

Protecting Your Family Is Easy...

Information provided by: RadonAwareness.org

1. Learn The Facts: Spend a little time reviewing the information found here. The more you know about radon, the safer your family will be.
2. Test Your Home: Testing is easy, inexpensive and only takes a few minutes of your time.
3. If A Problem Is Found, Fix It: Radon problems can usually be corrected in less than a day and will increase the value of your home. It is a smart investment with many healthful benefits.



Radon Awareness - The Bad News

Last year in America, over 21,000 of our loved ones died from cancer caused by radon. Our country spent over 2 Billion dollars in health care costs due to radon exposure and sadly, this year it will happen again because most people still do not know that radon has been linked to over 12% of all cancer deaths. Our State and Federal governments are trying everything they can to educate and inform all of us about radon but they simply do not have the proper funding to get the message out. An increase in the radon awareness budget does not seem likely anytime in the near future.

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The Good News

All the information you need to know about radon is right here and it only takes about 15 minutes to learn the facts. Protect your family and become an advocate for radon awareness. We can save thousands of lives every year through a grassroots effort by telling our friends, neighbors and loved ones about radon. Together, we can make a difference. Let's start with...



What Is Radon?

Glad you asked! Radon is radiation. There are no safe levels of radiation, so the higher your radon level, the greater your risk. Health experts recommend that you try to minimize your exposure to all forms of radiation including x-rays, nuclear radiation and solar radiation, but especially radon because of its ability to mutate cells within the human body.

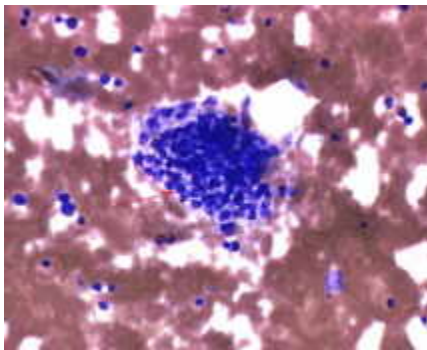
Radon is element # 86 on the periodic chart of elements. It is a colorless, tasteless and odorless gas with a radioactive half-life of only 3.82 days. Radon is created when radium, element #88, breaks down through radioactive decay. Radium's half-life is 1602 years. The amount of radon in your home will be determined by the amount of radium present in the soil that surrounds your house. It also depends on the ease of entry and amount of negative pressure within the home.

How Radon Causes Cancer

To protect your family from radon, a basic understanding of radiation is required. This isn't rocket science, but it does take a couple of minutes to explain.

All radioactive elements break down (radioactive decay) over time through a process measured in half-lives. As these elements breakdown, they actually create entirely new elements, each with its own specific half-life. Each time a new element is created, it releases more radiation. The faster this occurs, the more the radiation is produced. As radon breaks down, it creates other radioactive elements called radon progeny or daughters - each with even shorter half-lives that break down again, again and again in half-lives from minutes to just fractions of a second.

Each time an element breaks down, it explodes with energy, radioactive energy strong enough to form a small crater on glass when observed through a microscope. If these explosions occur within the human body, for example while breathing, the radiation can be deposited on a cell, either killing it or forcing it to repair itself. Fortunately, cells often do an excellent job of repairing themselves but sometimes, the DNA structure within the cell changes. The mutated cell then begins to multiply and cancer begins to spread. The more cells that are exposed to radiation, the greater the risk of cell mutation.



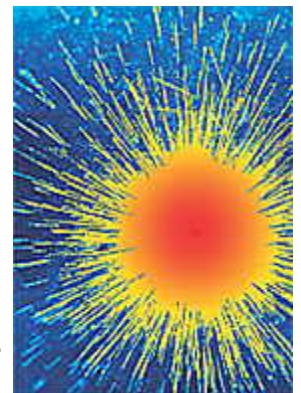
Children's cells are still growing and changing rapidly so they are at the greatest risk as well as anyone who spends a great deal of time at home. Unfortunately, the human body does not produce symptoms or warning signs to alert us when being exposed to radiation. Radon causes cancer, but does not cause headaches, nausea or other feelings of ill health. Most people won't know they have cancer until they hear it from their doctor. The only way to know if your family is being exposed is to test.

How Is Radon Measured?

Radon is measured in pico-Curies per liter of air (pCi/L), a standard unit used worldwide for radiation to measure the number of decays (radioactive explosions) that occur within 1 liter of air every 60 seconds. It was named after Madame Curie.

1 pCi/L equals 2.2 radioactive explosions every minute in every liter of air. That doesn't sound like much until you consider the amount of air within a house. For example, a 1,000 square foot home with 4pCi/L will have about 2 million explosions occurring in that house every single minute of every day. If they made special glasses that could see those explosions as they occurred, there is no doubt that everyone with a radon problem would have it fixed! Actual Photo--->

The half-life of radium is relatively stable at 1,622 years but the half-life of radon is only 3.82 days. Worse yet, is the half-life of radon decay products, which explode at even faster rates, repeatedly strike our cells with radiation. It is actually radon decay products that cause all the damage, not radon, but we still test for radon because it's easier to measure.





You may have seen guys dressed up in radiation suits on T.V. carrying a Geiger counter. Every time a Geiger counter makes a "tick" sound, it represents one of those radioactive explosions and the closer they get to the source of the radiation, the more it ticks. In other words, "Stay Away!" Radon tests work in a similar way by counting the number of explosions over a period of time to determine the amount of radon in your home. So in reality, radon test kits simply tell us is how many of those radioactive explosions are occurring in our home every minute of every hour of every day.

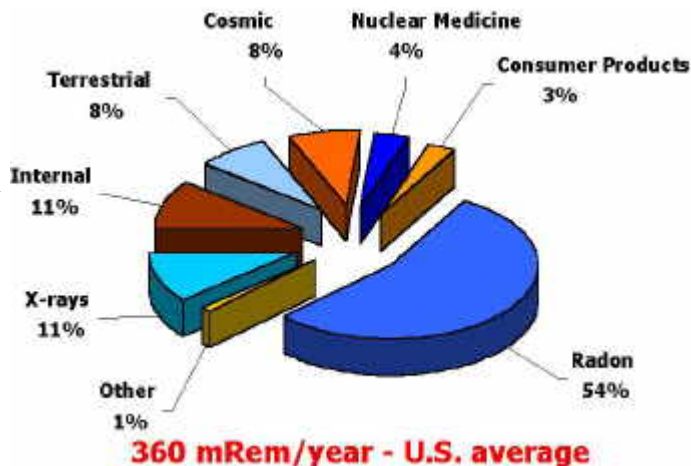
Time Vs. Radon



Time exposed multiplied by the amount of radiation, equals dose. So living in a house with 1 pCi/L for 5 years is the same radiation exposure as living in a house with 5 pCi/L for 1 year. Same amount of radiation exposure in both cases. Just like standing next to a nuclear power plant for 2 hours is twice as bad as standing there for 1 hour. So, either lower the amount of radon your family is exposed to or the amount of time exposed and it will immediately begin to effect your past exposure while also

protecting your family in the future. Be sure to also test anywhere you or a family member spends a lot of time like at work, school, child care, etc.

If you are fortunate to have a home that measures between 1.3 pCi/ to 1.5 pCi/L then your home is considered average. Combine this with all other forms of radiation that your family is exposed to and *radon will still account for more than 50% of your families total radiation exposure over their lifetime, even at that low of a dose.* Radon is the single greatest contributor of radiation to the average person and remember, less is better. Even Madame Curie, the discoverer of radium, never realized the seriousness of radiation and died as a direct result of her exposure to radiation during her research work. The letter "C" is always capitalized when using the abbreviation pCi/L in her honor.



How Do I Test?



There are a variety of test kits to choose from and they are extremely accurate so long as you follow the directions that come with each kit. Laboratory's that sell the kits are monitored to ensure accuracy and follow very specific guidelines for quality control.

Short Term Test Kits - If you've never tested your home before, it is recommended that you start with a short-term charcoal test. These tests vary in cost from \$10 to \$25 each and are placed in your home from 2 to 7 days depending upon the laboratory that manufactures the test kit. Short term test kits are recommended because if your home has a serious radon problem, you'll want to know right away. Testing is easy, just be sure to follow the directions that come with the test kit. Be sure to put the exact beginning and ending times/dates on the kit and mail it back to the laboratory immediately. Results will be mailed or e-mailed directly back to you.

Long Term Test Kits - For people that want to measure radon over longer periods of time, typically from 3 months to 1 year. These are called alpha track test kits and instead of having charcoal that absorbs the radon, they have a special piece of plastic in them that is perfectly smooth. As radon lands on the plastic it decays and makes little craters that are counted with a microscope. Based on the number of craters (alpha tracks) and the amount of time you exposed the kit, the lab will know how much radon is in your house. Cost varies from \$20 to \$30 each.

Radon In Water Test Kits - Testing your water is not usually needed unless your home uses water from a well for drinking, showering and cleaning. City and rural water supplies regulate radon concentrations to make sure that if you have a radon problem, it's coming from the soil, not your tap. Radon in water test kits vary in cost from \$25 to \$40.

Test kits are available on this site or from most hardware and home improvement stores. All the test kits available today are monitored by the EPA for accuracy and provide results directly to you. Some test kits do not include the cost for laboratory analysis so the actual price might cost twice as much when your done. That's o.k. so long as you know what the analysis fee is before buying the test kit. Only one test kit is needed unless the lowest level of your home is extremely large and greater than 1,500 square feet.

Buying A New Home?

If you're buying a new home, be sure to have it tested as part of the inspection process. You'll want to hire a certified radon specialist that uses a Continuous Radon Monitor or Electronic Radon Monitor instead of the kits mentioned above. These monitors provide hour to hour readings to detect tampering and insure that all required testing conditions are met. If you find a real estate agent that cares enough about you and your family to recommend a radon test, you've found a true professional, a real gem and worth recommending to everyone you know.



If you're not buying a new house, use the kits instead. They are just as accurate and you're certainly not going to cheat yourself.

Where Do I Test?

Test in the basement if you have one. Radon tends to spread throughout the entire house, especially if your furnace/air conditioning unit is located in the basement but testing in the basement is always preferred. Select a location in the center of the most used room, about 3 feet off the floor, (breathing zone while sitting), away from vents, fans and outside walls.

If you don't have a basement, test in the lowest livable area of the home. For homes with crawlspaces or homes with the floors in direct contact with the ground, test on the first floor, in the center of the most used room, about 3 feet off the floor, away from vents, fans and outside walls. Always test on the lowest livable area of the home whether you spend any time there or not.

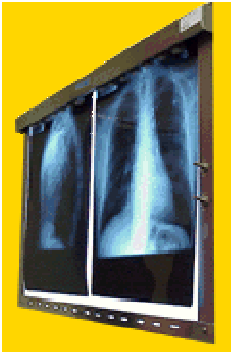


What Do The Results Mean?

As you already know, radon is radiation so you want to be exposed to as little of it as possible. Radon in outside air varies from 0.2 to 1.0 pCi/L. The average house in America is 1.3 to 1.5 pCi/L. The U.S. Environmental Protection Agency states that, "If your home is above 4.0 pCi/L,

fix it. If your home is between 2.0 and 3.9 pCi/L, seriously consider fixing it." Remember that 4 pCi/L is not considered safe, it is considered the maximum level you should have.

Comparing Apples To Apples



If you live in a home for 1 year that has exactly 4.0 pCi/L then your radiation exposure is the same as 200 chest x-rays per year. This is based on time exposed so if you are only home half the time, cut the amount of x-rays in half. If your radon level is twice that amount, then double the number of x-rays.

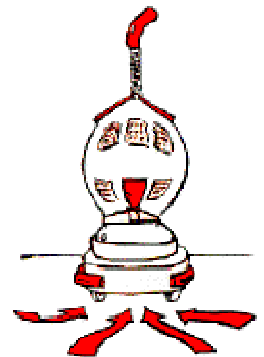
The Nuclear Regulatory Commission requires all nuclear power plants to put fences around each facility at a distance far enough away so that a person standing at the fence line will not receive any more radiation than 25 mRem. They use the same formula for around nuclear waste sites. That's a lot of "ticks" on a Geiger counter and a house with 4 pCi/L is worse than that! Just because you can't see the radiation doesn't mean it's not there.



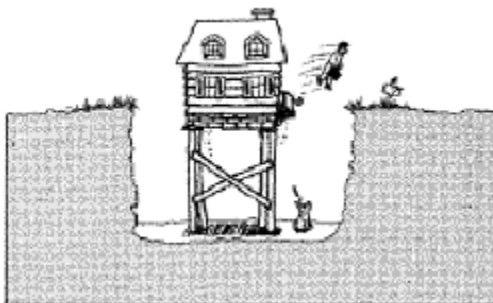
X-ray technicians wear lead aprons and stand as far away as possible. Take the same approach by either reducing the amount of radon in your home or stay away from home as much as possible. It's usually much easier just to have the radon problem fixed.

How Radon Enters Our Homes

Within everyone's homes are different pressures. You can't feel them but they are there. The upper portion of a home is under a positive pressure with air trying to get out and the lower portion of the home is under a negative pressure with air trying to get in. Somewhere in the middle is the neutral pressure zone where air isn't trying to get out or in. So the higher you go, the stronger the positive pressure. The lower you go, the stronger the negative pressure. It is this negative pressure, that pulls radon into our homes. The greater the temperature differential between the inside of our homes and the temperature outside our homes, the greater the pressures become. So radon levels are usually higher in the winter, then summer with spring and fall being the lowest.



Reducing Radon

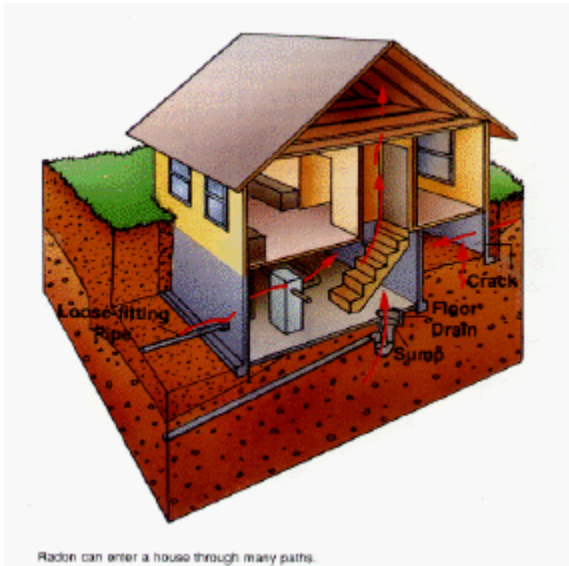


There are a variety of methods used to reduce the radon levels within a home. Some work much better than others and some aren't recommended at all. Don't try fancy air filters, furnace filters, ozone machines, air purifiers, ultra-violet lights, or any of the other gadgets being sold. They do absolutely nothing to reduce radon levels in the home. The best way to reduce radon is to attack the source and prevent it from entering. (see "Systems" below).

Ventilation - The easiest way to reduce radon is to keep all the windows of the home open, especially all of the basement windows.

Keeping basement windows open helps to minimize the negative pressure within the lower part of the home and helps to dilute the radon. For this to work though, the windows need to be kept open all the time. If not,

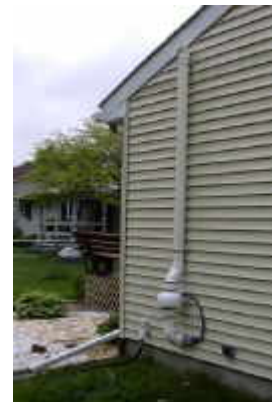
radon returns to full strength in as little as 6 hours. The problem with this method is that it takes a lot of fresh air to dilute radon. In the summer and wintertime, this can be very uncomfortable and greatly increase your utility bills. If you'd like to use a window fan to increase airflow, make sure that the fan is blowing air from outside into the basement, not the other way around. If the fan is blowing air out of the basement, it can increase the negative pressure that draws radon into your home and your radon level can go up instead of down.



Sealing Work – Since radon is drawn into the house from the soil, sealing openings in the basement floors or walls with caulk can help to reduce the amount of radon entering the home. Seal as many of the cracks as you can get to and if you have a sump pump, seal the lid airtight. Cracks in the basement floors, walls and other openings can allow radon to come in easier so caulking work can make a big difference. In some cases, however, sealing cracks and sump pits can increase your radon level by reducing the amount of fresh air that was coming in instead of contaminated air. Always re-test within a few weeks after attempting any radon work. Sometimes, sealing work has no effect at all. This is because radon is virtually the same size as a helium molecule, (extremely small) and can pass through most materials, even concrete. Openings and cracks in the foundation/floor just make it easier.

Radon Removal Systems - The most effective way to get rid of radon is to install a removal system that draws the radon out of the soil before it even has an opportunity to enter the house. These systems are called "Sub Slab Depressurization Systems" or "Active Soil Depressurization Systems". These systems operate by using a piping and fan system that depressurizes the soil that surrounds the home. This in effect reverses the pressure differential between the soil and the lower portion of your home. You'll still have the same pressures within your house that you've always had and never noticed, but the radon will be vented safely outside so that it can dissipate harmlessly into the atmosphere. It doesn't take much of a pressure differential to draw radon into a home, and it doesn't take a lot of pressure to draw it out.

Sometimes these systems can be piped up through the house and out the roof or are installed on the outside of the house. Depending on the type of house, you may need a system that pulls the radon out from below the basement slab, out of block walls or from the crawlspace. Every home is different but usually the most important factor regarding the method of installation is the type of soil around your house and its porosity. Homes with clay soils are much more difficult to pull air through than homes built on gravel. Since every home is so different, the EPA recommends hiring a certified radon mitigator to do this type of work and does not advise homeowners to try this on their own. An improperly installed system could raise the radon level or cause other problems like back drafting of the furnace or water heater pulling in carbon monoxide - another deadly gas. Costs can vary from \$800 to \$2,500 but could be more depending on what work needs to be done. Systems only cost pennies a day to operate and require almost no maintenance.



What Type Of System Is Best For My House?

A radon specialist can help to determine which type of system is best for you. Your home may need a combination of types and may also need sealing work as part of the system. A radon mitigator will usually performed diagnostics before any type of system is installed to determine what is best for your particular

home. Diagnostics normally consists of drilling small 1/2" holes through the concrete. These holes will later be plugged and sealed. These test holes allow the specialist to determine where the radon is coming from, types of soil and where the suction point(s) need to be for your particular home. Homes with crawlspaces, or homes built on ground level all require different approaches, but when designed and installed properly, systems can reduce radon levels by up to 99%.

Building A New Home?

Be sure to ask your builder to have a "passive" radon system installed during construction. The required piping can be hidden in the walls, vented out of the roof and tied into the drainage tiling system below your basement floor. If it tests high for radon after the home is completed, all you need to do is add the fan!



How To Choose A Radon Specialist



In most States, both radon testers and radon mitigators are required to complete an approved training course and pass a written exam. If your State requires certification, make sure the company you hire has been properly trained and certified.

Choose a radon specialist like you would a teacher, lawyer or doctor. You want the best your family can afford. There is no substitute for experience so select a mitigator with the most experience you can find in your area. It's also smart to look for the one that offers the best guarantee and longest warranty. Try to find a mitigator that will give you a firm price not an open ended estimate. It's also nice to find one that provides a free test after the work is completed. Just like any type of service, there are a wide variety of companies to choose from and price isn't always the best judge of quality. The best mitigators won't just look at your house and tell you what is needed. They will conduct diagnostics first to determine what is best for your particular style of house and soil characteristics. After diagnostics, they should be able to give you several options on how the system is installed and let you choose whichever you prefer. If the person you choose doesn't perform diagnostics, you probably picked the wrong guy. Usually, the better the mitigator you hire, the lower your final radon level will be.

Benefits Of A Radon Removal System



Of course the single largest benefit of having a radon removal system is low radiation exposure and a greatly reduced chance of getting cancer, but many other benefits have also been reported. As radon removal systems safely exhaust the radon, they also remove other chemicals and gases that are commonly found in the soil around our homes like insecticides, pesticides, herbicides, methane and carbon dioxide. Cleaner air means better health. The systems also remove moisture from the ground and can help to keep basements drier and prevent mold growth. Smart home buyers are now asking for a radon test as part of the inspection process so if you already have a radon removal system in place, you may sell your home faster

or even get more for it. One of the biggest benefits though is peace of mind and knowing that you're doing the right thing for yourself and your family.

Congratulations!

You've now learned some of the basic facts that our government has been trying to inform us about for years. What you do with the information is up to you, but maybe now you know how why the EPA recommends that every home in America be tested. If you haven't tested yet, you know the next step! Testing is easy and everyone needs to do it as soon as possible.

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