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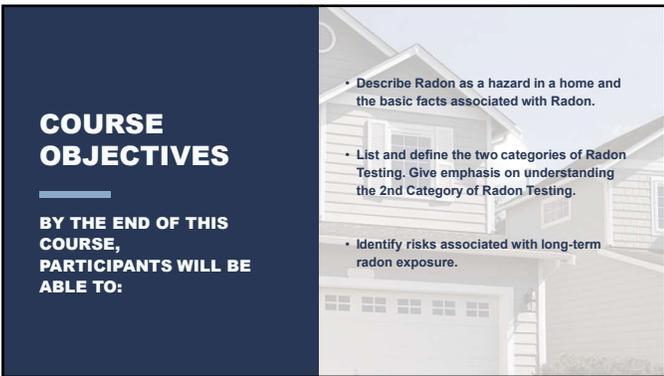
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**YOU WILL NOT LEARN...**

- TO SERVE AS AN EXPERT ON RADON SAFETY
- TO PROVIDE LEGAL OR TRAINING ADVICE ON RADON SAFETY



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**INTRODUCTION**

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**ICE BREAKER**  
WITH THE PEOPLE SITTING  
BESIDE YOU...

- Introduce yourself.
- What do you already know about radon?
- Share experiences you've had with radon and if/how radon has impacted a real estate transaction.
- How concerned are your clients with radon?
- Do you think these are valid concerns?

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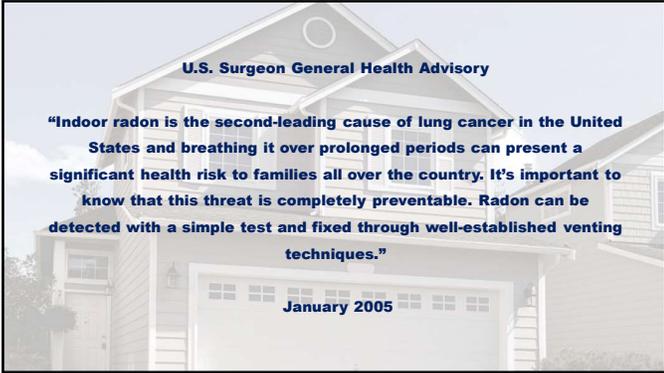
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radon

**86**

**Rn**

[222]

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- An invisible, radioactive gas created from the natural deposits of Uranium and Radium in the soil.
- Can be drawn into a building and accumulate to concentrations, that can increase the potential for contracting Lung cancer.
- Potential buyers often want to test for radon in a home and require that sellers correct any issues due to potential impact Radon could have on the home's resale value.

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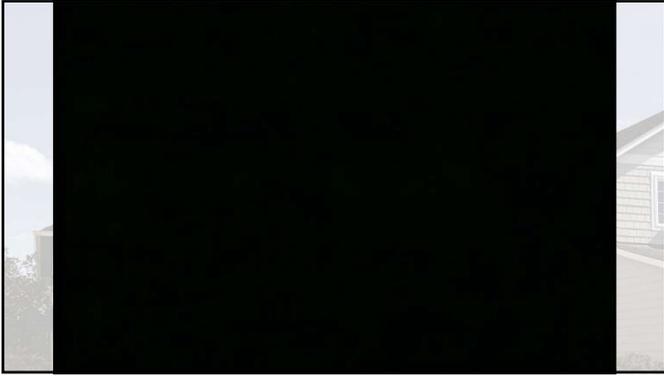
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- Radon cannot be seen, smelled, or tasted.
- Adverse health effects of Radon (such as, Lung cancer) is not immediately experienced.
- You can be exposed to Radon for years without ever detecting its presence in your home.

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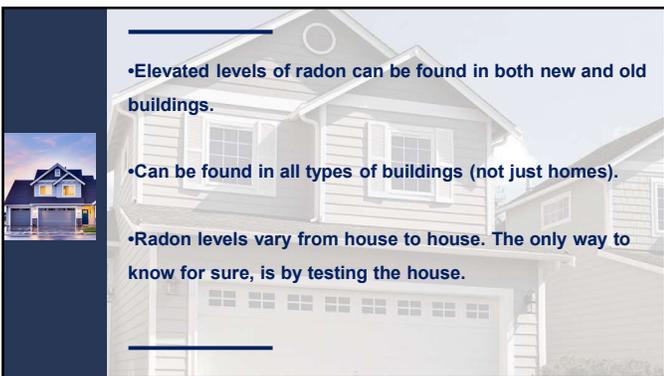
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- Elevated levels of radon can be found in both new and old buildings.
- Can be found in all types of buildings (not just homes).
- Radon levels vary from house to house. The only way to know for sure, is by testing the house.

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### **RADON RISKS**

•The risk of developing lung cancer at 4.0 pCi/L is estimated at about 7 lung cancer deaths per 1,000 persons.

•However, no single person's risk of developing lung cancer can be estimated, that's why homes should be tested.

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### **RADON RISKS**

- Radioactive particles are trapped in your lungs when you breathe Radon gas that has decayed
- Small bursts of energy are released as it [RADON] breaks down further
- Lung tissue is damaged as a result increasing the risk of lung cancer
- Smokers pose an even greater risk

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### **RADON RISKS**

- The United States spends over \$2 billion annually on radon-induced lung cancer (direct and indirect)
- The EPA establishing carcinogens on a 1 to 100,000 risk of death scale.

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### RADON RISKS

- 1 out of every 15 homes have elevated levels of Radon
- NO HOME IS IMMUNE
  - New and Old
  - Well sealed and drafty
  - Homes with or without a basement

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**The amount of radon in the air is measured in pCi/L (Picocuries per liter)**



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### Bottomline Radon Levels

- The U.S. Congress: Indoor radon levels be no more than outdoor levels; about 0.4 pCi/L of radon is normally found in the outside air.
- EPA: 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 higher.

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**HOW RADON GETS IN**

Uranium breaks down creating Radon

Home air pressure is lower than around house foundation

The home acts as a vacuum, drawing Radon into the house

Those with well water must proceed with caution and ensure they are employing the right strategy

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**HOW RADON GETS IN**

Enters through the foundation:

- Basement, crawlspace, or slab
- Diluted by air as it rises
- Air that comes in through exterior walls and openings

**Typically, Radon levels are highest in lowest areas of the home.**

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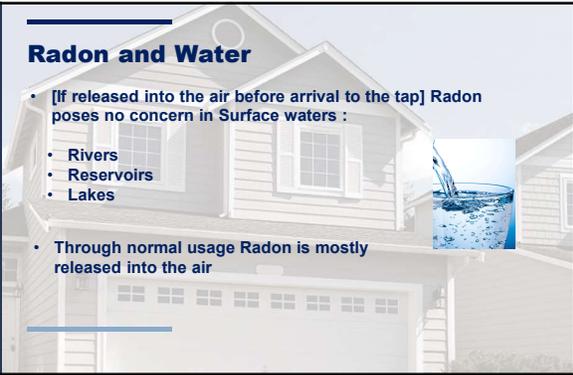
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### Radon and Water

- [If released into the air before arrival to the tap] Radon poses no concern in Surface waters :
  - Rivers
  - Reservoirs
  - Lakes
- Through normal usage Radon is mostly released into the air



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### Radon and Water

- Most commonly a problem in homes that use well water
- Rule of thumb: Takes 10,000 pCi/L in the water to add one additional pCi/L of radon in the air.



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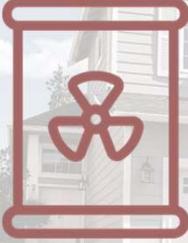
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### SHORT-TERM RADON TESTING



•Make sure to use a qualified radon professional

Should be trained in proper placement of Radon devices

•Tests should be placed in lowest livable area

At least 20 inches from floor.  
At least 3 feet from openings in exterior walls.

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### SHORT-TERM RADON TESTING



Short-test usually takes 2-3 days!

Data collected for less than 48 hours should be considered invalid

These tests usually used during time of resale

Follow up testing should be done if test reads above 4.0 pCi/L

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### LONG-TERM RADON TESTING



Preferred method as radon levels can vary from season to season.

Minimum of 91 days.

Device placed in lowest livable area of home.

Most often done if short term test comes back high.

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### DIY vs Professional Inspection

- DIY test kits are cheaper but can result in less accurate, or in some cases inaccurate, reads
- Must be sent to a lab for results
  - Unacceptable time constraint in a real estate transaction!
- DIY kits require proper placing
  - Wrong location = False positive

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### DIY vs Professional Inspection

- Professional tests are performed by certified and trained PROFESSIONALS
- Test multiple areas of the home
- Required by the state to regularly calibrate their equipment to ensure accuracy
- Results within a day of picking up the test

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### CATEGORIES OF RADON TESTING

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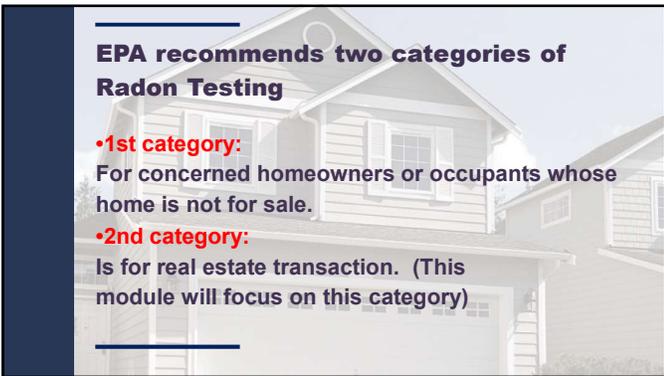
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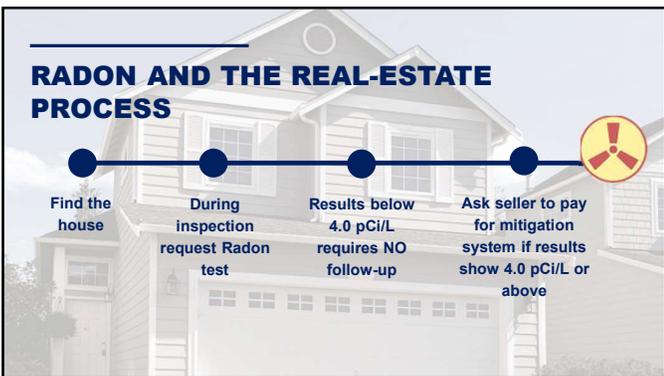
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**RADON AND THE REAL-ESTATE PROCESS**



Or consider purchasing the home and performing a long-term test yourself.

Use bids from contractors as a basis for negotiations with the seller.

If the seller is willing to pay for a mitigation system, work with the realtor to determine the best way to obtain the funding from the seller and have the system installed after taking possession of the property.

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**Implications in Real-estate**

Homeowners should always

- Ask for references.
- Require proof of certification.
- Ask for proof of insurance.
- Ask for a clear contract with details of guarantee and warranty.

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**RADON MITIGATION SYSTEMS**

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### Radon Mitigation Systems

- Find a QUALIFIED contractor well-versed in Radon Mitigation
- Proper equipment and technical skill/knowledge are essential
- You could end up increasing Radon levels if you do something wrong
- Taking the appropriate training courses are imperative before undertaking this as a DIY

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### How to Select a Contractor

- Ask yourself (for each) YES/NO
  - Will the contractor provide references/photographs?
  - Will the contractor provide test results of before and after radon levels of past work?
  - Can the contractor explain:
    - What is involved in the process?
    - How long will this take?
    - How will it work?

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### How to Select a Contractor

- Ask yourself (for each) YES/NO
  - Are there diagnostic test fees?
    - If so – How much are they?
  - Did the contractor inspect your home's structure before providing an estimate?
  - Did they review the quality of your radon measurement results to determine is appropriate procedures were followed?

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**Do the Proposals/Estimates Provided by the Contractor include:**

- Proof of state certifications?
- Credentials?
- Proficiency?
- Proof of necessary licenses for local requirements?
- Liability insurance?
- Diagnostic testing prior to installation and design of a radon reduction system?

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**Do the Proposals/Estimates Provided by the Contractor include:**

- Installation of a warning device (This will alert you if the system is malfunctioning)?
- Testing after installation to make sure the radon reduction system is working?
- A GUARANTEE TO REDUCE LEVELS TO 4 pCi/L OR BELOW?
  - If so, FOR HOW LONG?

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**Contract Should Include:**

- Total cost of the job:
  - Taxes
  - Permit Fees
  - Deposit (if any)
- When payment is due in full
- Time required to complete the work

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**Contract Should Include:**

- Agreement by contractor to:
  - Obtain permits
  - Follow building codes
- Statement of liability insurance
- Statement they are bonded and insured
  - This is to protect you in case of injury to persons, or damage to property, while work is being done
- Guarantee contractor will be responsible for damage during the job and cleanup afterwards

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**Contract Should Include:**

- Details of guarantees (if any) to reduce radon below negotiated level (4 pCi/L or lower)
- Details of warranties or other optional features associated with the hardware components
- Declaration stating whether any of these are transferrable if you sell your home
- Description of what contractor expects homeowner to do
  - Setting up
  - Clearing space
  - Accessibility

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**To Be Aware**

- Radon Reduction Systems can potentially cause some loss of heated or air-conditioned air
- This can increase your utility bills
  - Depends on:
    - Climate
    - Type of system installed
    - How your home is built
- Fan systems are more effective at reducing levels of radon
  - These also will increase your electric bill

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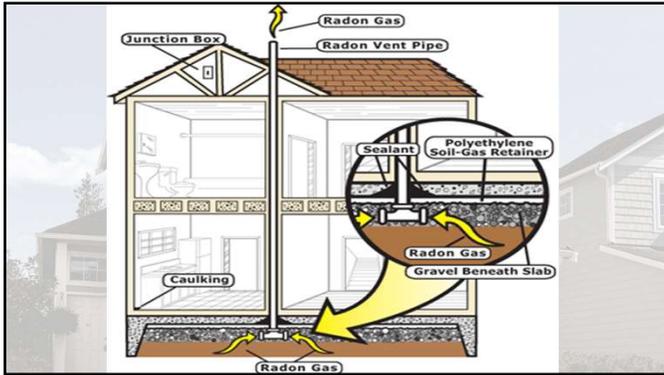
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### Radon Mitigation Systems

- Radon is mitigated installing a system
  - Draws the Radon-laded soil gas that is beneath the foundation
- Caulking and sealing cracks in the foundation is NOT a suitable mitigation technique




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### Radon Mitigation Systems

- Radon levels can be reduced by up to 99%
- Levels can always, with proper systems in place, be reduced to acceptable levels (Below 4 pCi/L)
- Test your home after levels have been reduced to ensure safety




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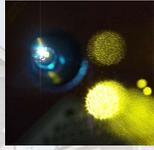
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### Radon Mitigation Systems

- Helps to reduce Radon levels in homes.
- In most areas, Radon systems are not a code requirement, but are a value-added product.



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### Radon Mitigation Systems

- Advantages to installing when home is being built:
  - Piping can be easily concealed
  - Can be installed so that a fan is not necessary

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### Radon Mitigation Systems Standards

- Make sure to use a qualified contractor
  - Install the system in accordance with the EPA's Radon mitigation standards.
- System Standards
  - At least 10 feet above grade.
  - At least 10 feet away from an opening that is two feet below the discharge.
  - Above the eave of the roof.

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### Radon Mitigation Systems Standards

- System fans should not be located inside the home or a crawlspace.
- Indicator located in a prominent location.
- Power to the fan should be run in accordance with electrical codes.

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### Radon Mitigation Systems Standards

- All portions of the system are to be labeled.
- Instruction manual, with warranties, provided to the homeowner.
- Home should be retested 24 hours after installation and every two years, thereafter.

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### Radon Mitigation Systems Costs

- Cost a function of the design of a home
- Not a function of the amount of radon present:
  - Average U.S. installation - \$1,200-\$1,500
  - Average monthly operating cost - \$3-\$5
  - Expected life span of fan – 11 years
  - Fan replacement cost - \$250 - \$500
  - Periodic maintenance - none

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**Why Buy a Radon-Resistant Home?**

- Working Techniques
  - They reduce radon levels on average 50%
  - Reduces other soil gases
  - Decreases moisture problems
- Cost Effective
  - Building in features is cheaper than fixing a problem later as it comes on

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**Why Buy a Radon-Resistant Home?**

- Save Money
  - The techniques make your home more energy efficient
  - Average of \$65 annual savings on energy bills
- Upgrading is Easy
  - If levels of Radon are found to be high you can easily install a fan for further reduction

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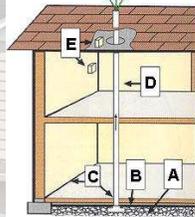
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**What are Radon-Resistant Features in a Home?**

- A. Gas Permeable Layer
- B. Plastic Sheeting
- C. Sealing and Caulking
- D. Vent Pipe
- E. Junction Box



• \*These systems are designed to work together and would be ineffective if implemented as a standalone solution\*

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**What are Radon-Resistant Features in a Home?**

- **A. Gas Permeable Layer:**
- Placed beneath flooring system
- Allows soil gas to move uninhibited below the house
- Typically, a 4in layer of clean gravel
- Only used in casement and slab-on-grade foundations and NOT used with crawlspace foundations



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**What are Radon-Resistant Features in a Home?**

- **B. Plastic Sheeting:**
- Placed on top of gas permeable layer and under the slab
- Does not allow soil gas to enter the home
- Can be used in crawlspaces
- Sheeting is then placed over the CS floor



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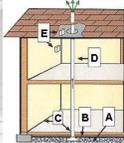
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**What are Radon-Resistant Features in a Home?**

- **C. Sealing and Caulking:**
- Every below-grade opening in the concrete floor of the foundation are sealed
- Reduced soil gas entry into the home



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**What are Radon-Resistant Features in a Home?**

- **D. Vent Pipe:**
  - 3 or 4 inch gas-tight OR PVC pipe (or other gas-tight pipe) is used
  - Runs from gas permeable layer and through the house to the roof
  - Safely vents Radon and other soil gases above the house



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**What are Radon-Resistant Features in a Home?**

- **E. Junction Box:**
  - Electrical Junction Box is included in the attic
  - Makes the wiring and installation of a vent fan an easier process
  - If you decide to activate your system upon elevated levels of Radon (4 pCi/L+)
  - Separate box is placed in the living space for power and an alarm alerts a malfunctioning vent fan



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**RADON AND REAL-ESTATE**

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### Radon and New Construction

The Environmental Protection Agency (EPA) recommends:

- If buying or selling your home to have it tested for Radon
- For new homes you should ask:
  - Were radon-resistant features used?
  - Was the home already tested?
    - What were the results if so?
- Radon levels less than 4pCi/L can pose a risk still
  - In many cases they can be reduced even lower
- Prevent device interference during an active radon test

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### Implications in Real-estate

Radon testing in real estate transactions, which involve multiple parties and financial interests, is unique and specific testing protocols are required.

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### Implications in Real-estate

- In some states, including Illinois, if Radon is known to ever have existed in a home, that information must be disclosed to buyers.
- Many lending institutions may require radon testing.
- Can impact the resale value of a home.
- Sellers may have to address radon issues.
- Some states' Emergency Management Agencies recommend professional Radon testing in all real estate transactions.

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**Resources:**

United States Environmental Protection Agency. (2009, August). The Facts About Radon Gas – It's Deadly.[Video file] Retrieved from <https://www.youtube.com/watch?v=S8vr27plZs>.

Radon | US EPA  
<https://www.epa.gov/radon>

Radon | Environmental Health | Maine DHHS  
<https://www.maine.gov/dhhs/rad/radon/hp-radon>

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**Mini Virtual Quiz Game**

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**MINI VIRTUAL QUIZ GAME**

Question:

Installing a system that will draw the radon-laden soil gas from beneath the foundation and exhaust it outside of the building, far enough away from windows and other openings that will not re-enter.

A. Short-term Radon Testing      B. Long-term Radon Testing      C. Radon Mitigation Systems

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**MINI VIRTUAL QUIZ GAME** 

Question:  
Radon problems cannot fix.



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**MINI VIRTUAL QUIZ GAME** 

Question:  
In mitigating Radon, a qualified contractor is NOT needed.



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**MINI VIRTUAL QUIZ GAME** 

Question:  
There are TWO categories of Radon Testing.



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**MINI VIRTUAL QUIZ GAME** 

Question:  
Which of these is **NOT** a quality of Radon?

A. Invisible    B. Cancer-causing    C. Consists of Calcium Deposits



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**QUESTIONS?**

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