

# RADON BEST PRACTICES

IN A REAL ESTATE TRANSACTION

*A guide to radon risks, testing protocol,  
and mitigation for the real estate professional.*



Department  
of Health

ELAP# 12137



## WHAT IS RADON

Radon is an odorless colorless inert gas that is created naturally as a result of the decay of uranium in the soil. It is the 2nd leading cause of lung cancer, behind smoking. Nearly one out of every 15 homes in the United States is estimated to have an elevated radon level (4 pCi/L or more).

Radon is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock, and water and gets into the air you breathe. Radon typically moves up through the ground to the air above and into a home through cracks and other holes in the foundation and floor. Radon can also enter a home through well water. Your home can trap radon inside. Any home can have a radon problem. This means new and old homes, well sealed and drafty homes, and homes with or without basements. You are most likely to get your greatest radiation exposure at home, where you spend most of your time.

Radon is estimated to cause tens of thousands of lung cancer deaths each year. In fact, the Surgeon General has warned that radon is the second leading cause of lung cancer in the United States. 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.

You cannot predict radon levels based on state, local, and neighborhood radon measurements. Do not rely on radon test results taken in other homes in the neighborhood to estimate the radon level in your home. Homes which are next to each other can have different indoor radon levels. Testing is the only way to find out what a home's radon level is.

## WHAT EVERYONE SHOULD KNOW\*

Lung cancer kills thousands of Americans every year. Smoking, radon, and secondhand smoke are the leading causes of lung cancer. Although lung cancer can be treated, the survival rate is one of the lowest for those with cancer. From the time of diagnosis, between **11** and **15%** of those afflicted will live beyond five years, depending upon demographic factors. In many cases lung cancer can be prevented.

Smoking is the leading cause of lung cancer. Smoking causes an estimated **160,000** cancer deaths in the U.S. every year. Radon is the number one cause of lung cancer among non-smokers, according to EPA estimates. Overall, radon is the second leading cause of lung cancer. Radon is responsible for about **21,000** lung cancer deaths every year. About **2,900** of these deaths occur among people who have never smoked.

Two studies show definitive evidence of an association between residential radon exposure and lung cancer. Two studies, a North American study and a European study, both combined data from several previous residential studies. These two studies go a step beyond earlier findings. They confirm the radon health risks predicted by occupational studies of underground miners who breathed radon for a period of years. Early in the debate about radon-related risks, some researchers questioned whether occupational studies could be used to calculate risks from exposure to radon in the home environment. **Tom Kelly**, Former Director of EPA's Indoor Environments Division said, "These findings effectively end any doubts about the risks to Americans of having radon in their homes. We know that radon is a carcinogen. This research confirms that breathing low levels of radon can lead to lung cancer."

U.S. Surgeon General, **Dr. Richard H. Carmona**, issued a Health Advisory warning Americans about the health risk from exposure to radon in indoor air. He urged Americans to test their homes to find out how much radon they might be breathing. Dr. Carmona also stressed the need to remedy the problem as soon as possible when the radon level is **4 pCi/L** or more, noting that more than **20,000** Americans die of radon-related lung cancer each year.

The **World Health Organization (WHO)** says radon causes up to **15%** of lung cancers worldwide. In an effort to reduce the rate of lung cancer around the world. "Radon poses an easily reducible health risk to populations all over the world, but has not up to now received widespread attention," said **Dr. Michael Repacholi**, coordinator of WHO's Radiation and Environmental Health Unit. He went on to say that "radon in our homes is the main source of exposure to ionizing radiation, and accounts for 50% of the public's exposure to naturally-occurring sources of radiation in many countries."

WHAT  
SHOULD  
YOU KNOW  
AS A  
**REALTOR**

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As radon is created in the geology under and near a home, it is released into the air above by the path of least resistance. A structure can act like a chimney and draw the radon out of the soil. It then can trap the radon inside. HVAC systems and thermal convection create negative air pressure in the soil under the home. This air that fills the spaces between the particles of aggregate, carries with it the radon gases as they are released by uranium containing geology. As the radon escapes the soil, it passes through gaps and cracks in basement floors, and foundation walls. Perimeter drains, sump pits, pipe chases, and HVAC ducts that penetrate the walls and floors can also be entry points. It then can flow throughout the home.

Generally speaking, radon dilutes as it passes to upper floors of a home. It is usually safe to say that if the lowest level of a structure measures under 4 pci/l that the floors above are also less than 4 pci/l.

**Stack Effect** is the primary cause of radon infiltration. Think of a building as a very wide and short chimney, that pulls a negative pressure draft in a very small amount on the soil under and near the foundation. This makes the structure a suction cup on the earth drawing soil gases up, out, and into the home; bringing radon with it.

The air in a home needs to reach equilibrium in order to ensure an accurate measurement. It is important to maintain closed-house conditions for at least **12 hours** before the beginning of the test and for the entire test period. Do not operate fans or other machines which bring in air from the outside. Closed building conditions must be kept for the entire test.

## WHAT A BUYER SHOULD KNOW

Radon testing is easy and the only way to find out if you have a radon problem in your home. You should test in the **lowest level** of the home that could be used regularly. This means testing in the lowest level that is currently lived in or a lower level not currently used, but which a buyer might use as a family room or play area, etc. NY state requires radon measurement testers to follow a specific testing protocol. **You should carefully follow the testing protocol outlined in EPA's Radon Testing Checklist.**

This checklist provided by the EPA can help ensure accurate radon test results will be obtained. Radon testing is not a complicated process, but must be done properly. Otherwise, the test results may not be accurate and more testing may have to be done.

Disturbing or interfering with the test device or the closed-house conditions will invalidate the test results. The certified tester should be able to confirm that all the items in this checklist have been followed. If the tester cannot confirm this, another test should be performed.

### EPA'S TESTING CHECKLIST BEFORE THE RADON TEST:

- Notify occupants of the importance of proper testing conditions. Give occupants written instructions or this checklist and explain the directions carefully.
- If conducting the test yourself, use a radon measurement device approved by the national certification programs and follow the manufacturer's instructions that come with the device.
- If you use a testing professional, hire a nationally certified individual and ask to see his or her identification. The contractor's identification number should be clearly visible on the test report.
- The test should include method(s) to prevent or detect interference with testing conditions or with the testing device itself.
- Conduct the radon test for a minimum of 48 hours. Certain devices must be exposed for more than the 48-hour minimum.
- Check to see if an active radon reduction system is in the house. Before taking a short-term test lasting less than 4 days, make sure the system, if any, is operating at least 24 hours before the beginning of the test.
- Short-term radon testing, which lasts for no more than a week in length, is to be conducted under closed-house conditions.
 

*Note: Closed-house conditions means keeping all windows closed, keeping doors closed except for normal entry and exit, and not operating fans or other machines which bring in air from outside. Note that fans that are part of a radon reduction system, or small exhaust fans operating for only short periods of time, may run during the test.*
- When doing short-term testing lasting less than 4 days, it is important to maintain closed-house conditions for at least 12 hours before the beginning of the test and for the entire test period. Do not operate fans or other machines which bring in air from the outside.

## **DURING THE RADON TEST:**

- Maintain closed-house conditions during the entire time of a short-term test, especially for tests shorter than one week in length.
- Operate the home's heating and cooling systems normally during the test. For tests lasting less than one week, only operate air conditioning units which recirculate interior air.
- Do not disturb the test device at any time during the test.
- If a radon reduction system is in place, make sure the system is working properly and will be in operation during the entire radon test.

## **AFTER THE RADON TEST:**

If a high radon level is confirmed, fix the home. See the [EPA Home Buyer's and Seller's Guide](#) for recommendations for steps such as contacting a qualified radon reduction contractor to lower the home's radon level. The homeowner or the professional radon tester should be able to verify that the test followed recommended protocols.

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## **RADON TEST DEVICE PLACEMENT**

EPA recommends that the test device(s) be placed in the lowest level of the home that could be used regularly, whether it is finished or unfinished. Conduct the test in any space that could be used by the buyer as a bedroom, play area, family room, den, exercise room, or workshop. Based on their client's intended use of the space, the qualified testing professional should identify the appropriate test location and inform their client (buyer). Do not test in a closet, stairway, hallway, crawlspace or in an enclosed area of high humidity or high air velocity. An enclosed area may include a kitchen, bathroom, laundry room or furnace room.

## **CLOSED BUILDING CONDITIONS**

Closed-house conditions means keeping all windows closed, keeping doors closed except for normal entry and exit, and not operating fans or other machines which bring in air from outside. Fans that are part of a radon-reduction system or small exhaust fans operating for only short periods of time may run during the test.

## **LENGTH OF TIME TO TEST**

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. However, if you need results quickly, a short-term test may be used to decide whether to fix the home.

## MITIGATION

A radon mitigation system is a way to capture soil gases and re route them to bypass the home. A variety of methods can be used to reduce radon in homes. The most common method for mitigation is sub-slab depressurization.

The basics are to seal up the penetration, gaps, and cracks in the floor and walls in the basement. Then create a suction point. Sealing cracks and other openings in the foundation is a basic part of most approaches to radon reduction. EPA does not recommend the use of sealing alone to limit radon entry. Sealing alone has not been shown to lower radon levels significantly or consistently.

Sometimes the sump pit is used to create this suction point, sometimes the sump is simply sealed off, and the suction point is in another part of the floor. A hole is drilled through the floor and a schedule 40 PVC pipe is sealed into the hole. This pipe is routed up through the house or out the wall and then up the exterior wall.

The vent pipe exhaust point should always be at least **10 feet** away from any vents, or doors and windows, and **2 feet** above the roof line, to prevent gas re-entry. The suction fan must not be mounted inside or below living space. Outdoors, in the attic, or garage is the only acceptable location for a radon mitigation fan. The basement is not OK, as there will be pressurized pipe in or below living space and if the, fan, pipe, or fittings leak then the fan will be pushing radon dense air directly back into the home.

The mitigation fan must have a hard wired shut off switch within **6 feet**, and in the line of sight of the fan. All components of a radon mitigation system must be labeled as a part of the system, including the breaker in the panel that supplies the circuit for the fan.

As most radon fans are relatively low amperage, radon fans are not required to be on a dedicated circuit, however it is recommended that the system have some sort of a monitor to determine weather or not the system is running. A **U-tube manometer** is most commonly used, there are audible alarms available as well.

If you are testing a home with a mitigation system already installed it is important to ensure that the system is running properly before beginning the test, for at least **24 hours**. This can be an issue in real estate transactions where the power has been shut off due to the building being unoccupied.

## RETESTING

You should test your home again after it has been mitigated to be sure that radon levels have been reduced. 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. In addition, it is recommended to retest your home after making any changes to the footprint of the property, additions, patio's, new "city" water connections, or septic systems, to be sure radon levels remain low.

According to the EPA all homes should be tested every **5 years**, and a home with a mitigation system should be retested every **2 years**, to ensure radon levels remain low.

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