Source: EPA 2004

