

RADON: THE BASICS

- Radon is the second leading cause of lung cancer, after cigarette smoking.
- Testing is easy and inexpensive.
- The NJDEP recommends that 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.
- For further information, contact the NJDEP Radon Information Line at 1-800-648-0394, Monday through Friday, or visit the NJDEP website at www.njradon.org.



New Jersey Department of
Environmental Protection

**INFORMATION YOU
SHOULD KNOW ABOUT**

RADON

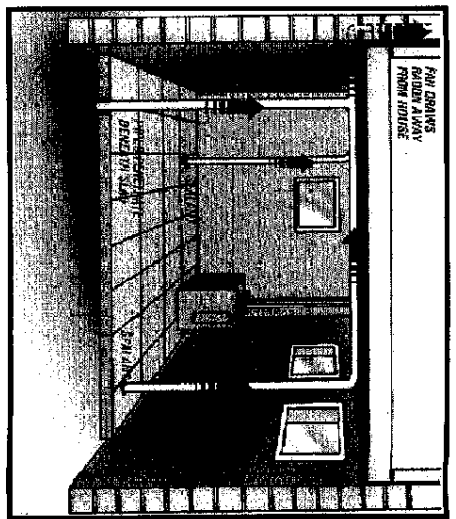
Richard J. Codey, Acting Governor
Bradley M. Campbell, Commissioner

MITIGATION TECHNIQUES

Radon mitigation systems are highly effective in reducing radon concentrations, bringing them to below 4 pCi/L in virtually all cases. In about half of the homes mitigated in New Jersey, radon levels have been brought to below 1 pCi/L. However, radon cannot be completely eliminated from the home; radon is present even in the outdoor air at an average concentration of 0.4 pCi/L.

Homeowners should consult a certified radon mitigation contractor about the best methods 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** 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.
2. **Block-Wall Depressurization** is effective in cases where radon enters through hollow concrete walls. This method depressurizes the air space in walls by means of an exhaust fan. Sealing cracks in basement walls will increase the effectiveness of this method.
3. **Sealing Opening and Cracks** reduces the possible entry points for radon. Sump pumps, openings around utility pipes, gaps between floors and walls, and large cracks in basement floors are common entry points.



ACTIVE SOIL DEPRESSURIZATION

This method is best done in conjunction with other mitigation procedures.

4. **Drain-Tile Suction** involves the use of a continuous loop of perforated tiles along the perimeter of the house. An exhaust fan is hooked to the network of tiles. The suction created by the fan pulls radon away from the surrounding soil and reduces the entry of radon into the home.

5. **Covering Exposed Earth** in basements and crawl spaces with concrete or some impermeable material can help to reduce radon entry.

6. **Providing Replacement Air** for large home combustion appliances, such as furnaces, clothes dryers, and even fireplaces, can lessen the effect of lowered air pressure caused by these appliances. This will reduce the amount of radon entering a home.

For all mitigation work, whether done by a certified contractor or a homeowner, a post-mitigation test should be performed to determine if radon levels have been reduced to less than 4 pCi/L. A retest should be performed every two years or so to ensure that the mitigation system is working properly.

CERTIFICATION IN NEW JERSEY

By New Jersey law, only certified individuals or the homeowner may conduct radon testing and mitigation in a home. New Jersey's certification program requires that certified individuals demonstrate required education and experience, take NJDEP-approved courses, and pass a written examination. Certified businesses must report test and mitigation data to the NJDEP, 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). If consumers have questions about businesses or radon professionals, or would like a list of certified businesses in New Jersey, they can contact the NJDEP Radon Program at 1-800-648-0394 or visit their website, www.njradon.org.

INTRODUCTION

Radon is a naturally occurring radioactive gas. It results from the radioactive decay process of natural uranium in the soil, and is found in rocks and soil everywhere in varying concentrations.

While radon disperses quickly in the outdoor environment, it can accumulate in enclosed spaces, and can be an unwelcome part of our home environment. 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 lung cancer. Since radon is invisible and odorless, the only way to detect the presence of radon is with a specialized test.

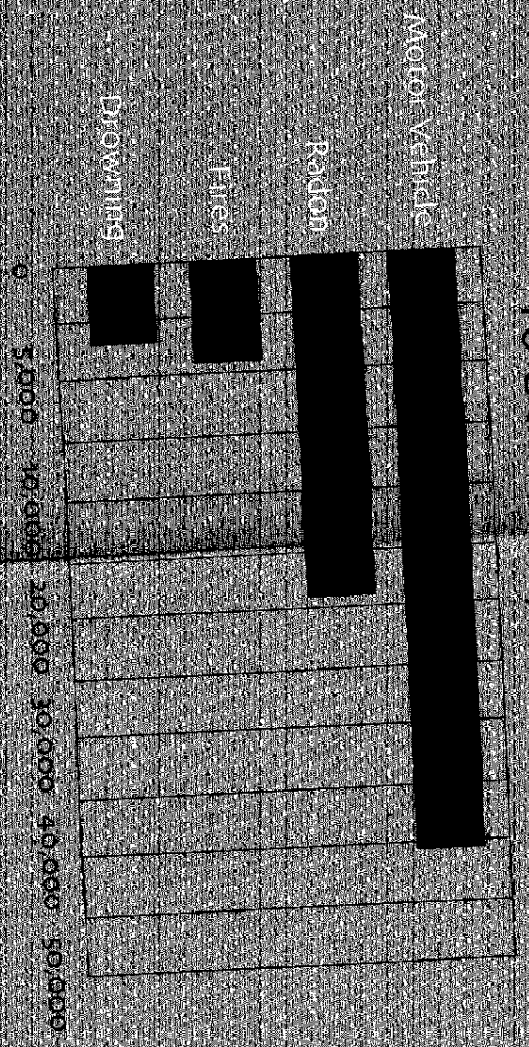
The New Jersey Department of Environmental Protection (NJDEP) recommends that all homeowners test

their homes for radon, and consider mitigating (fixing) their homes if tests reveal elevated levels. Even in areas that generally have low radon potential, elevated levels of radon have been found in some homes.

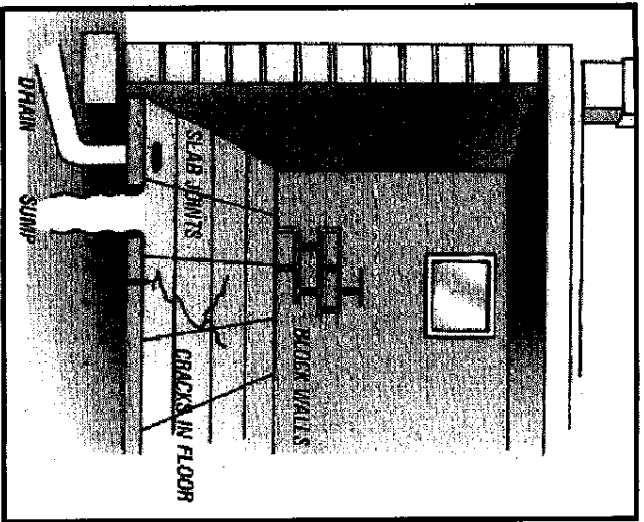
Radon concentration is affected by many factors including: the concentration of uranium in the soil beneath the home; the ease with which radon moves through the soil; and the number and size of openings into the home (such as cracks in the flooring, openings around pipes, and sump pits).

In addition, slight differences between indoor and outdoor air pressure will affect the rate at which radon enters the home. Reduced indoor pressure draws radon gas in greater amounts from underlying soil into the house. 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 use of kitchen or

Projected Radon Deaths Per Year Compared To Other Daily Risks



Source: The National Safety Council, 1995



COMMON ENTRY POINTS

attic 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. Another means of entrance for radon gas is from water supplies, when radon escapes from water during showering, cooking, etc.

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.

The higher the level of radon gas in a home, the greater the amount that is inhaled. As radon goes through the radioactive decay process, it produces other radioactive materials in the form of solids. These decay products can attach to particles in the air, such as dust or cigarette smoke, which can become trapped in the lungs. The decay products continue to

emit a type of radiation that has the potential to damage lung cells and possibly start the formation of cancer. The risk of lung cancer from radon is much greater for smokers than non-smokers.

Lung cancer is the only known health effect from radon exposure. The National Academy of Sciences estimates that between 15,000 and 22,000 deaths from lung cancer are caused by radon each year in the United States. Radon is the second leading cause of lung cancer after smoking.

TESTING FOR RADON

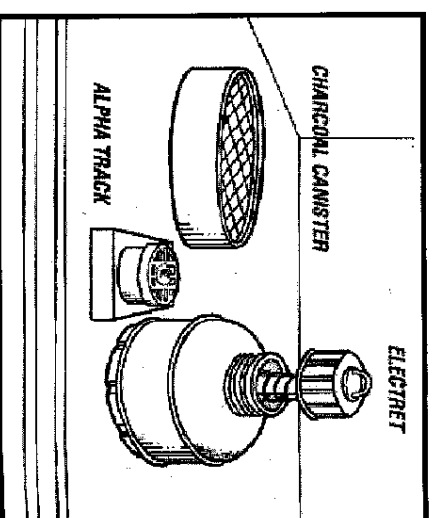
The first step in determining if a home has elevated radon levels is to perform a radon test. Radon is most commonly measured in picocuries per liter (pCi/L) of air. The U.S. Environmental Protection Agency (USEPA) and the NJDEP have established a guideline that homes with 4 pCi/L or more of radon should 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 – however, the likelihood decreases as the radon concentration decreases. (Specific information about the risk at different radon concentrations can be obtained from the Radon Program, 800-648-0394 or www.njradon.org.)

The three most common radon test devices are the charcoal canister, alpha track detector, and electret ion chamber. The charcoal canister is 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.

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, NJDEP data indicate that subsequent testing would confirm that levels in the home are 4 pCi/L or more in 80% 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 will provide the best estimate of average exposure, since radon levels fluctuate daily and by season.

"Closed house" conditions must be observed 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 4 days or less, closed house conditions must be initiated 12 hours before the start of the test.



TESTING DEVICES

It is of concern to you, your test can include one or more measures against possible test interference. Consult your certified tester for more information.

The DEP recommends taking steps to reduce radon levels if the gas concentration in the lowest livable level of the house is four picocuries per liter (pCi/L) or more. (A picocurie per liter is a measure of radioactivity in the air.) This will markedly decrease the risk of developing lung cancer caused by radon exposure.

The most common method of radon gas remediation is sub-slab ventilation, which uses a fan to draw the radon gas out from below the slab or foundation, thereby preventing its entry into the house. Based on New Jersey data, this method is effective in almost every case in reducing radon gas to levels lower than 4 pCi/L. The cost is typically about \$1,300, but varies according to the type of house and the type of soil or aggregate under the slab.

Buyers of newly constructed homes should also test for radon after moving in. Unless specified contractually, builders are not responsible for testing or subsequent remediation of radon.

To obtain further information, including listings of New Jersey certified radon measurement and mitigation businesses, contact the DEP radon information line at (800) 648-0394, or visit our Web site at www.njradon.org

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New Jersey Department of Environmental Protection
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Information for Home Buyers and Sellers



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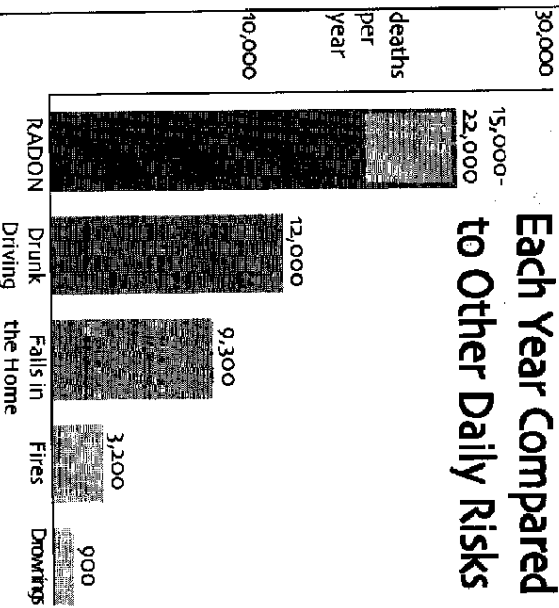
Information for Home Buyers and Sellers

Radon is a colorless and odorless naturally occurring radioactive gas that seeps from soil into homes through cracks and other openings in the foundation or walls in contact with the soil.

The National Academy of Sciences estimates that radon causes between 15,000-22,000 lung cancer deaths each year in the U.S.

The New Jersey Department of Environmental Protection (DEP) recommends that all homeowners test their homes for radon.

Radon Deaths Each Year Compared to Other Daily Risks



Source: EPA 2004

Radon gas measurement is easy and should be considered by the buyer as part of any real estate transaction. A contingency clause can be included in a real estate contract to allow the buyer to have the home tested for radon and to provide for correcting the problem if an elevated level of radon gas is found. Alternatively, an escrow account can be created in the contract so the buyer can test after moving into the home and use the escrow account to pay for a radon remediation (mitigation) system if needed. The DEP recommends you discuss these issues with your attorney.

If you are testing a house that you are considering purchasing, you must use the services of a DEP-certified radon tester. All professionals who perform radon tests or correct radon problems in New Jersey must be certified. They must demonstrate sufficient education and experience, take DEP-approved courses in radon testing or mitigation techniques, and pass a written examination.

If hired by the prospective buyer the certified radon tester must state and complete the test. No portion of the test can be delegated to the homeowner or Realtor, including mailing the test kit to the radon company. In addition, home inspectors who are not certified for radon testing may not give or sell radon test devices to homeowners to use as part of their home inspection process.

The radon test should be done 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, for example, an unfinished basement but not a crawl space.

Opening windows or doors on any floor that let in outside air (other than for normal entering and exiting the home) during a test can cause misleading results and make the test invalid. Depending on air flow, the test results may be higher or lower than the true concentration. If the test is less than four days in duration, windows and doors must be kept closed for an additional 12 hours before the start of the test so radon levels stabilize. The certified tester is responsible for notifying occupants of the importance of maintaining proper testing conditions.

How Radon Enters the House

