Version 2.2

April 23, 2009

These are steps to reduce household hazards. People are not born knowing that they must brush their teeth to prevent decay, they must learn it. So with household hazards, they must learn how to take care of themselves. Occupants know things about the building and themselves that can be learned nowhere else. Start with the people.

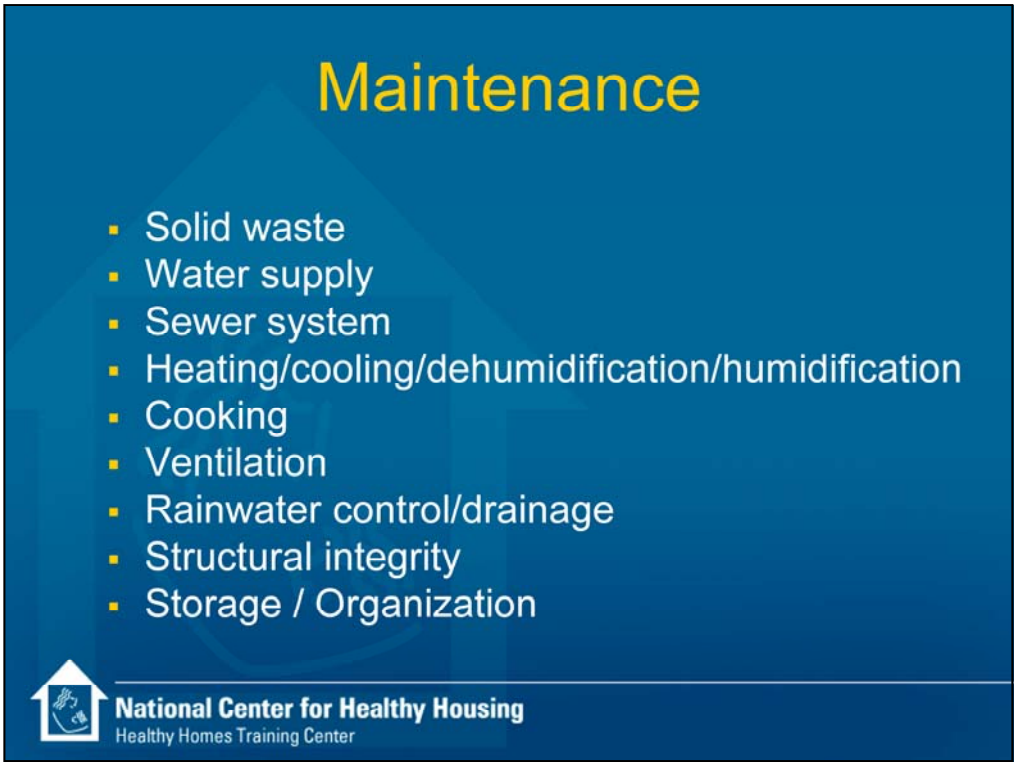
The second step is to keep the household in a certain condition:

- limit moisture related problems,
- limit dust and allergens,
- limit pest borne disease,
- provide local exhaust ventilation and general dilution ventilation to control unavoidable air contaminants,
- provide a comfortable space by limiting hazards like slips, falls, electric shock, drowning and poisons.

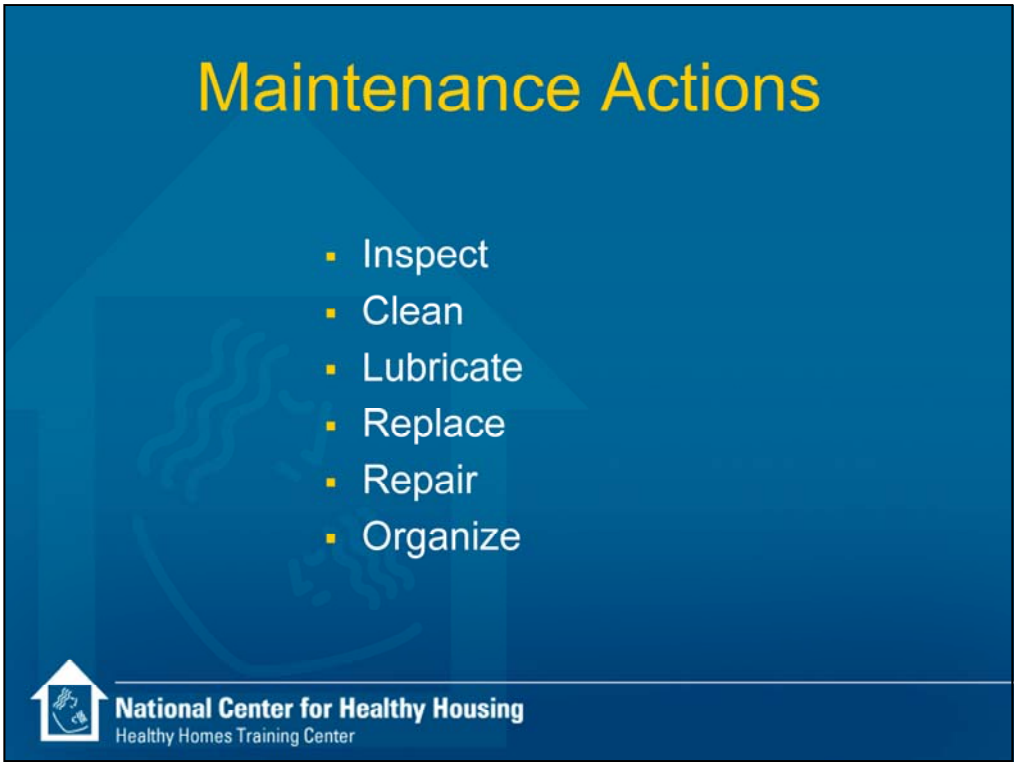
Third, limit sources of contaminants like lead, asbestos, combustion fumes, VOCs (Volatile organic compounds) and radon.

Fourth, maintain the house so it continues to provide dry, clean, comfortable and safe conditions.

In this module, we will be focusing on maintenance in general and then on contaminants not addressed earlier that are associated with maintenance problems – Lead-based Paint, Asbestos and Radon.



Proper, routine maintenance of the above items will prevent substantial moisture sources and associated health hazards.

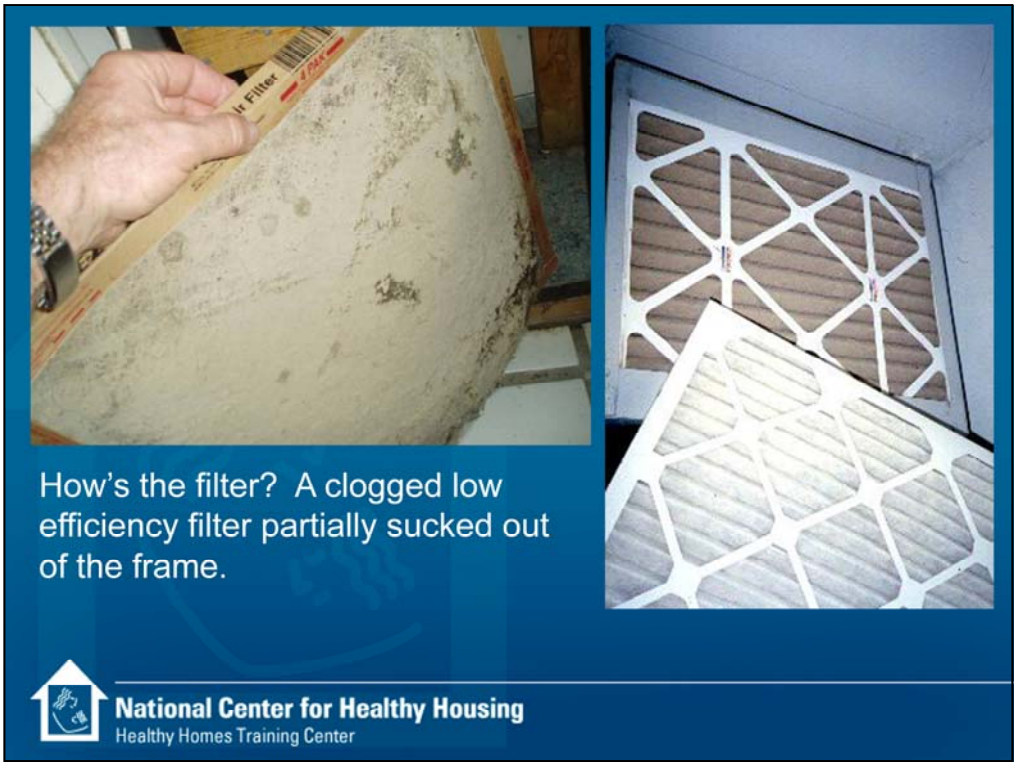


First steps are to inspect systems and appliances regularly to ensure their proper function.

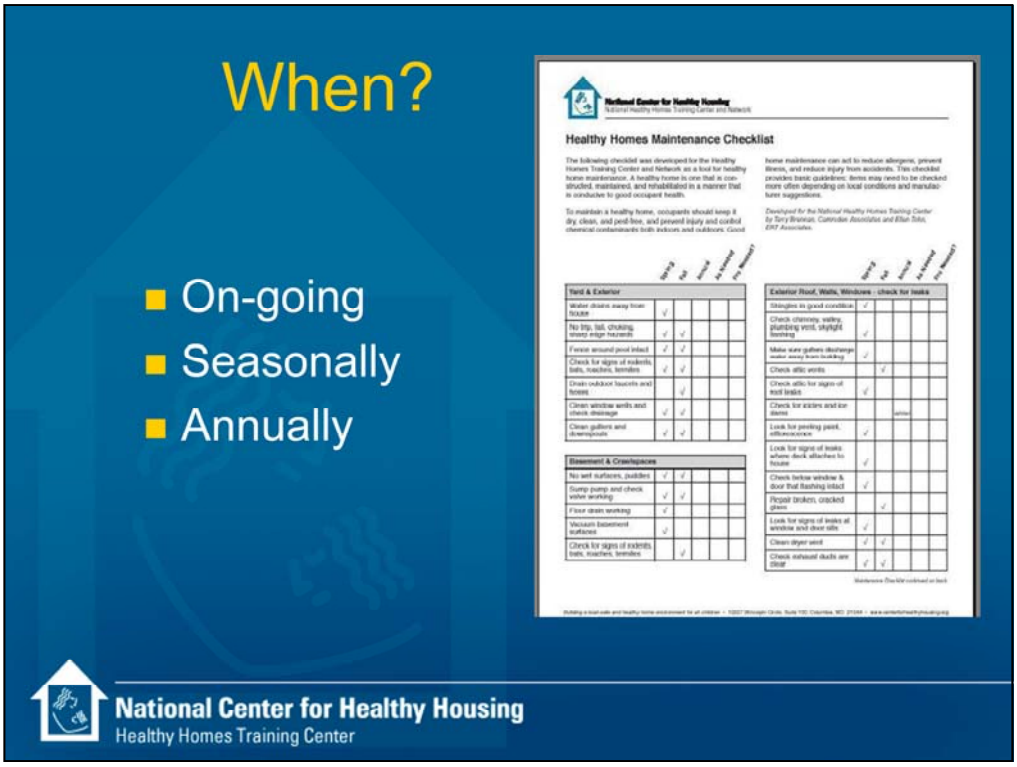
Routine cleaning and lubrication are needed for some systems.

Repair and replace systems immediately when they fail.

Poor maintenance of the downspout in this picture caused rainwater to be deposited next to the foundation.



Filters must be routinely replaced (usually every 3 months) to prevent clogged filters from blocking proper air flows.



Maintenance should be on-going, done seasonally, and done annually.

See page 31 and 32 of 32 in Reference Tab Assessment Section

These are the key sources of lead in a home. Federal EPA standards define lead-based paint hazards to include [2]:

- Deteriorated lead-based paint
- Lead in dust above certain thresholds. There are standards for lead dust on floors, window sills and window troughs.
- Lead in soil that exceeds certain thresholds.

EPA has also set a level of lead in drinking water that is considered a hazard.

Some pottery, produced in other countries can have lead in the glazes.

Lead was added to paint to make it more durable. We therefore find lead-based paint more frequently on exterior surfaces and on windows and doors which used a more durable paint. We are most likely to find leaded paint outside in older homes. The second greatest use of leaded paint is on doors and windows inside older homes. Often windows have deteriorated paint. Windows experience moisture due to variations between inside and outside temperatures and this causes paint failure.

Why Avoid Lead?

- Reduced IQ
- Learning disabilities
- Impaired hearing
- Reduced attention spans, behavior problems
- Anemia
- Kidney damage
- Damage to central nervous system
- Coma, convulsions, death

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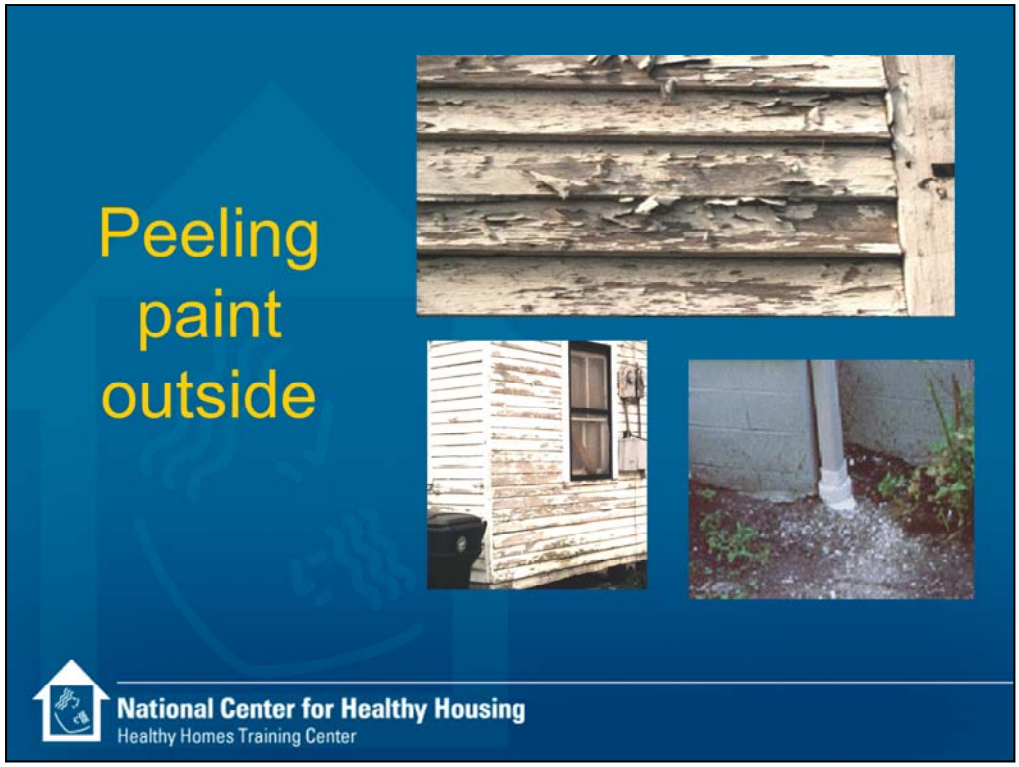
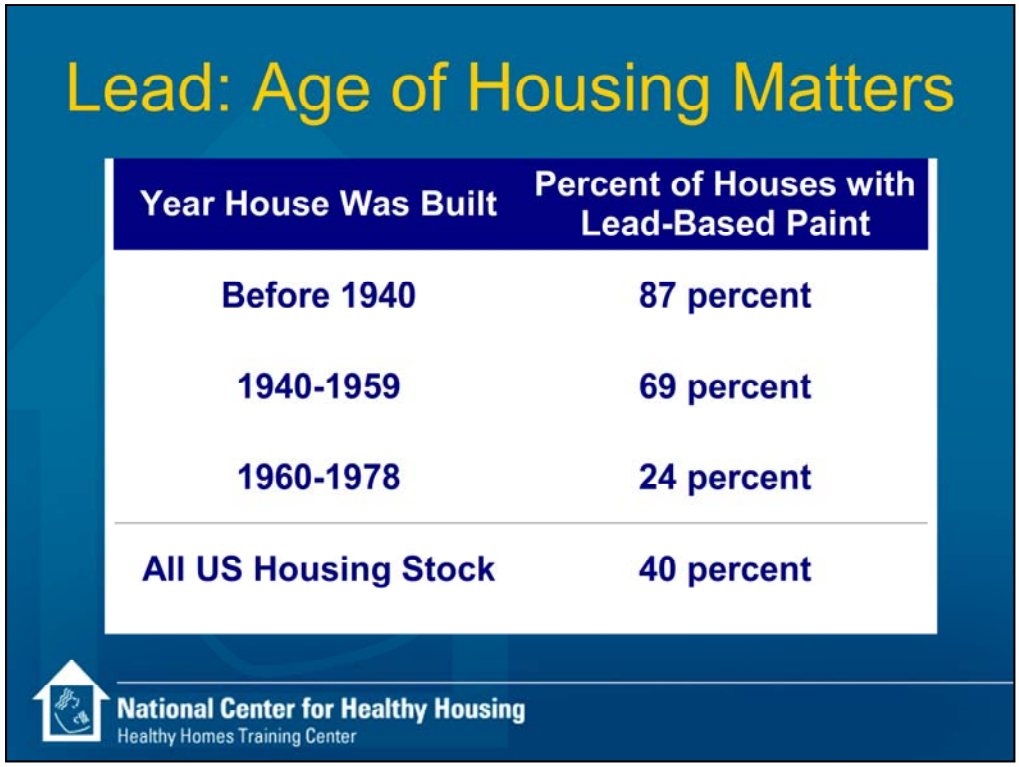


We can see deteriorated paint. It can be peeling, flaking, chipping or chalking.

Chalking is when paint leaves a whitish film. Many of you have walked alongside a building and then noticed a white film on your clothing. This is chalking. The paint was designed to do this and help keep the exterior clean. Unfortunately, the chalking can contain lead.



Of all U.S. housing stock, 40% of houses contain lead based paint because so much of the housing stock is old.

Lead was banned from use in residential paint in 1978 in the United States.

The lead industry began voluntarily phasing out lead in paint in the mid 1950's.

The above chart shows this trend. Nearly 9 of 10 homes built before 1940 have lead-based paint somewhere in the building. [3] More than ½ of homes built in the 1950's have some lead-based paint and the use of lead in paint declines sharply in the 1960's.

Prevalence on Deteriorated Paint - 2007

- 2% of homes have broken plaster or peeling paint
- Conditions that Deteriorate Paint
  - 17.5% of homes exterior problems that can deteriorate paint.
  - In past twelve months,
    - 7.9% of homes had interior water damage
    - 10.3% of homes had exterior water damage

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Besides just looking, we have tools to test for lead in paint, dust, soil and drinking water. Testing may be one of the actions recommended after analysis of the interview and inspection. People who are sampling for clearance testing usually need to be licensed.

EPA Lead Renovation, Repair and Painting (RRP) Rule

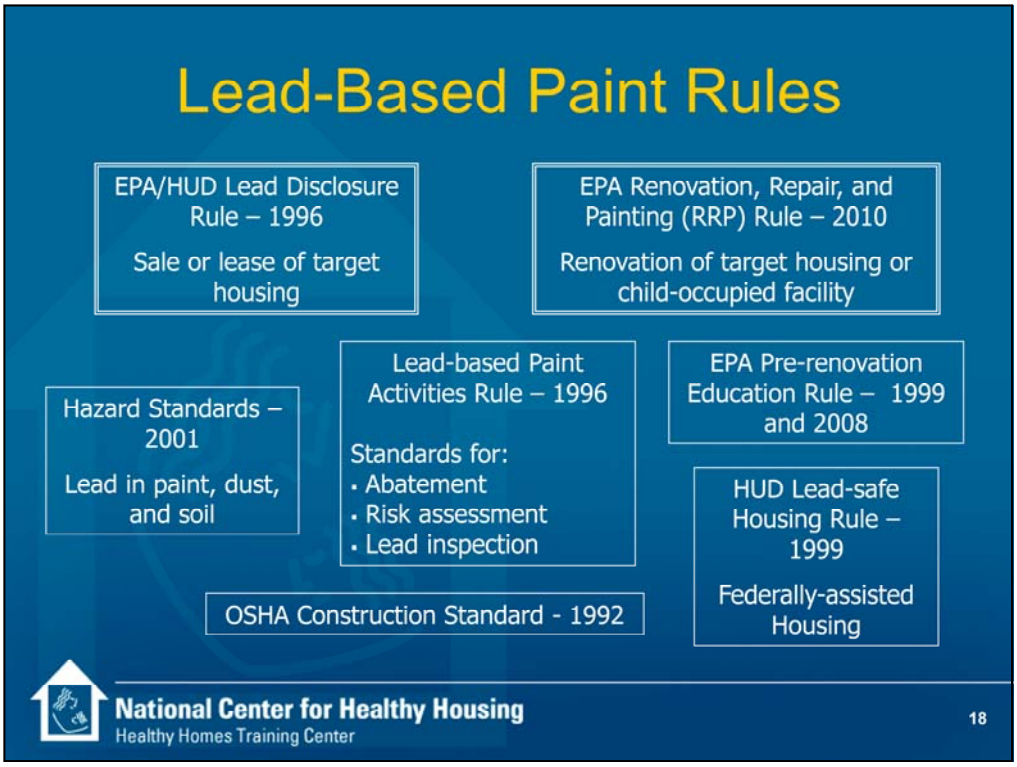
- Effective April 22, 2010
- Applies to pre-1978:
  - Target Housing (same as disclosure rule)
  - Child-occupied facilities
- Triggers:
  - Compensation
  - Paint disturbance (a/k/a renovation)
- 40 CFR 745.80 to 745.91
- April 22, 2008 *Federal Register*

Impacts of RRP Rule

- 8.4 million renovation events annually
  - Impact may drop to 4.4 million events
- Requires certification of:
  - 210,000 renovation firms by EPA after October 22, 2009
  - 235,000 individuals by accredited trainers after April 22, 2009
- Estimated by EPA to add $35 per job

Why Now?

- Required by the Residential Lead-based Hazard Reduction Act of 1992
- Congress required rule to be finalized in 1996
- Still to come:
  - Public buildings built before 1978
  - Commercial buildings that create lead-based paint hazards


Lead-Based Paint Rules
EPA/HUD Lead Disclosure Rule – 1996
Sale or lease of target housing
EPA Renovation, Repair, and Painting (RRP) Rule – 2010
Renovation of target housing or child-occupied facility
Hazard Standards – 2001
Lead in paint, dust, and soil
Lead-based Paint Activities Rule – 1996
Standards for:
• Abatement
• Risk assessment
• Lead inspection
EPA Pre-renovation Education Rule – 1999 and 2008
HUD Lead-safe Housing Rule – 1999
Federally-assisted Housing
OSHA Construction Standard - 1992
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EPA Resources

- www.epa.gov/lead
- www.epa.gov/lead/pubs/renovation.htm

Also
www.hud.gov/lead

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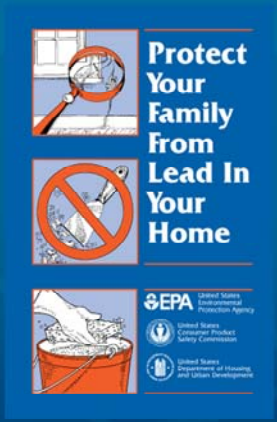
So What Will Change?

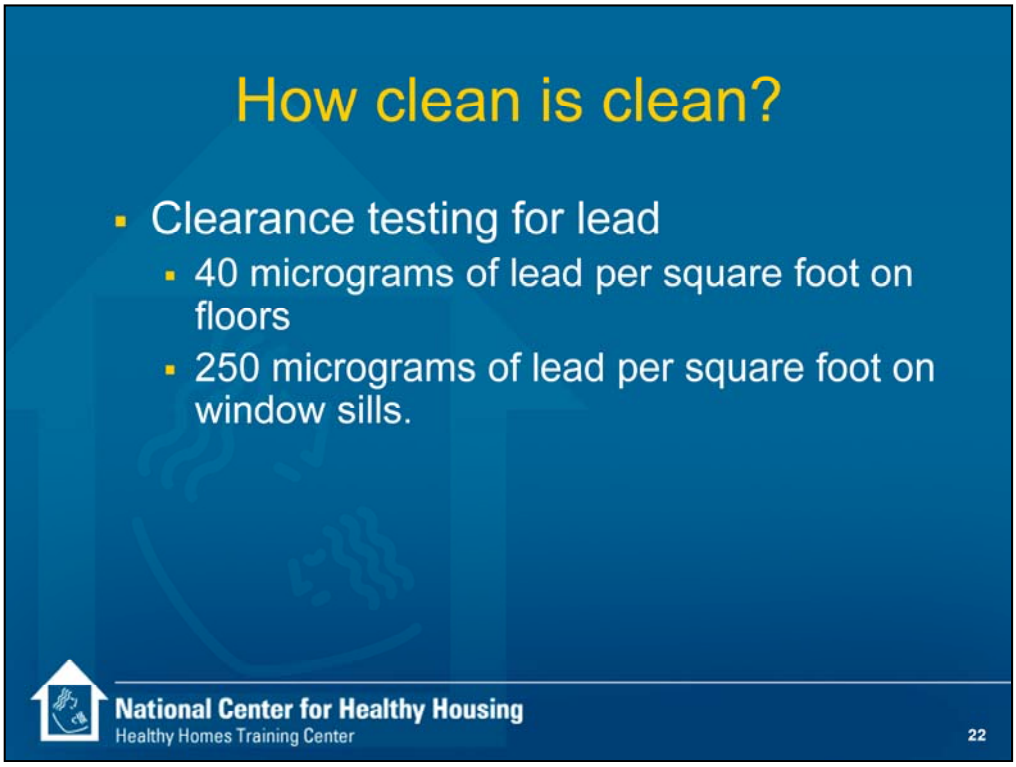
- "Certified Renovation Firm" Disturbs Paint
  - EPA or State Certification (after 10/22/09)
  - Fees and five-year renewal
- "Certified Renovator" Supervises Work
  - One-day training (after 4/22/09)
  - Certified by EPA-Approved Training Provider
  - Five-year renewal
- Mandatory Work Practices
  - Isolate work area
  - Contain dust
  - Thoroughly clean-up work area for debris and dust
- Post-renovation Cleaning Verification
- Documentation!

A New Booklet

Only for Leases and Sales of Target Housing



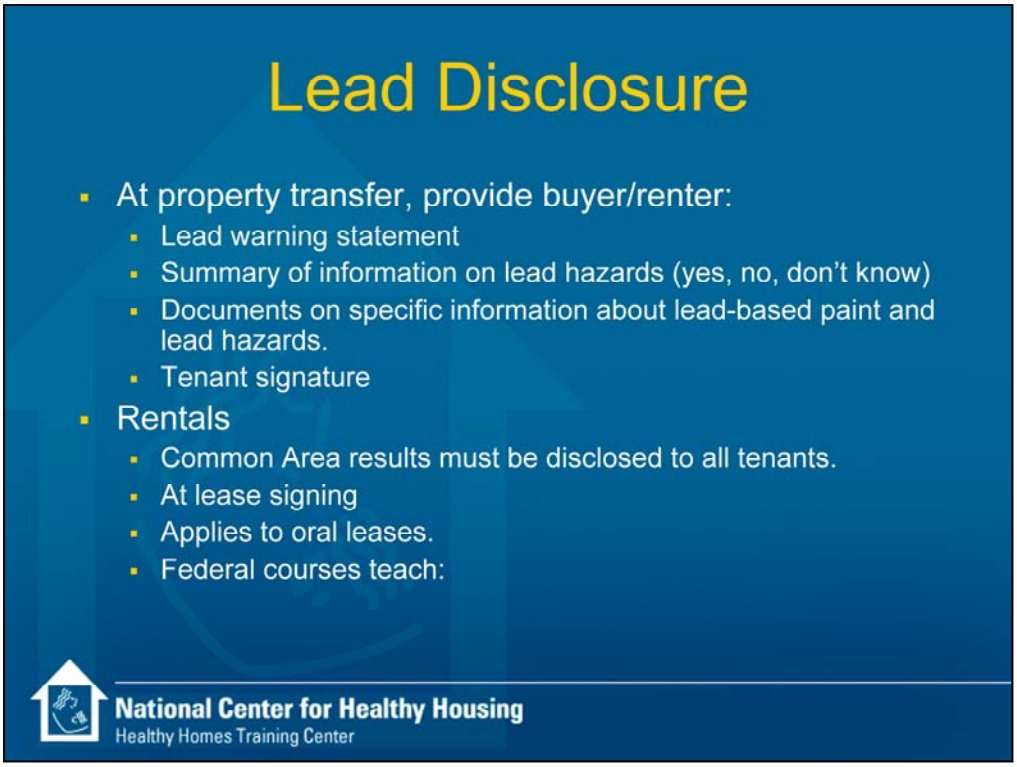
For Renovations in Target Housing and Child-occupied Facilities



Determining if the house is clean is often difficult because there are very few standards for cleaning.

However, there are standards for lead dust at 40 CFR Section 765. There are also standards for lead in soil.

A sugar packet of contains one gram of sugar. If the sugar would be all lead, 40 ug/ft2 would be equivalent to spreading the sugar packet over 25,000 ft2 – one-third of a football field. Open a packet and sprinkle it on the floor to see if people notice.



The EPA has developed a federal course for lead inspection, risk assessment and sampling technicians. Inspectors receive 3 days of training and are taught to test lead in paint using an XRF device, how to sample for lead in dust and complete a full inspection for lead in paint. They can also do lead dust clearance testing following lead abatement and renovation work. Risk assessors have 5 days of training, which is the 3 days of inspector training plus 2 additional days to learn how to sample lead in soil and conduct a risk assessment that looks for lead in paint, soil and dust. They also learn how to recommend solutions for lead hazards. Sampling technicians are the newest discipline and accepted in some but not all states. This one day course teaches students to sample lead in dust. They are qualified once they have state certification to perform clearance testing after lead hazard control work but not abatement work. They can also assess lead dust levels in properties to identify lead problems.

Cleaning Verification Card

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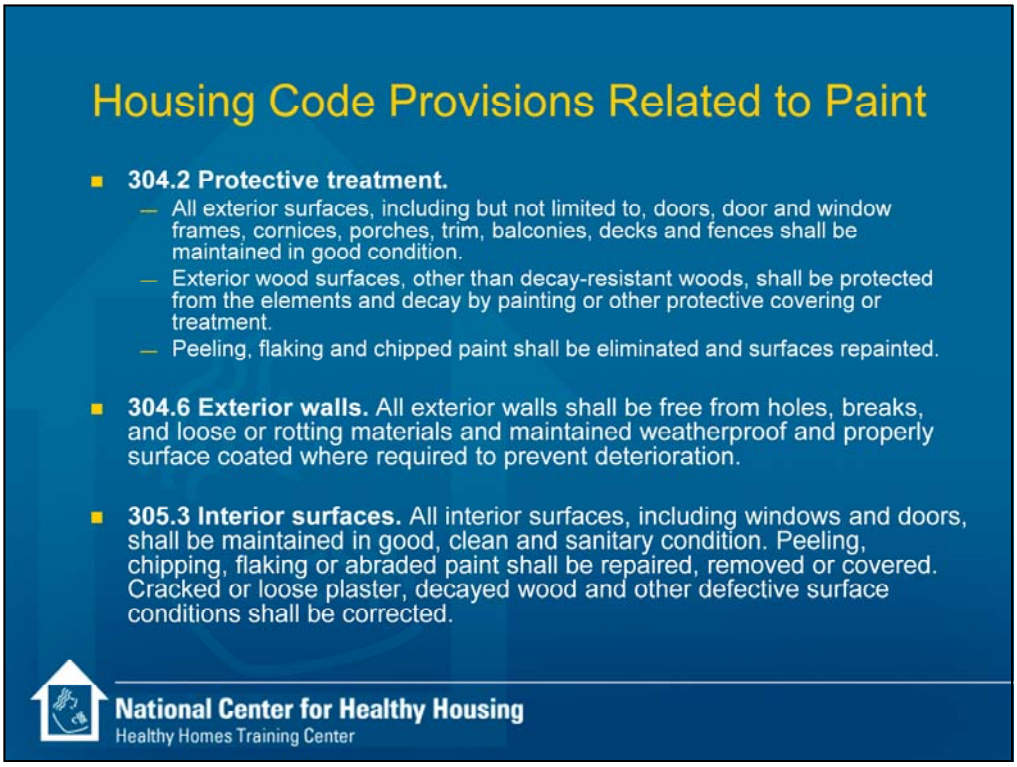
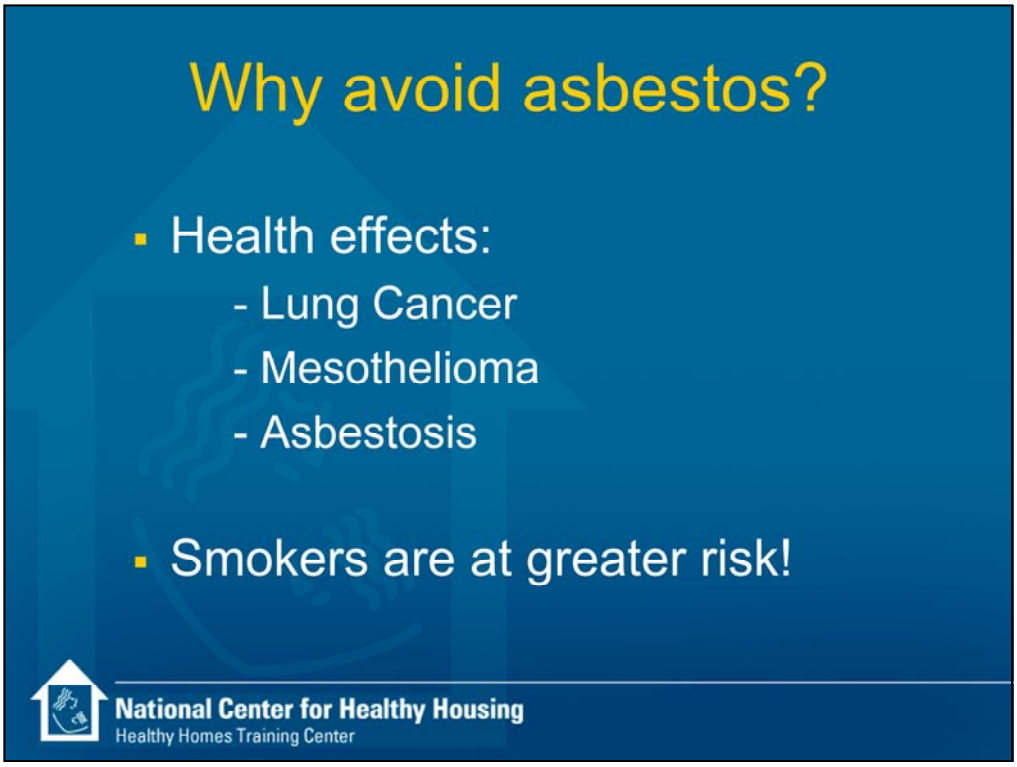


From IPMC. See page 9 of 48 in Reference Tab Codes Section

Asbestos was used in building materials from around 1900 to 1978. It can be found in old floor tiles, siding, roofing materials, and around pipes.

Some roofing and siding shingles are made of asbestos cement.

- Houses built between 1930 and 1950 may have asbestos as insulation.
- Asbestos may be present in textured paint and in patching compounds used on wall and ceiling joints. Their use was banned in 1977.
- Artificial ashes and embers sold for use in gas-fired fireplaces may contain asbestos.
- Older products such as stove-top pads may have some asbestos compounds.
- Walls and floors around woodburning stoves may be protected with asbestos paper, millboard, or cement sheets.
- Asbestos is found in some vinyl floor tiles and the backing on vinyl sheet flooring and adhesives.
- Hot water and steam pipes in older houses may be coated with an asbestos material or covered with an asbestos blanket or tape.
- Oil and coal furnaces and door gaskets may have asbestos insulation.



From studies of people who were exposed to asbestos in factories and shipyards, we know that breathing high levels of asbestos fibers can lead to an increased risk of:

- lung cancer:
- mesothelioma, a cancer of the lining of the chest and the abdominal cavity; and
- asbestosis, in which the lungs become scarred with fibrous tissue.

The risk of lung cancer and mesothelioma increases with the number of fibers inhaled. The risk of lung cancer from inhaling asbestos fibers is also greater if you smoke. People who get asbestosis have usually been exposed to high levels of asbestos for a long time. The symptoms of these diseases do not usually appear until about 20 to 30 years after the first exposure to asbestos.

How to handle asbestos

- LEAVE IT ALONE (if in good condition).
- Look for signs of wear or damage such as tears, abrasions, or water damage but avoid touching the material.
- If damaged or renovation might disturb it, repair or removal by a licensed professional is needed.

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See www.epa.gov/asbestos/pubs/insulation.html

What is vermiculite insulation?

Vermiculite is a naturally occurring mineral that has the unusual property of expanding into worm-like accordion shaped pieces when heated. The expanded vermiculite is a light-weight, fireresistant, absorbent, and odorless material. These properties allow vermiculite to be used to make numerous products, including attic insulation.

Do I have vermiculite insulation?

Vermiculite can be purchased in various forms for various uses. Sizes of vermiculite products range from very fine particles to large (coarse) pieces nearly an inch long. Vermiculite attic insulation is a pebble-like, pour-in product and is usually lightbrown or gold in color. The pictures in the center of this pamphlet and on the cover show several samples of vermiculite attic insulation.

Is vermiculite insulation a problem?

Prior to its close in 1990, much of the world's supply of vermiculite came from a mine near Libby, Montana. This mine had a natural deposit of asbestos which resulted in the vermiculite being contaminated with asbestos. Attic insulation produced using vermiculite ore, particularly ore that originated from the Libby mine, may contain asbestos fibers. Today, vermiculite is mined at three U.S. facilities and in other countries which have low levels of contamination in the finished material.

Asbestos Regulations

- National Emission Standard for Hazardous Air Pollutant (NESHAP)
  - Applies to buildings with more than 4 units
  - Work practices, training and notice to EPA
- Model Asbestos Program for States
  - Applies to buildings with more than 10 units
  - Work practices and training
- EPA's Ban on Asbestos in Products Reversed in 1992

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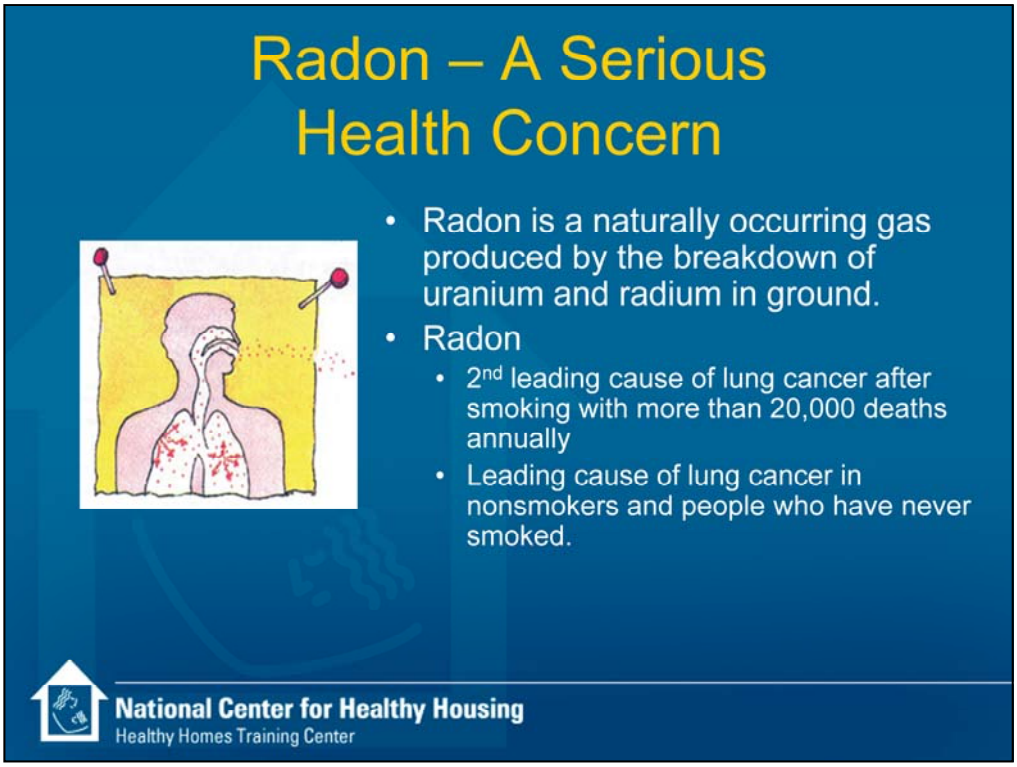
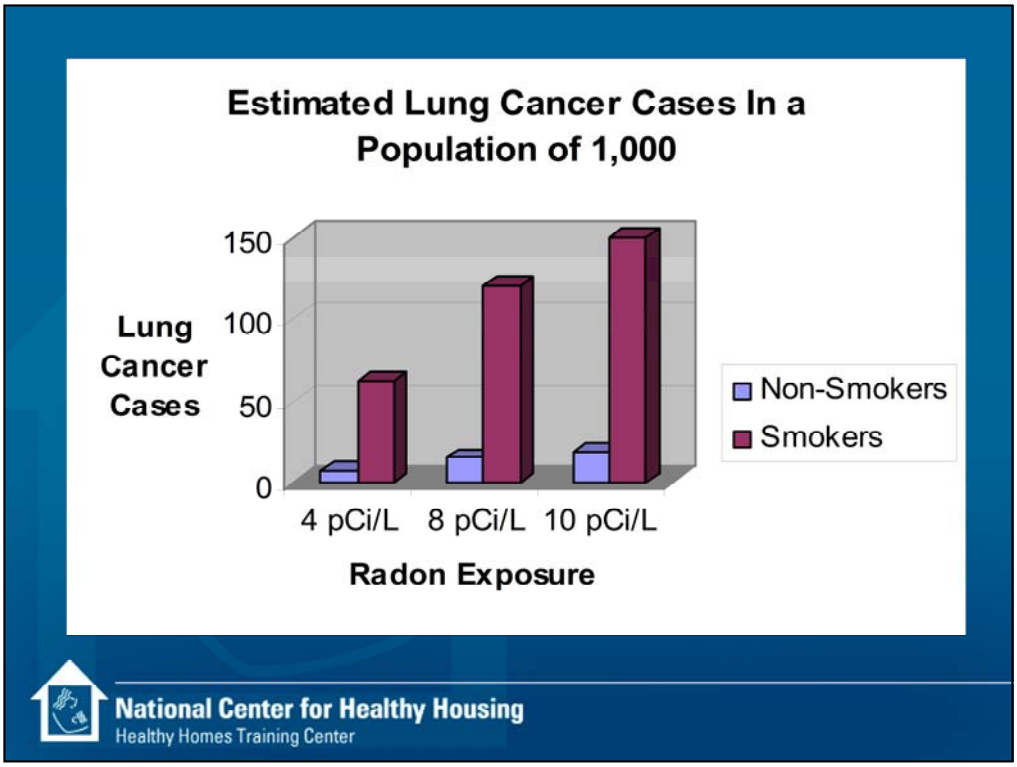


Radon is a naturally occurring gas produced by the breakdown of uranium and radium in soil, rock, and water. Naturally occurring uranium and radium exist in ground – especially in granite, shale, phosphate, or pitchblend. Uranium spontaneously breaks down into radium and radium spontaneously breaks down into radon. Radon is a gas that can be carried into the home. Radon spontaneously breaks down into radioactive elements (sometimes called radon decay products) that have a static charge which attracts them to particles such as smoke and dirt. Residents breathe the radioactive elements into their lungs. Residents who smoke breathe in more radioactive elements deep into their lungs. The radioactive elements spontaneously break down to release burst of energy which damages DNA in the lungs. This can lead to cancer.

Radon is a Class A carcinogen. The National Academy of Sciences (NAS) has determined that radon is the second leading cause of lung cancer overall and the leading cause of lung cancer in non-smokers. In its "Assessment of Risks from Radon in Homes," (EPA 402-R-03-003, June 2003, pg 1), EPA estimated that out of a total of 146,600 lung cancer deaths nationally in 1995, 21,100 (14.4%) were radon related. Among non-smokers, an estimated 26% were radon-related.[13]

EPA's reports estimate that there are about 3,000 deaths due to radon from lung cancer in people who have never smoked. EPA reports that this number is three times more than environmental tobacco smoke-related, lung cancer deaths in people who have never smoked. See Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders, December 1992, Document # EPA/600/6-90/006F.[14]

The effects of radon and cigarette smoking are *synergistic,* so that smokers are at higher risk from radon.



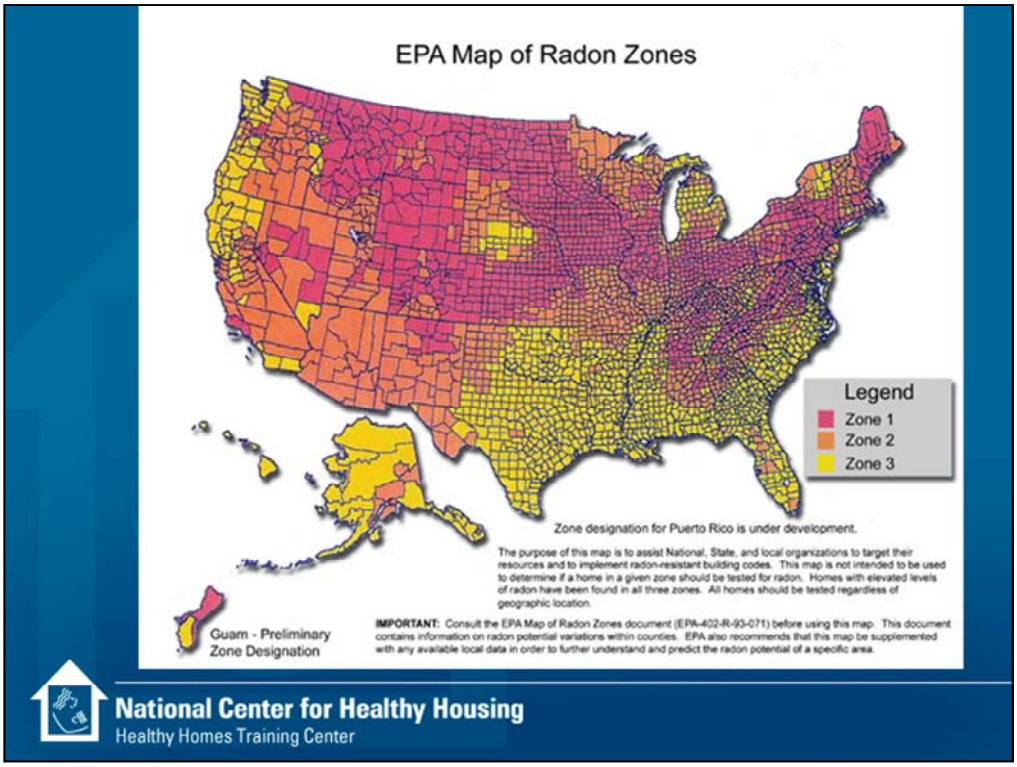
Data for this figure were obtained from EPA's "Home Buyer's and Seller's Guide to Radon" (EPA 402-K-05-005, May 2005, pg 18).[15]

EPA recommends that action to reduce radon be taken whenever levels are above 4 pCi/L. pCi/L means picoCuries per liter of air; a unit of measure for radon.

For smokers, the risk of lung cancer is even more significant than for non-smokers due to the synergistic effects of radon and smoking. In a population of 1,000 exposed to 4 pCi/L of radon over their lifetimes, EPA estimates that 7.3 people will get lung cancer. The risk is much greater for smokers exposed to the same level of radon. EPA estimates that 41 out of 1,000 smokers exposed to this level of radon over their lifetimes will get cancer.

Put another way, a person who never smoked who is exposed to 1.3 pCi/L of radon has a 2 in 1,000 chance of lung cancer; while a smoker has a 20 in 1,000 chance of lung cancer. The above chart shows the increased risk of lung cancer for smokers versus non smokers exposed to the same level of radon. At 8 pCi/L the risk to smokers is six times the risk to non-smokers.

For non-smokers, EPA estimates that radon and ETS are the leading causes of lung cancer.



This map shows where radon is found nationally and shows that radon is found in every state.[16] This map is available on-line at www.epa.gov/radon/zonemap.html. Each block is a county (or a parish in Louisiana). Keep in mind that:

•Some states and EPA regions consider the map to be outdated – some states have better and newer maps. Many states have collected radon data over the past ten years and have more current data than EPA. Some states, such as Florida and New Jersey, have identified their radon high-risk areas.

•The map should be used for radon-resistant new construction only when no local information is available. It should also be used for prioritizing radon outreach activities. The map provides general guidance on anticipated indoor radon levels, i.e., areas of the country where homes are likely to have measurable radon. The map is not an exact predictor of indoor radon levels.

•The only way to know if radon is a problem is to test for it. The map may not be accurate for your specific location. The U.S. Surgeon General recommends testing all homes for radon – not just some areas on the map.

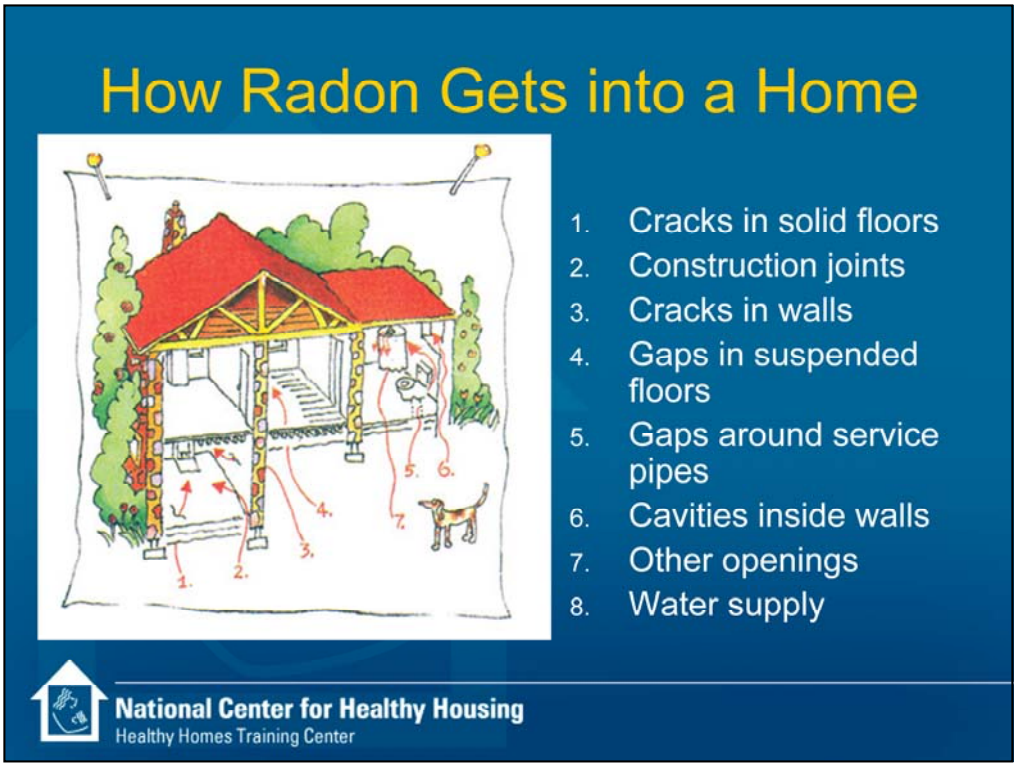
•Radon comes from uranium and radium in rock, soil and water. Consequently, the location of radon is not unified in the country. EPA's map of radon zones show trends in radon levels. Although a Zone 1 designation reflects the high risk potential for radon, elevated radon levels are found in all states.

One out of every 15 homes is estimated to have an elevated radon levels (above EPA action level of 4 pCi/L). Some regions have higher radon levels. This map shows radon levels across the nation.

Red - Zone 1 is where radon is the biggest problem. EPA predicts that red counties have a predicted average indoor radon screening level greater than 4 picocuries per liter (pCi/L)

Orange - Zone 2 is where EPA predicts that counties have a predicted average indoor radon screening level between 2 and 4 pCi/L

Yellow - Zone 3 is where EPA predicts that counties have a predicted average indoor radon screening level less than 2 pCi/L



This slide was taken from EPA's "Citizen's Guide to Radon" (EPA 402-K-02-006, May 2004, pg 4).[17]

You can't see or smell radon. It is an invisible radioactive gas that comes from the natural decay of uranium that is found in nearly all soils. Air pressure inside the home is usually lower than the pressure in the soil around the home's foundation. Because of this difference in pressure, the house can act as a vacuum, drawing radon in through foundation cracks, and other openings. It typically moves up through the ground to the air above and into your home through cracks and other holes in the foundation. A home can trap 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. Although the ground is the major source of radon for most homes, sometimes radon enters the home through well water. An NAS report (BEIR VI) issued earlier this year confirmed that there are drinking water related cancer deaths, primarily due to lung cancer (less than 200 lung-cancer deaths per year).

The NAS report confirms that the estimated risk posed by radon from drinking water is small, relative to exposure to radon in indoor air, and is larger than the risk from other regulated drinking water contaminants. Most of the cancer risk from radon in drinking water arises from the transfer of radon into indoor air, and exposure through inhalation, although there is some risk from ingesting water containing radon.

In a small number of homes, the building materials can give off radon, too. However, building materials rarely cause radon problems by themselves.

Detector Types: Charcoal canister devices absorb radon or its products on to the charcoal. Alpha track detectors have a plastic film that gets etched by the alpha particles that strike it. Electric ion detectors have a Teflon disc, which is statically charged. When an ion generated from radon decay strikes the Teflon disc, the electrical charge is reduced. The top photo is a short-term test kit. The bottom photo is a long-term test kit.

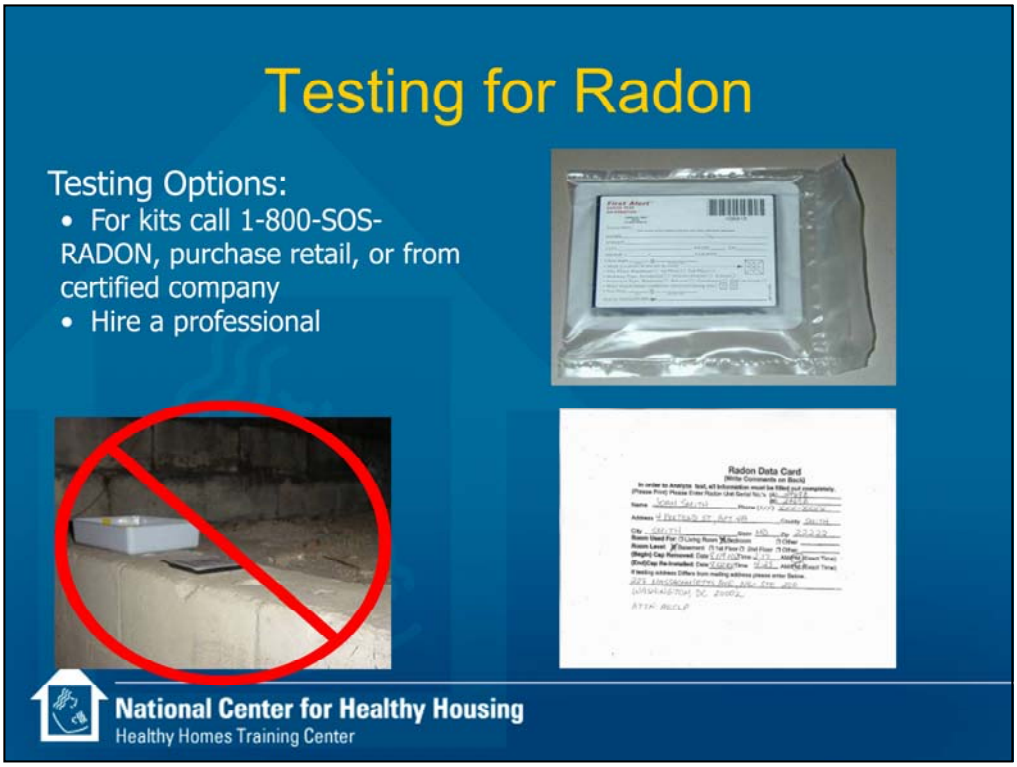
How/When to Test: In new construction, test home after construction is complete but after occupancy. In existing housing, EPA and the US Surgeon General recommend testing all homes below the third floor. Be sure to test before and after renovation, at purchase, or at new occupancy.

As summarized in EPA's "Citizen's Guide to Radon" (EPA-402-K-02-006, May, 2004, pg. 6)[17] and "Home Buyers and Sellers Guide to Radon (pg. 15)[15,] EPA recommends these testing steps:

1. Take a short-term test (or take 2 short-term tests at the same time). If your result is 4 pCi/L or higher take a follow-up test (Step 2).

2. Follow up with either a long-term test or a second short-term test. For a better understanding of 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.

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 (or the 2 simultaneous tests) is 4 pCi/L or higher.



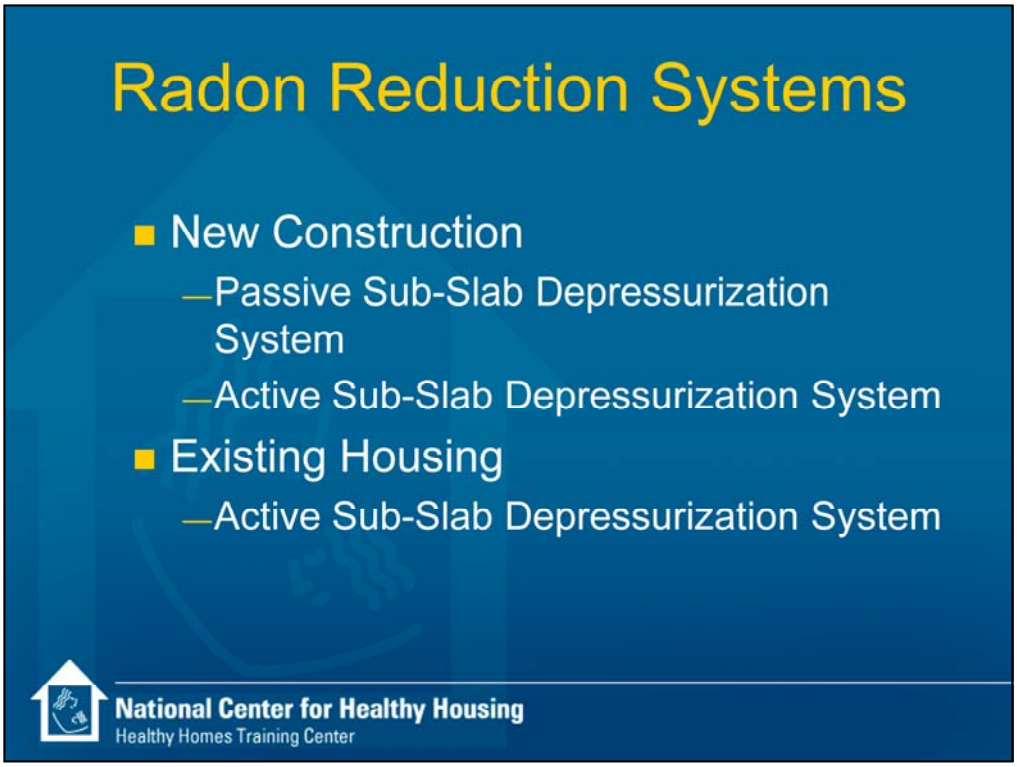
You can purchase radon test kits in the local hardware store, via the Internet or from the National Safety Council. You can also hire a radon professional.

If you use a home test kit, it will likely will contain at least one radon testing device, a mailing bag and label and a sheet or card to record the key data. Follow the sampling instructions.

Top Right and Bottom Right: The person completing the sampling fills out the radon data card and form to tell the lab the property address, location of the sample, test start and completion date, the serial number for the testing device, building type, whether the home was closed during testing, and the location/address where the result should be mailed. Be sure to promptly send the testing device to the lab.

Bottom Left: This picture shows the canisters in a basement area that is not livable. Consumers should place test kits in the lowest ***lived-in*** level of their home (according to the EPA Citizen's Guide to Radon).[17] Please note that in some states, radon professionals who do testing may be required to test areas that are suitable for occupancy but are not the lowest lived-in level (according to EPA Home Buyers and Sellers Guide).[15]

Conduct the test in a room to be used regularly (e.g., family room, living room, playroom, den bedroom); do **not** test in a kitchen, bathroom, laundry room or hallway. Put the test kit at least 20 inches off the ground, in an area where it will not be disturbed during the sampling period. Shut off all exhaust fans and keep doors and windows closed during testing (except for normal entry and exit).



You cannot prevent exposure to radon, but you can minimize the exposure.

Passive System: Has no fan. Radon passively moves from below slab up through pipe to vent outside through the roof.

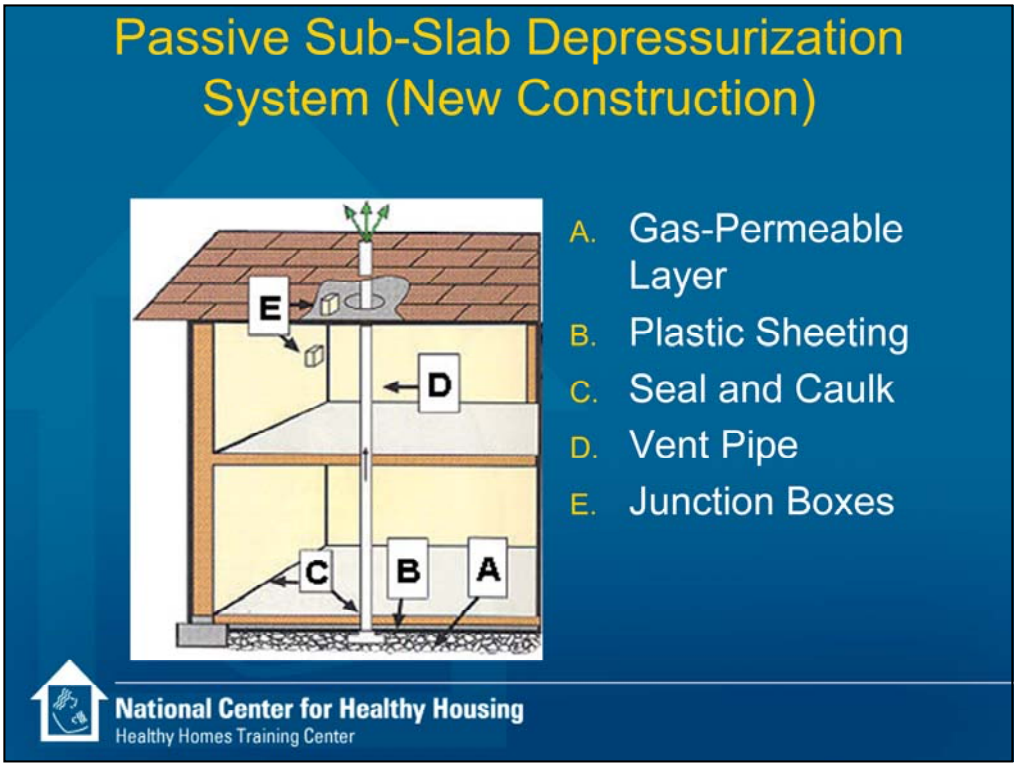
Active System: Has fan to actively pull radon gas from below the slab through a pipe and outside through the roof.

Other mitigation methods exist, and not all houses have slabs; however, these two methods are the most common.

Passive vs. Active: If testing post construction indicates high radon levels exist with the passive system, then a fan can be added to make the system an active system to suck radon gas out from below the slab through the venting. It may also be appropriate to use a passive system for homes in Zones 2 or 3. If more aggressive removal of radon is needed, an active system can provide it by sucking air out from below the slab.

In Zone 1, EPA recommends building in passive radon system into all new construction or substantial renovation jobs when a slab or crawl space is being created. This gives the property owner the option of converting to an active system if test results show radon level above 4 pCi/L.

In Zones 2 and 3, a given property may still experience high radon levels and hence testing post construction (before occupancy) is appropriate. If levels exceed 4 pCi/L then the contractor should install a radon control system prior to occupancy.



This slide is taken from EPA's webpage at www.epa.gov/radon/construc.html[18]

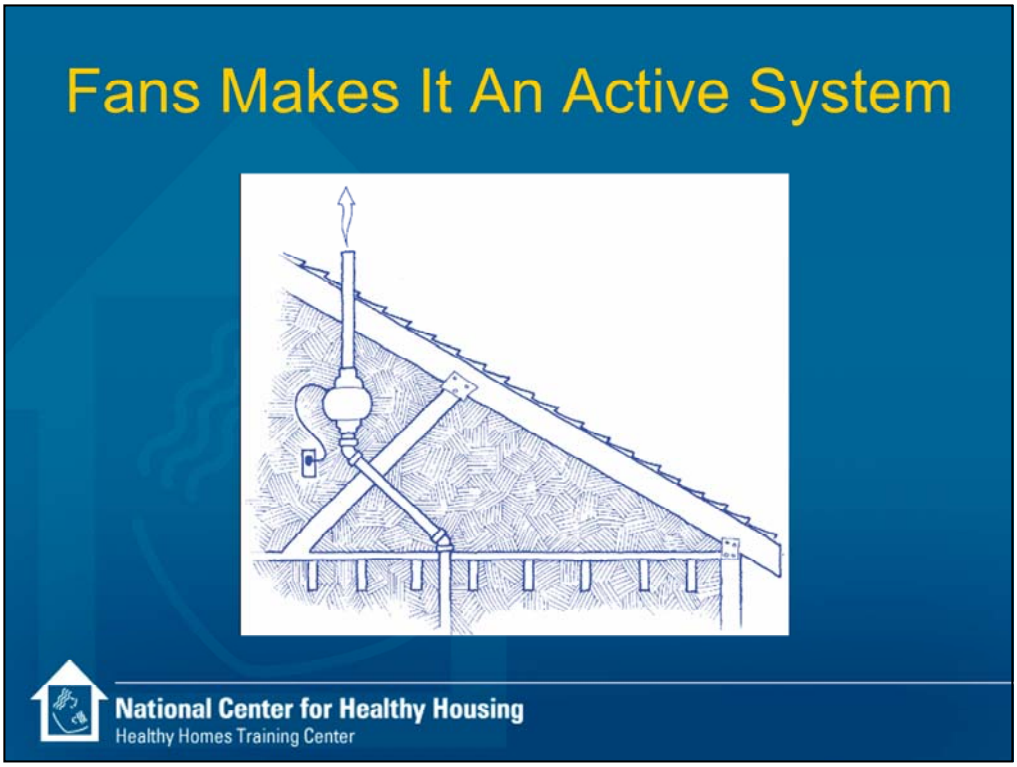
This system should be used for new construction. EPA does not recommend a passive system for existing sub-slab construction.

Five important steps in a passive system:

A. Put a gas permeable layer beneath the slab or flooring system to allow soil gas to move freely underneath the house.
B. On top of the gas permeable layer, put plastic sheeting to help prevent the soil gas from entering the home.
C. Seal and caulk all below grade openings in the foundation and walls to reduce soil gas entry into the home.
D. Install vent pipe – 4 inches preferred – from gas permeable layer to roof to safely vent radon and other soil gases to the outside.
E. Install junction boxes to make wiring and installation of a vent fan for an active system easier.

For systems in crawl spaces, cover the floor with poly sheeting, lay a perforated collection pipe below the poly sheeting and connect the pipe to a radon vent riser. It is also important to close openings between the crawl space and basement or crawl space and the living areas. The recommended installation is a T- joint at the bottom of the stack with corrugated pipe running in both directions.

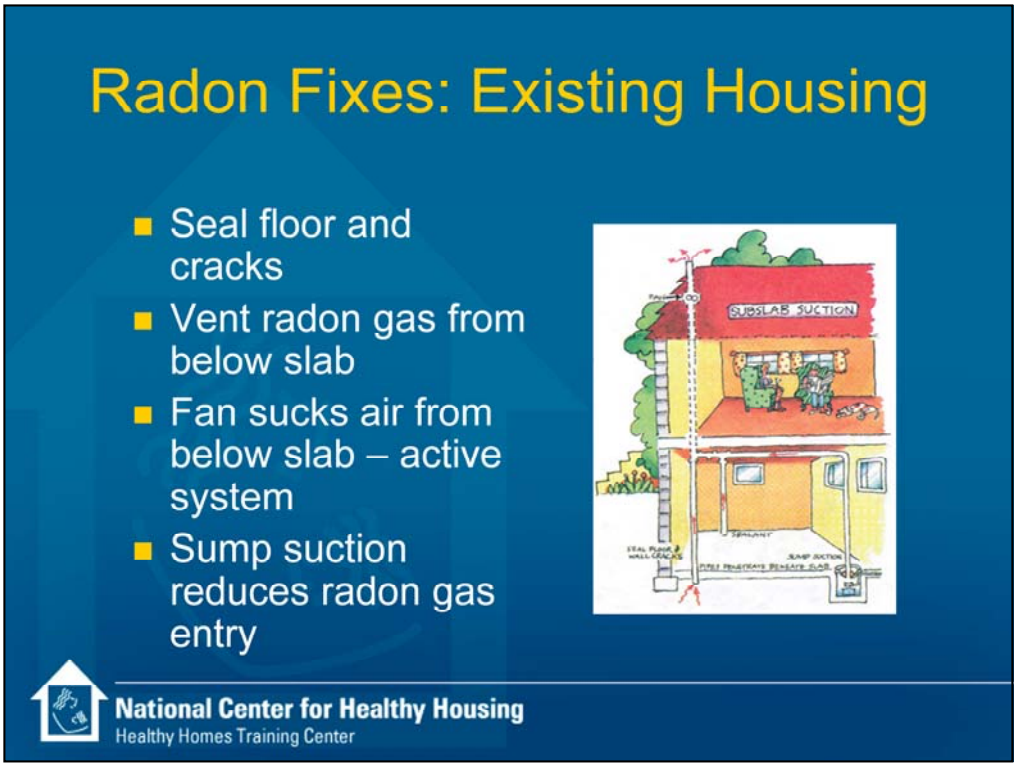
Please note that the pipe (stub up) must be connected to a vent pipe that goes through the interior of the house and vents to the outside. Otherwise, it is not a passive system and radon is vented in the house instead of outside or creating a situation where the pipe (stub up) could be misused for something else such as a commode. Vent pipes passing through the house are required to be labeled.



The drawing was taken from EPA's "Building Radon Out" (EPA-402-K-01-002, April 2001, pg 62) and shows an in-line fan in the attic.[19]

An active system adds a fan to pull radon from the ground and exhausts it outside through the roof, avoiding radon exposure in the home.

EPA recommends that if a radon fan is used that it be installed in an **unoccupied** space to avoid radon exposures if the fan leaks or fails. In this case, the fan is in the attic and we see a gable vent to the right.



This information is taken from EPA's "Consumer's Guide to Radon Reduction" (EPA-402-K-03-002, February 2003, pg 9-12).[20] There are several proven methods to reduce radon in your home, but the one primarily used is "subslab suction," 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.

Active subslab suction (also called **subslab depressurization**) is the most common and usually the most reliable radon reduction method. One or more suction pipes are inserted through the floor slab into the crushed rock or soil underneath. They also may be inserted below the concrete slab from outside the house. 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. Often, only a single suction point is needed.

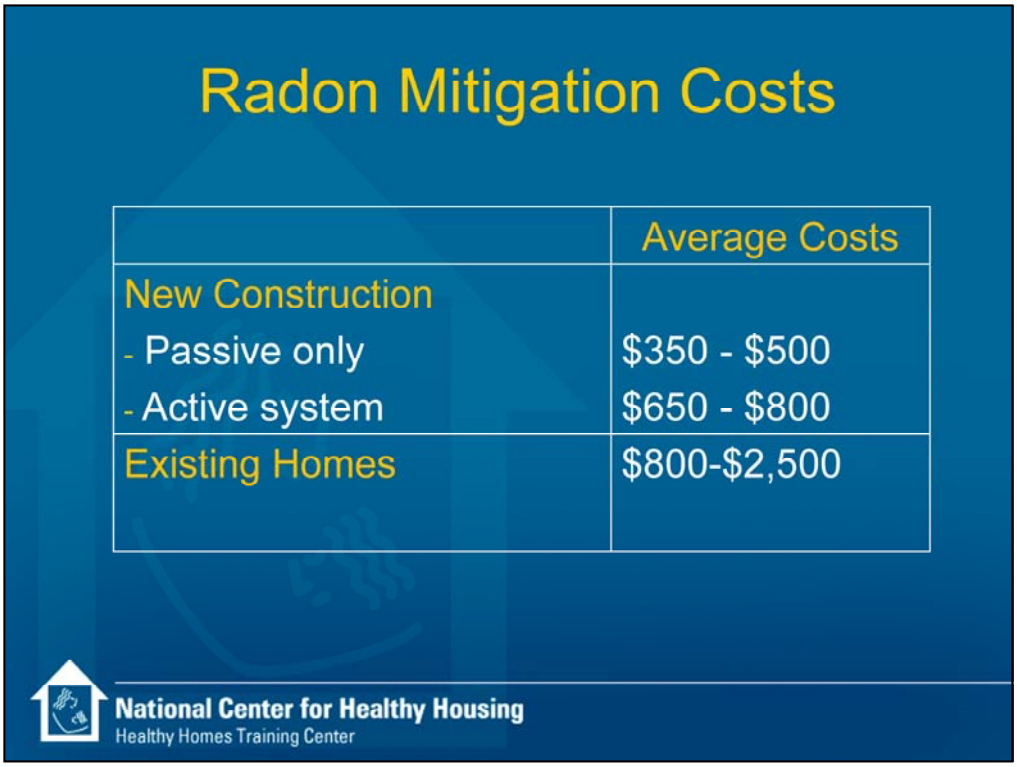
A contractor usually gets this information from visual inspection, diagnostic tests, and/or experience. A radon vent fan connected to the suction pipe(s) draws the radon gas from below the house and releases it into the outdoor air while simultaneously creating a negative pressure (vacuum) beneath the slab. Common fan locations include attics, garages and the exterior of the house.

Passive subslab suction is the same as active subslab suction except it relies on natural pressure differentials and air currents instead of a fan to draw radon up from below the house. Passive subslab suction is usually associated with radon-resistant features installed in newly constructed homes. Passive subslab is generally not as effective in reducing high radon levels as active subslab suction.

Some houses have **drain tiles or perforated pipe** to direct water away from the foundation of the house. Suction on these tiles or pipes is often effective in reducing radon levels.

All radon systems should be labeled to alert the owners, occupants and contractors about the purpose of various pipes and tubing.

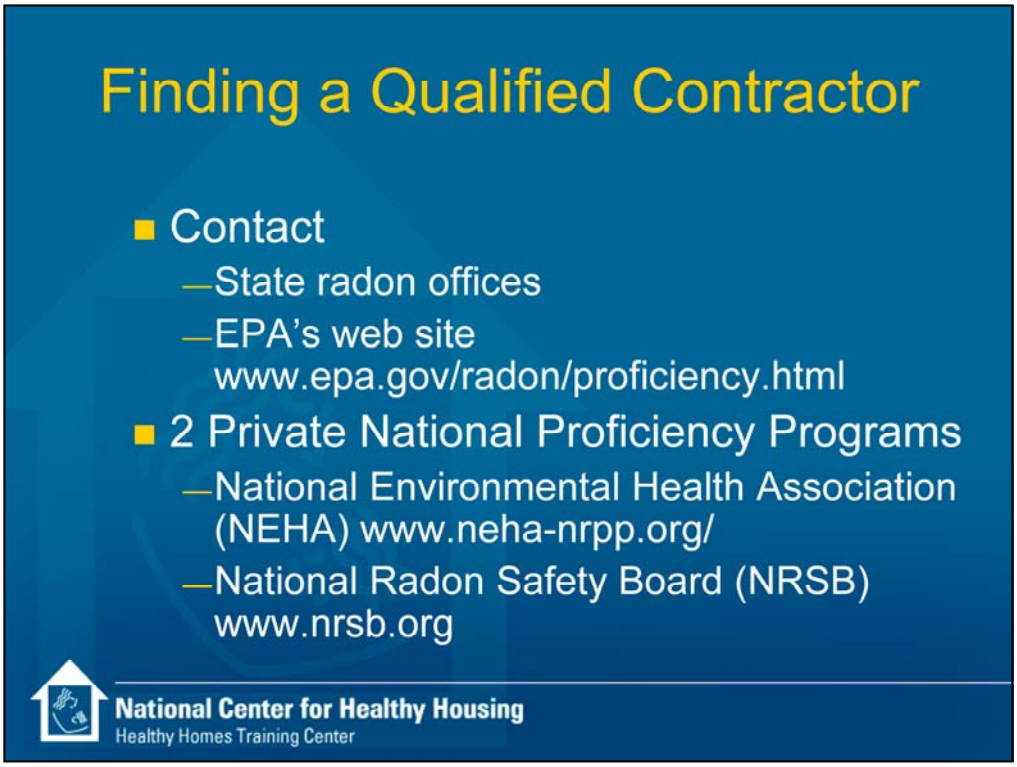
The picture shows labeling of the radon control pipes by the contractor clearly showing the purpose of the pipe. This photo also shows potential mistakes. Why is duct tape used? And the pressure tube to ensure there is a vacuum is too high for more people. Also, it appears that there are holes in the walls. This is not good for many reasons.



This information is taken from EPA's "Home Buyer's and Seller's Guide to Radon" (EPA-402-K-05-005, May 2005, pg. 9) [15].

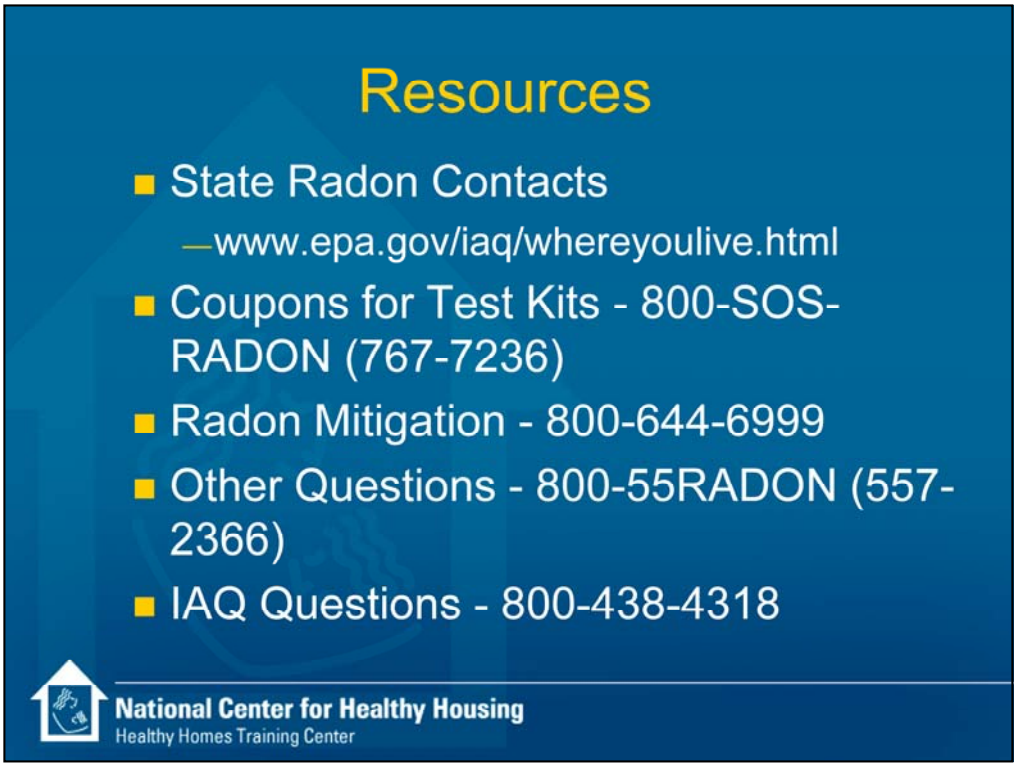
Costs may be lower or higher in different regions of the US. For example, costs for radon-resistant new construction vary with local code requirements, with some areas requiring gravel for drainage and that cost would not be included again as part of RRNC costs.

For new housing, it is more cost-effective to do radon-resistant new construction than it is to fix a home once it is built. However, remember that even in new homes, testing is needed even if radon-resistant new construction is done, and all existing homes should have pre- and post-mitigation testing performed.



EPA recommends that you use a state-certified and/or qualified radon mitigation contractor trained to fix radon problems. You can determine a service provider's qualifications to perform radon measurements or to mitigate your home in several ways. First, check with your state radon office.

Many states require radon professionals to be licensed, certified, or registered, and to install radon mitigation systems that meet state requirements. Most states can provide you with a list of knowledgeable radon service providers doing business in the state. In states that do not regulate radon services, ask the contractor if they hold a professional proficiency or certification credential, and if they follow industry consensus standards such as the American Society for Testing and Materials (ASTM) Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings[21], or the U.S. EPA's "Radon Mitigation Standards" (EPA-402-R-93-078, April, 1994). [22] You can contact private proficiency programs for lists of privately-certified professionals in your area. Such programs usually provide members with a photo-ID, which indicates their qualification(s) and the ID-card's expiration date. For more information on private proficiency programs, visit www.epa.gov/radon/proficiency.html or contact your state radon office.



EPA supports these hotlines to best serve consumers with radon-related questions and concerns.

1-800-SOS-RADON (767-7236). Radon Hotline, operated by the National Safety Council (NSC) in partnership with EPA. Obtain coupons for radon test kits (for consumers, individual kits, not in bulk). ($10 for short-term kit; $20 for long-term kit).

1-800-55RADON (557-2366). For live help with your radon questions. Operated by the National Safety Council (NSC) in partnership with EPA.

1-800-438-4318. The Indoor Air Quality (IAQ) Information Clearinghouse is privately operated under contract to EPA. You can order copies of EPA consumer-oriented radon publications and get general information on radon and indoor air quality issues.

1-800-426-4791. Safe Drinking Water Hotline, privately operated under contract to EPA. For general information on drinking water, radon in water, testing and treatment, and radon drinking water standards.

Sewer Gas

- A mixture of gases generated by bacteria and fungi while digesting wastes
- Often contains methane, hydrogen sulfide, ammonia, carbon dioxide, and carbon monoxide
- Source - Dried out traps in drains, especially in floor drains or homes that have been vacant for awhile.

National Center for Healthy Housing
Healthy Homes Training Center

Key Messages

- Systems should be inspected regularly to ensure proper function.
- Some maintenance activities require the use of trained professionals.

National Center for Healthy Housing
Healthy Homes Training Center