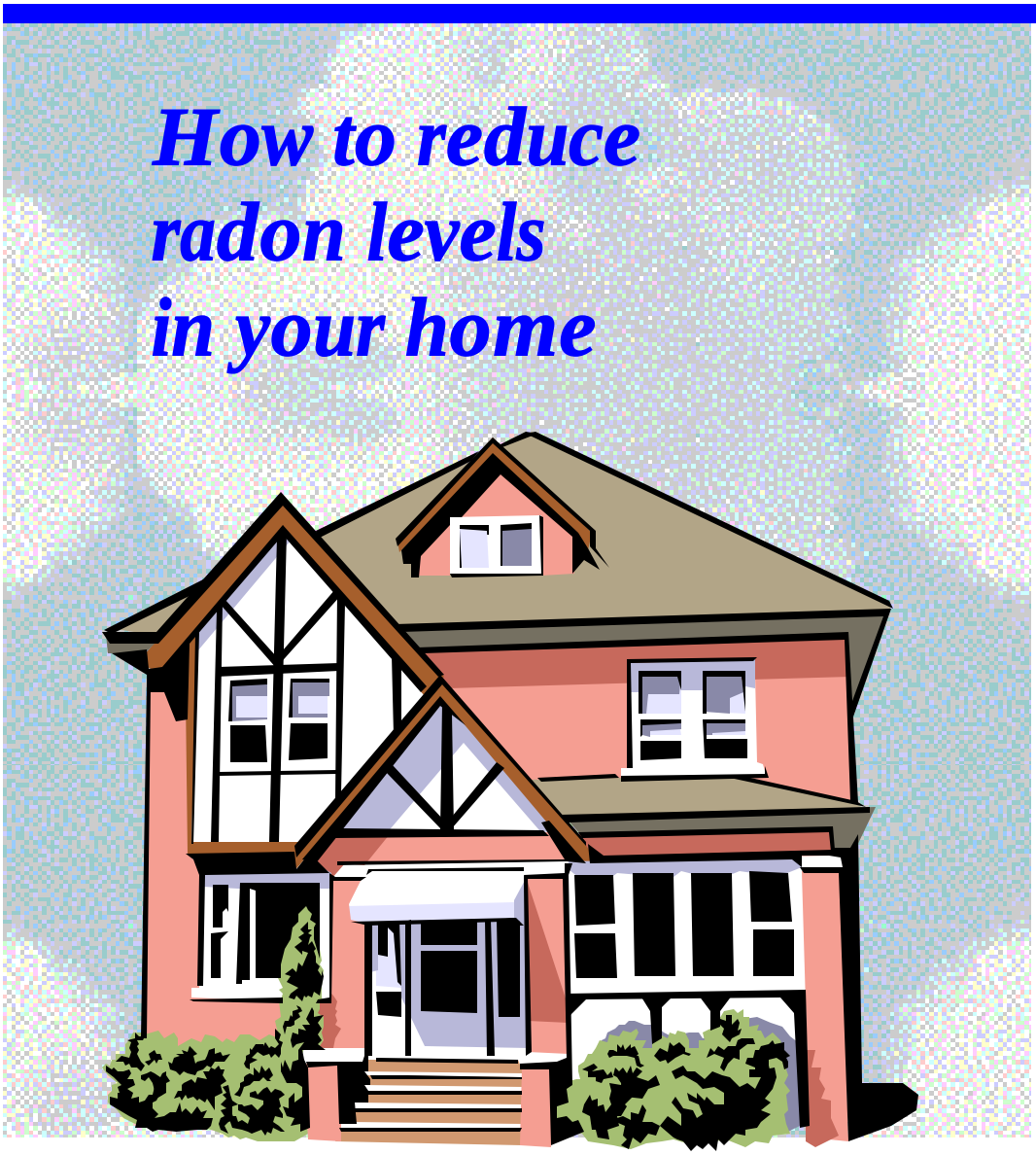
Maine Department of Human Services
Bureau of Health
Radiation Control Program

Maine's Guide to Radon Reduction



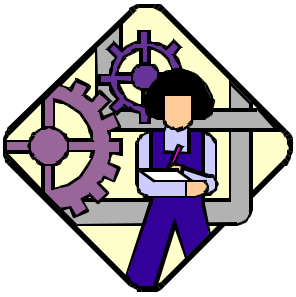
Reduce Radon in Your Home

All Homes Should Be Tested for Radon, and High Radon Levels Should Be Reduced

Radon is the second leading cause of lung cancer. The Surgeon General and Maine recommend testing for all homes for radon and fixing homes that have high levels.

Select A Maine Registered Radon Mitigation Contractor

Choose a registered radon mitigation contractor to fix your home. Maine requires radon mitigation contractors (mitigators) to be registered. To become registered, they must have training and meet other requirements See page ?? for more information.



Maintain Your Radon Reduction System

Maintaining your radon reduction (mitigation) system takes little effort and keeps the system working properly and radon levels low.

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Introduction

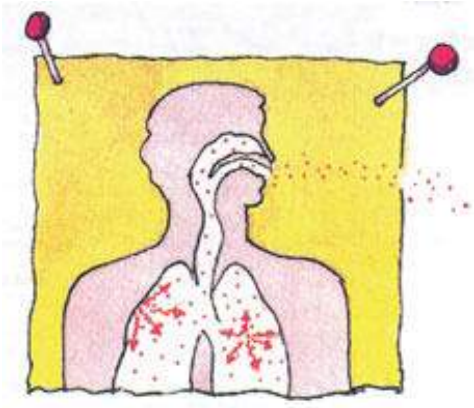
You have tested your home for radon, but now what? This booklet is for people who have tested their home for radon and found that they have high radon levels -- 4 picoCuries per liter (pCi/L) or higher. This booklet can help you:

- Select a registered mitigator to reduce the radon levels in your home
- Determine an appropriate radon mitigation method
- Maintain your radon mitigation system

If you want information on how to test your home for radon, call the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org.

Radon is a Cancer-causing, Radioactive Gas

Radon is estimated to cause many 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.



How Does Radon Enter My House?

Radon is a naturally occurring

gas produced by the breakdown of uranium in soil, rock, and water. Air pressure inside your home is usually lower than pressure in the soil around your home's foundation. Because of this difference in pressure, your house acts like a vacuum, drawing radon in through foundation cracks and other openings.

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. In most cases, radon entering the home through water is a small risk compared with radon entering your home from the soil. In a small number of homes, some building materials (such as granite, concrete, cinderblock, etc.) can give off radon, although building materials rarely cause radon problems by themselves.

Radon in Water

Most often, the radon in your home's indoor air can come from two sources: the soil or your water. Compared to radon entering your home through water, radon entering your home through soil is usually a much higher risk. The devices and procedures for testing your home's water are different from those used for measuring radon in air.

If you have a well and are concerned about radon, test your water for radon.

The radon in your water poses a risk through breathing in radon released to the air, and a much smaller risk from drinking radon-contaminated water. Research has shown that your risk of lung cancer from breathing radon in the air is much larger than your risk of stomach cancer from drinking 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 the source is surface water, or comes from a public water supply. A radon in water problem is more likely when the water comes from a private well. Public water systems in Maine that have high radon levels treat their water to reduce radon levels before it is delivered to your home.

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 have tested your private well and have a radon in water problem (20,000 pCi/l or more), it can easily be fixed.

- Point-of-entry (whole house) treatment can effectively remove radon from the water before it enters your home. Point-of-entry treatment usually employs either granular activated carbon (GAC) filters or aeration devices. Both GAC filters and aeration systems have pros and cons that should be discussed with the Maine Radon/IAQ Program or a registered radon water mitigator. Please note Maine requires registration of water treatment professionals (mitigators) installing any radon mitigation system for radon in water.

- Do not install a point-of-use treatment device (a filter on the faucet) because it does not remove much radon, and it does nothing to stop radon from getting into your air from all other water uses (such as showering or laundry).

For information on radon in water, testing and treatment, or for general help, call the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org

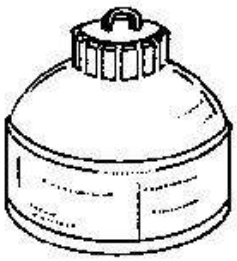
How Do I Select a Tester or a Test Kit that Meets Maine Requirements?

Whether you use a short- or long-term test for radon, use a device and a testing company that is Maine registered. This means that it has met proficiency requirements, and will give you reliable results..

When you are ready to test your home, you can contact the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org for assistance. They can provide you with names of registered labs and/or registered testers in your area, and will help you decide where to test, and what type of test device best meets your needs.

There are two types of radon testing devices. Passive testing devices do not need power to function. These include charcoal canisters, electret ion chamber detectors, charcoal liquid scintillation devices and alpha-track detectors. Both short– and long-term passive devices are generally inexpensive.
Active radon testing devices require power to function. These include continuous radon monitors and continuous working level monitors. Although these tests cost more, they may ensure the test is not interfered with.

The Maine Radon/ IAQ Program can explain the differences between testing devices and recommend ones that are most appropriate for your needs and expected testing conditions.



Electret Ion Detector

Charcoal Canister

What Do My Radon Test Results Mean?

The amount of radon in the air is measured in "picoCuries of radon per liter of air," or "pCi/L." Sometimes test results are expressed in Working Levels, "WL," rather than picoCuries per liter of air. A level of 0.02 WL is usually equal to about 4 pCi/L in a typical home.

Any radon exposure has some risk of causing lung cancer. The lower the radon level in your home, the lower your family's risk of lung cancer.

The U.S. Congress has set a long-term goal that indoor radon levels be no more than outdoor levels; about 0.5 pCi/L of radon is normally found in the outside air in Maine.

Maine recommends fixing your home if the results of one long-term test or the average of two short-term tests show radon levels of 4 pCi/L (or 0.02 WL) or higher.

With today's technology, radon levels in most homes can be reduced to 2 pCi/L or below. You may also want to consider fixing the problem if the level is between 2 and 4 pCi/L.

A short-term test remains in your home for two days to 90 days, whereas a long-term test remains in your home for more than 90 days. All tests during a home sale are short-term tests. A short-term test will yield faster results, but long-term test will give a better understanding of your year-round average radon level.

All radon tests should be taken for a *minimum* of 48 hours, and all tests less than 90 days.

If your first short-term test result is 4 pCi/L or higher (or 0.02 WL or more), you can take a second test to be sure. **If your first test came back well over 4 pCi/l, or you need results quickly, take a short term follow up test. If your first test came back just**

under or just over 4 pCi/l, or if your first test was during summer, and was just below 4 pCi/l, take a long-term follow up test. Remember, indoor radon levels are typically higher in colder months than warmer months. Note: If you are buying or selling a home, different testing protocols apply. For instance, generally two test devices are placed side by side during a real estate test. This approach provides enough information to make a decision whether or not to mitigate without taking more time to perform another test later. See the "Maine Home Buyers and Sellers Guide to Radon" for more information. 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 several times the action level -- for example, about 10 pCi/L or higher -- you should take a second short-term test immediately.

Why Hire a Mitigator to Fix a Radon Problem?

Maine recommends that you **use a state registered radon mitigation contractor trained to fix radon problems** because lowering high radon levels requires specific technical knowledge and special skills. Without the proper equipment or technical knowledge, you could actually increase your radon level or create other potential hazards. But, if you decide to do the work yourself, get appropriate information and technical guidance from the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org*. ***Please note that when a home is for sale Maine requires that, if the radon problem gets fixed, a registered mitigator installs the system***.

When using a mitigator, remember that Maine requires any indi-

vidual or company that will fix a radon problem to be registered. To get registered, they must meet minimum training requirements, adhere to approved standards and guidelines, and follow approved protocols. Contact the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org for names of mitigators in your area. And don't be afraid to **ask to see the mitigators Maine Registration card.**

How Do I Select a Qualified Mitigator?

Get Estimates

Choose a mitigator to fix a radon problem just as you would choose someone to do other home repairs. It is wise to get more than one estimate, to ask for references, and to contact some of those references to ask if they are satisfied with the mitigators' work. Also, since the Maine Radon/IAQ Program (see above) regulates all mitigators, you can contact them to ask for information about the mitigator.

Compare the mitigators' proposed costs and consider what you will get for your money. Take into account the following: number of suction points (pipes through the floor), location of vent pipe, size of fan, type of system indicator, and quality of materials. The best system for your house may be the more expensive option; and the quality of the building material will affect how long the system lasts.

The Contract

Ask the mitigator to prepare a contract before any work starts. **Carefully read the contract before you sign it.** Make sure everything in the contract matches the original proposal. The contract should describe exactly what work will be done prior to and dur-

ing the installation of the system, what the system consists of, and

Use this check-list when evaluating and comparing contractors and ask the following questions:

YES	NO	
		Will the mitigator provide references or photographs, as well as test results of 'before' and 'after' radon levels of past radon reduction work?
		Can the mitigator explain what the work will involve, how long it will take to complete, and exactly how the radon reduction system will work?
		Does the mitigator charge a fee for any diagnostic tests? Although many contractors give free estimates, they may charge for diagnostic tests -- these tests help determine how to best install the radon reduction system (see "Radon Reduction Techniques" for more on diagnostic tests).
		Did the mitigator inspect your home's structure before giving you an estimate?
		Did the mitigator review the quality of your radon measurement results and determine if proper testing procedures were followed? (Required)
		What are the estimated costs: to Install? to maintain?

Do the contractors' proposals and estimates include:

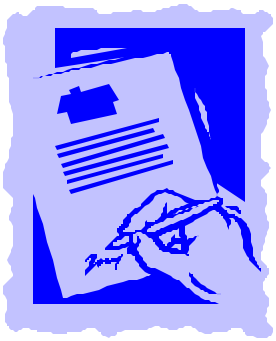
YES	NO	
		Proof of liability insurance and being bonded?
		Proof of Maine Registration? (Required)
		Diagnostic testing prior to design and installation of a radon mitigation system?
		Installation of a warning device to caution you if the radon mitigation system is not working correctly? [Required]
		Testing or a notice that testing is required after installation to make sure the radon reduction system works well? [Required]
		A guarantee to reduce radon levels to 4 pCi/L or below and, if so, for how long?

how the system will operate.

Many mitigators provide a guarantee that they will adjust or modify the system to reach a negotiated radon level. Carefully read the conditions of the contract describing the guarantee. Carefully consider optional additions to your contract that may add to the initial cost of the system, but may be worth the extra expense. Typical options might include an extended warranty and/or a service plan. This is particularly true with radon in water systems.

Important information that should appear in the contract includes:

- The total cost of the job, including all taxes and permit fees; how much, if any, is required for a deposit; and when payment is due in full.



- The time needed to complete the work.
- An agreement by the mitigator to obtain necessary licenses and follow required building codes.
- A statement that the mitigator carries liability insurance and is bonded and insured to protect you in case of injury to persons, or damage to property, while the work is being done.
- A guarantee that the mitigator will be responsible for damage and clean-up after the job.
- Details of any guarantee to reduce radon below a negotiated level.
- Details of warranties or other optional features associated with the hardware components of the mitigation system.
- A declaration stating whether any warranties or guarantees are transferable if you sell your home.
- A description of what the mitigator expects the homeowner to do (e.g., make the work area accessible) before work begins.

What Do I Look for in a Radon Reduction System?

In selecting a radon mitigation method for your home, you and your mitigator should consider

(continued on page 16)

RADON REDUCTIO
INSTALLATION AND OPI

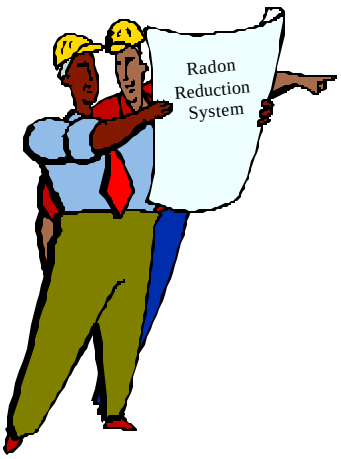
Technique	Typical Radon Reduction	Typical Range of Installation Costs (Contractor)
Air Systems:		
Subslab Suction (Subslab Depressurization)	Up to 99%	$800 — $2,500
Submembrane Depressurization in a crawl space	Up to 99%	$1000 — $2500
Water Systems:		
Aeration	85 — 99+%	$3500 — $5000
Granular Activated Carbon (GAC)	50 — 95%	$1000 — -$2000

* NOTE: The fan electricity and house heating/cooling loss cost range is based on tricity and fuel. Your costs may vary.

several things, including: how high your initial radon level is, the costs of installation and system operation, your house size and your foundation type.

Installation and Operating Costs

For most homes, radon reduction measures are no more expensive than having a new hot water heater installed or having the house painted. The cost of a mitigator fixing a home generally ranges from $800 to $2500 for radon in air and $1,000 to $5,000 for radon in water, depending on the characteristics of the house and choice of radon reduction methods. **The average cost of a radon in air mitigation system is about $1200, and for water it is about $4,000.**



Most types of radon mitigation systems cause a small loss of heated or conditioned air, which could increase your utility bills a little. How much your utility bills will be affected depends on the climate you live in, what kind of mitigation system you select, and how your house is built. Systems that use fans are more effective in reducing radon levels; however, they will increase your electric bill. The table on page 14 lists typical installation and average operating costs for different radon mitigation systems and describes the best use of each method.

How a Radon Reduction System May Affect Your Home's Appearance

In order to minimize the effect of installing a radon reduction system in your house, ask your mitigator before any work starts how the system can be made to blend with its surroundings. For instance: radon vent pipes may be encased with materials that match the exterior of your house,

or the pipes may be routed up through closets.

How Do I Choose a Radon Reduction Technique?

There are several methods that a mitigator can use to lower radon levels in your home. Some techniques prevent radon from entering your home while others reduce radon levels after it has entered.

Maine generally recommends methods which prevent the entry of radon.

Soil suction, for example, prevents radon from entering your home by drawing the radon from below the house and venting it through a pipe, or pipes, to the air above the house where it is quickly diluted.

Any information that you may have about the construction of your house could help your mitigator choose the best system. Your mitigator will perform a visual inspection of your house and design a system that considers specific features of your house. If this inspection fails to provide enough information, the mitigator will need to perform diagnostic tests to help develop the best radon reduction system for your home. For instance, your mitigator can use chemical smoke or a pressure differential indicator to find the source and direction of air movement. A mitigator can learn air flow sources and directions by watching a small amount of smoke that he or she shot into holes, drains, sumps, or along cracks. The sources of air flow show possible radon routes.

Another type of diagnostic test is a "soil communication test." This test uses a vacuum cleaner and chemical smoke or a pressure differential indicator to determine how easily air can move from

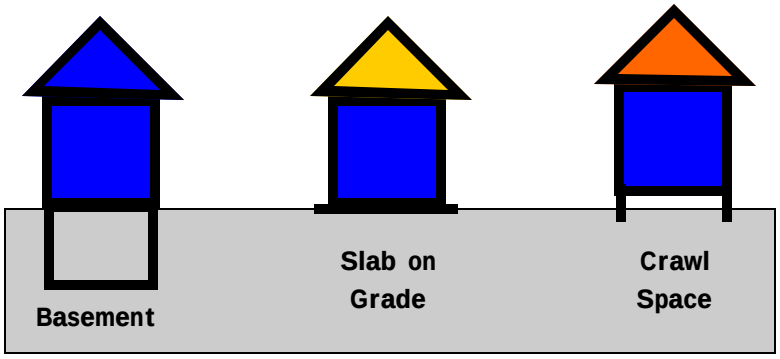
one point to another under the foundation. By inserting a vacuum cleaner hose in one small hole and using the chemical smoke or pressure indicator in a second small hole, a mitigator can see the result of the vacuum cleaner's suction. This helps them determine how easily they will be able to draw the radon from under the foundation, and helps them design the system.

Whether diagnostic tests are needed is decided by details specific to your house, such as the foundation design, what kind of material is under your house, and by the mitigator's experience with similar houses and similar radon test results.

Which Reduction Systems Work Best for My House Foundation Type?

Your house type will affect the kind of radon reduction system that will work best. Houses are generally categorized according to their foundation design. For example: *basement, slab-on-grade* (concrete poured at ground level), or *crawlspace* (a shallow unfinished space under the first floor).

Some houses have more than one foundation design feature. For instance, it is common to have a basement under part of the house and to have a slab-on-grade or crawlspace under the rest of the house. In these situations a combination of radon reduction techniques may be needed to reduce radon levels to below 4 pCi/L.

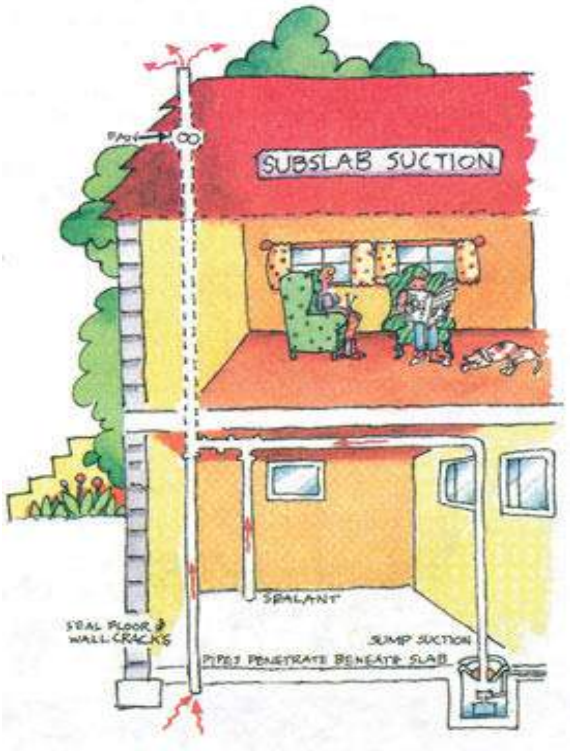


Radon reduction systems can be grouped by house foundation design. Find your type of foundation design above and read about which radon reduction systems may be best for your house.

Basement and Slab-on-Grade Houses

In houses that have a basement or a slab-on-grade foundation, radon is usually reduced by one of four types of soil suction: subslab suction, drain tile suction, sump hole suction, or block wall suction.

Active Subslab Suction (also called subslab depressurization) is the most common and usually the most reliable mitigation method. Suction pipes are inserted through the floor slab into the crushed rock or soil underneath. The number and location of suction pipes that are needed depends on how easily air can move in the crushed rock or soil under the slab, and on the strength of the radon source. A mitigator usually gets this information from visual inspection, from diagnostic tests, and/or from experience. Acting like a vacuum cleaner, a fan connected to the pipes draws the radon gas from below the house and then releases it outdoors. Sealing cracks and other openings in the foundation makes this method more effective. Sealing does two



things: it limits the flow of radon into your home and it reduces the loss of conditioned air, thereby making radon reduction techniques more effective and cost-efficient.

Maine does *not* recommend the use of sealing alone to reduce radon because, by itself, sealing has not been shown to lower radon levels significantly or consistently.

Passive Subslab Suction is the same as active subslab suction except it relies on air currents instead of a fan to draw radon up from below the house. Passive subslab suction is not as effective in reducing high radon levels as active subslab suction.

Drain tile or perforated pipe suction directs water away from the foundation of the house. Suction on these drain tiles is often effective in reducing radon levels if the drain tiles form a complete loop around the foundation.

Sump hole suction is one variation of subslab and drain tile suction. Often, when a house with a basement has a sump pump to remove unwanted water, the sump can be capped so that it can continue to drain water and serve as the location for a radon suction pipe.

Block wall suction can be used in basement houses with hollow block foundation walls. This method removes radon from the hollow spaces within the basement's concrete block wall. It is often used together with subslab suction.

Crawlspace Houses

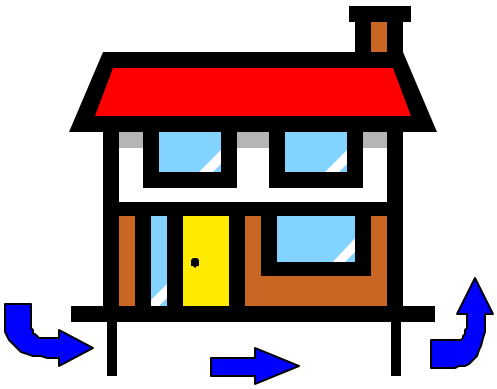
Submembrane depressurization is an effective method to reduce radon levels in crawl space houses. It involves covering the earth floor with a heavy plastic sheet. A vent pipe and fan are used to draw the radon from under the sheet and vent it to the outdoors.

Crawlspace ventilation can lower radon levels in some cases by ventilating the crawlspace passively (without the use of a fan) or

actively (with the use of a fan). Crawlspace ventilation lowers indoor radon levels both by reducing the home's suction on the soil and by diluting the radon beneath the house. Passive ventilation in a crawlspace is achieved by opening vents, or installing additional vents. Active ventilation uses a fan to blow air through the crawlspace instead of relying on natural air circulation. In Maine's climate, for either passive or active crawlspace ventilation, water pipes, sewer lines and appliances in the crawlspace will need to be insulated against the cold. These ventilation options could result in increased energy costs for the house.

Other Types of Radon Reduction Methods

Other radon reduction techniques that can be used in any type of house include: house/room pressurization, natural ventilation, and heat recovery ventilation. Most of these methods are considered to be either temporary measures, or only partial solutions to be used in combination with other measures.



House/room pressurization uses a fan to blow air into the basement or living area from either upstairs or outdoors. It attempts to create enough pressure at the lowest level indoors (in a basement for example) to prevent radon from entering into the house. The effectiveness of this technique is limited by house construction, climate, other appliances in the house, and occupant lifestyle. In order to maintain enough pressure to keep radon out, the doors and windows at the lowest level must not be left opened, except for normal entry and exit.

Natural ventilation occurs in all houses to some degree. By opening windows, doors, and vents on the lower floors you in-

crease the ventilation in your house. This increase in ventilation mixes radon with outside air and can result in reduced radon levels. In addition, ventilating your house can help to lower indoor radon levels by reducing the vacuum effect. ***Natural ventilation in any type of house, (aside from ventilation of a crawlspace), should be regarded as a temporary radon reduction approach because of the following disadvantages***: loss of conditioned air and related discomfort, greatly increased costs of conditioning additional outside air, and security concerns.

A heat recovery ventilator (HRV), also called an air-to-air heat exchanger, can be installed to increase ventilation. An HRV will increase house ventilation while using the heated or cooled air being exhausted to warm or cool the incoming air. HRVs can be designed to ventilate all or part of your home, although they are more effective in reducing radon levels when used to ventilate only the basement. If properly balanced and maintained, they ensure a constant degree of ventilation throughout the year. HRVs also can improve air quality in houses that have other indoor pollutants. There could be *significant* increase in the heating and cooling costs with an HRV, but not as great as ventilation without heat recovery.

What About Radon In Water?

There are two methods for removing radon from water. Both of these methods must be installed so they treat all the water coming into the house, not just the water you may drink. This is because radon is released from water any time it is used, such as when showering, washing laundry, or even flushing a toilet. Since the major problem from radon in water is breathing in the radon released by the water, treating only the drinking water would not protect you from the hazards associated with radon from water. Both methods will also remove other contaminants, so talk to your registered water mitigator about other contaminants in your water before having the system installed.

A granular activated carbon filter (GAC), also called a charcoal filter, can lower radon in water between 50 and 95%. This type of filter looks like a tall scuba tank with water pipes connected to its top. A GAC filter should only be used for moderate levels of radon in water because it will not be able to reduce high levels to below recommended guidelines. Also, a GAC filter holds the radon, which allows some radiation to escape through the sides of the filter. For lower radon levels, little radiation escapes, but for higher levels the radiation that escapes can be a concern. Keeping the GAC filter away from areas people often use, and shielding are ways to avoid problems from the escaping radiation. ***(note to Muskie staff-can we put a drawing of a GAC filter and an aeration system in these sections?)***

An aeration system can lower radon in water between 85% and over 99%. This type of system looks like a plastic tank (circular or square) with water pipes connected to its top and bottom, a vent pipe to outdoors, and has a fan on or near it to force air through the water. This type of system mixes the water with air inside the plastic tank, causing the radon to be released from the water, then vents the air and radon outdoors using a pipe similar to a subslab suction pipe (except the pipe begins in the aeration tank instead of below the slab). Some aeration systems have a second fan near the top of the vent pipe to help draw radon out of the aeration tank and pipe. Aeration systems can be used for any level of radon in water. Since radon is not held in these systems, there is no radiation to escape. However, aerations systems are big, and do force air from your house into your water. This air might leave small amounts of other contaminants in your water. Due to this, some registered water mitigators also install a disinfectant system when they install an aeration system. Talk to your registered water mitigator about this.

How to Check Your Mitigator's Work

Below is a list of tasks that your mitigator should perform when installing a radon reduction system in your home. **It is important to verify with your mitigator that these tasks were performed properly to ensure that your radon reduction system will be effective.** You can also check with the Maine Radon/IAQ Program (207-287-5676; toll free: 1-800-232-0842) to ask what to look for when making sure these requirements are met.

- Radon mitigation systems (air or water) *must* be clearly labeled. This will avoid accidental changes to the system which could disrupt its function.

- The vent pipes of soil suction systems and water systems *must* vent 10 feet or more above the ground, and away from windows, doors, or other openings that could allow the radon to reenter the house. The exhaust fan *must not* be located in or below a livable area. For instance, it should be in an un-occupied attic of the house or outside - not in a basement!

- If installing an exhaust fan outside, the mitigator *must* install a fan that meets local building codes for exterior use.

- Electrical connections of all active radon reduction systems *must* be installed according to local electrical codes.

- A warning device *must* be installed to alert you if an active radon air system stops working properly. Examples of system failure warning devices are: a liquid gauge, a sound alarm, a light indicator, and a dial (needle display) gauge. The warning device must be placed where it can be seen or heard easily. Your mitigator should check that the warning device works. Later on, if your system shows that the system is not working properly, call a mitigator to have it checked.

☐ Make sure your mitigator completely explains your radon reduction system, demonstrates how it operates, and explains how to maintain it. Ask for written operating and maintenance instructions and copies of any warranties.

A post-mitigation test must be done within 30 days of system installation, but no sooner than 24 hours after your system is in operation with the fan on, if it has one. Either the homeowner or a registered radon tester can perform this post mitigation radon test. Some mitigators are also registered testers, but it is considered a conflict of interest if the mitigator who installed the system does the post mitigation test also.

To test the system's initial effectiveness, a 2 to 7 day measurement is recommended. Remember– the windows and doors must be closed except for normal entry/exit, and if the test is less than four days the windows and doors must also be closed 12 hours before the test begins.

Living in a House with a Radon Reduction System

Maintaining Your Radon Reduction System

Similar to a furnace or chimney, radon reduction systems need some occasional maintenance. **You should check your warning device on a regular basis to make sure the system is working correctly, and should service a radon water system annually.** Fans may last for five years or more (although manufacturer warranties tend not to exceed five years) and may then need to be repaired or replaced. Replacing a fan will cost around $200 — $350, including parts and labor. It is a good idea to retest your home water and air) at least every two years be sure that radon

levels remain low.

Remember, the radon air system fan should NEVER be turned off; it must run continuously for the system to work correctly.

The filter in an HRV requires periodic cleaning and should be changed twice a year. Replacement filters for an HRV are easily changed and are priced between $10 and $25. Ask your mitigator where filters can be purchased. Also, the vent that brings fresh air in from the outside needs to be inspected for leaves and debris. The ventilator should be checked annually by a heating, ventilating, and air-conditioning professional to make sure the air flow remains properly balanced. HRVs used for radon control should run all the time. For radon in water systems, any aeration system should be checked annually by a professional to make sure it is operating properly. Some aeration systems can be maintained by the homeowner- ask you registered water mitigator what is involved with maintaining yours.

Remodeling Your Home After Radon Levels Have Been Lowered

If you decide to make major structural changes to your home after you have had a radon mitigation system installed (such as converting an unfinished basement area into living space), ask your radon mitigator whether these changes could void any warranties. After you remodel, retest in the lowest usable area to make sure the construction did not reduce the effectiveness of the radon reduction system. If you are adding a new foundation for an addition to your house, address the radon problem during construction.

Considering Radon When You Buy or Sell a Home

If you are buying or selling a home and need to make deci-

sions about radon, the *Maine Home Buyer's and Seller's Guide to Radon* has information you need. If you are selling a home that has a radon mitigation system, inform potential buyers and supply them with information about your system's operation and maintenance. When you sell, give the buyer all documentation you have regarding the system.

If you are having a new house built for you, consider that it is almost always less expensive to build radon-resistant features into new construction than it is to fix an existing house that has high radon levels. Ask your builder if he or she uses radon-resistant construction features. Contact the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* for current guidance on radon resistant construction that you and your builder can refer to when designing and building your home.

All homes should be tested for radon, and high radon levels should be reduced.

Even new homes built with radon-resistant features should be tested after occupancy to ensure that radon levels are below 4 pCi/L. If you have a test result of 4 pCi/L or higher, you should have a qualified radon mitigator upgrade the system by adding a radon vent fan to further reduce the radon level in your home.

To Obtain a Copy of This Publication

Contact:

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Bureau of Health
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SURGEON GENERAL HEALTH ADVISORY:

"Indoor radon gas is a national health problem. Radon causes thousands of deaths each year. Millions of homes have elevated radon levels. Homes should be tested for radon. When elevated levels are confirmed, the problem should be corrected."

Contents of this booklet have been adapted from the EPA's "A Citizen's Guide to Radon (Third Edition)" , EPA's "Home Buyers and Sellers Guide to Radon (Second Edition)", and EPA's "Consumers Guide to Radon Reduction".
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