

# RADON 101



# What is radon?

- Radon is a radioactive gas that is colorless, odorless, and tasteless.

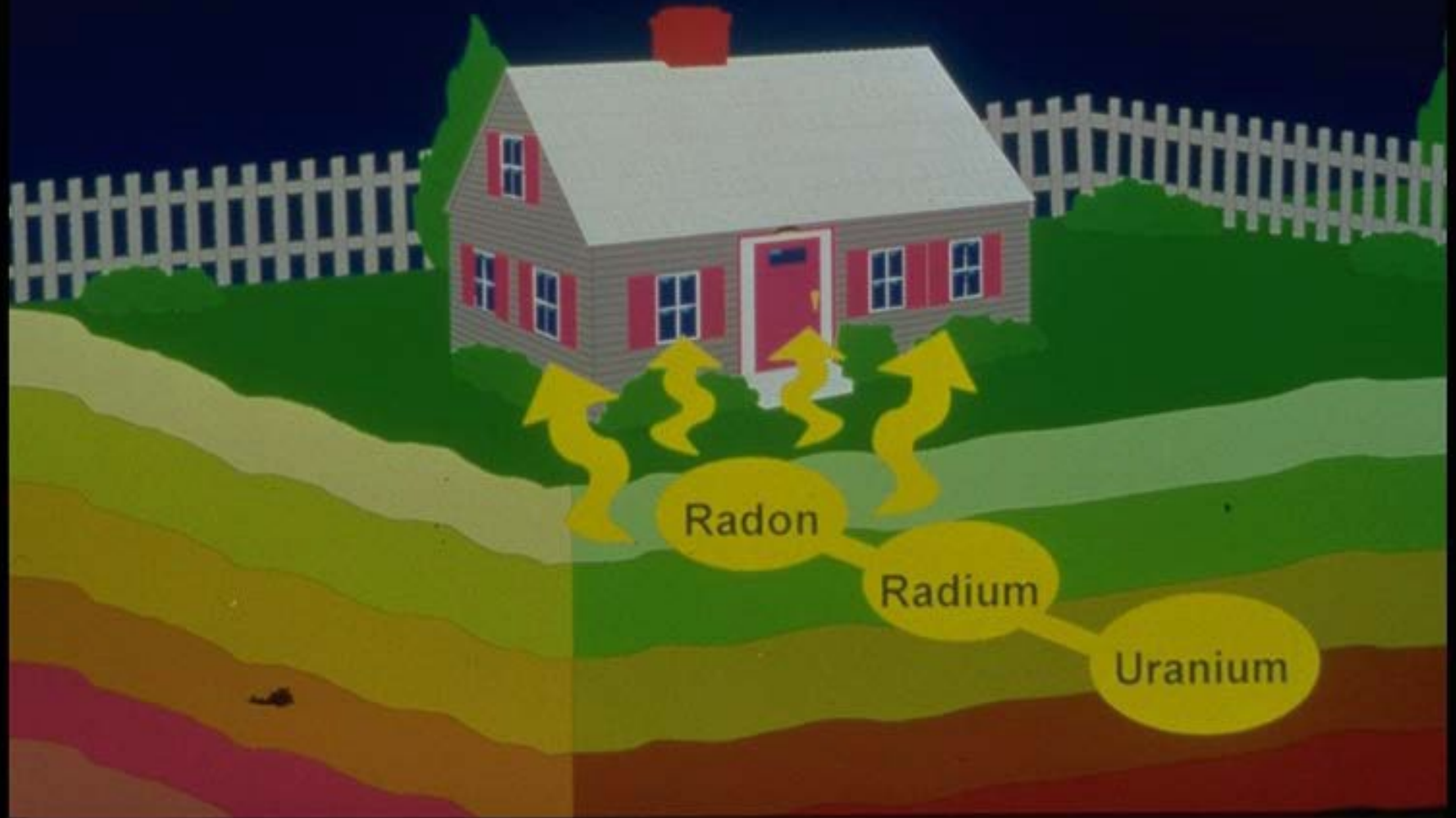


# What is radon?

- Uranium, a radioactive metal, is naturally found in Iowa soils.
- When uranium decays, it turns into radium, a radioactive metal.
- When radium decays, it turns into radon, a radioactive gas.



# Uranium Decay Chart



# Why is radon important?

- Radon is the leading cause of lung cancer in non-smokers.
- Radon is responsible for ~21,000 deaths each year in the United States and ~400 deaths annually in Iowa.



# Why is radon important?

- Iowa has the highest percentage of homes above EPA action level of 4 picocuries per liter (pCi/l).
- As many as 5 in 7 homes in Iowa have radon levels above EPA action level.



# Why is radon important?

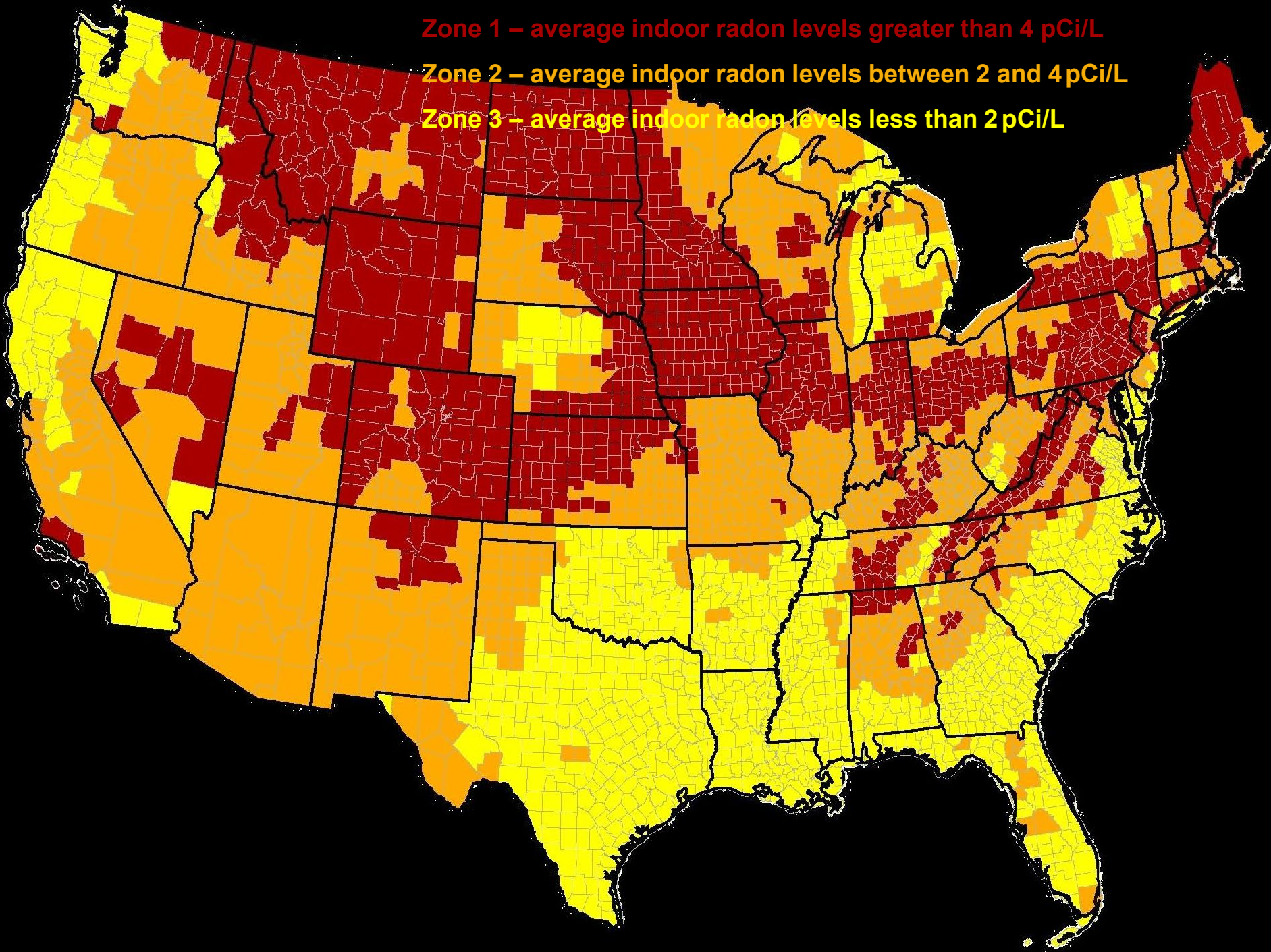
- Iowa's indoor radon average is 8 pCi/l according to the Iowa Department of Public Health.



**Zone 1 – average indoor radon levels greater than 4 pCi/L**

**Zone 2 – average indoor radon levels between 2 and 4 pCi/L**

**Zone 3 – average indoor radon levels less than 2 pCi/L**

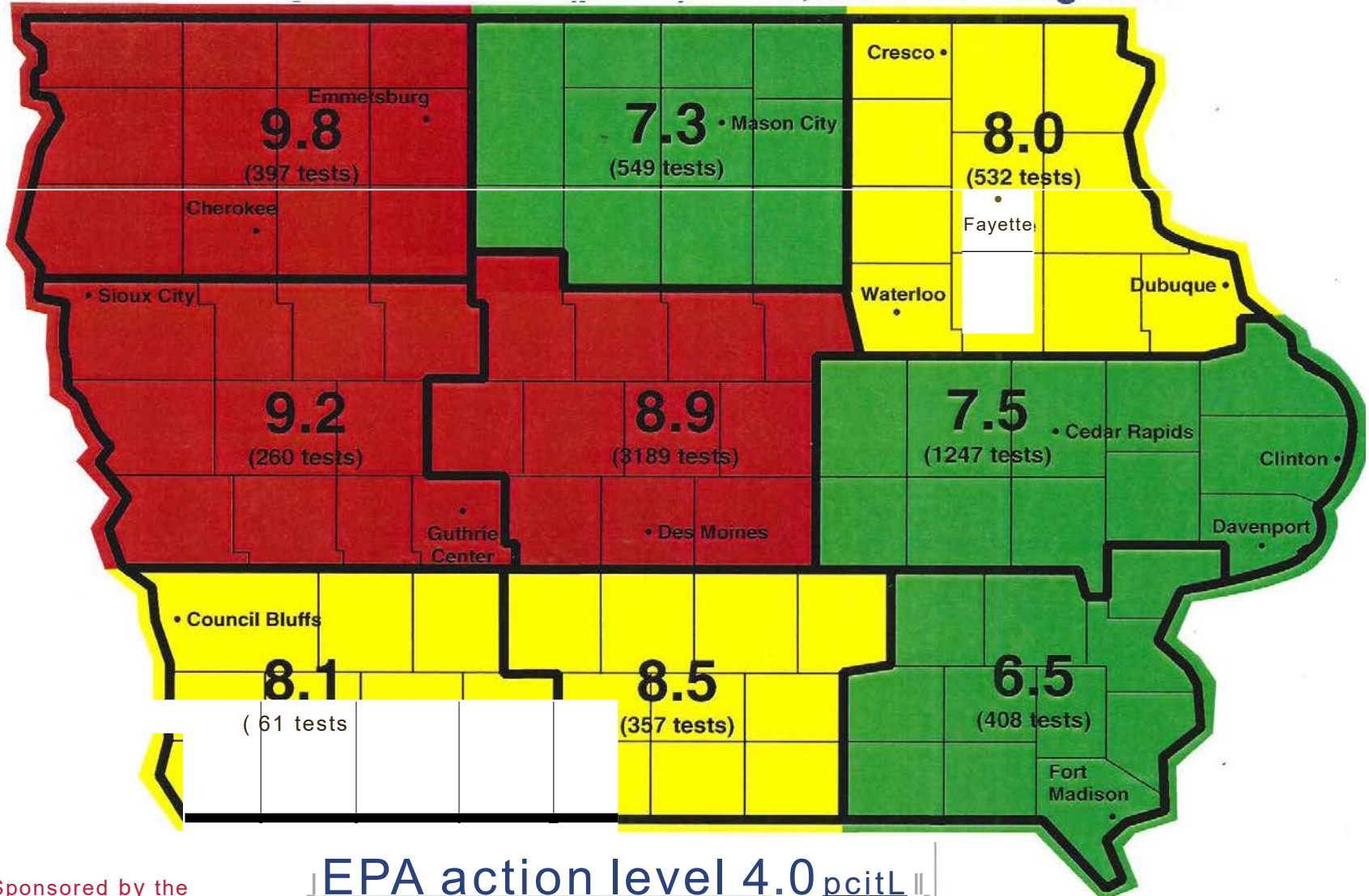




# RADON IN IOWA

Average radon level (pCi/L)

7,100 screening tests



Sponsored by the  
Iowa Radon Coalition

Testing is the only way to know if you and your family are at risk

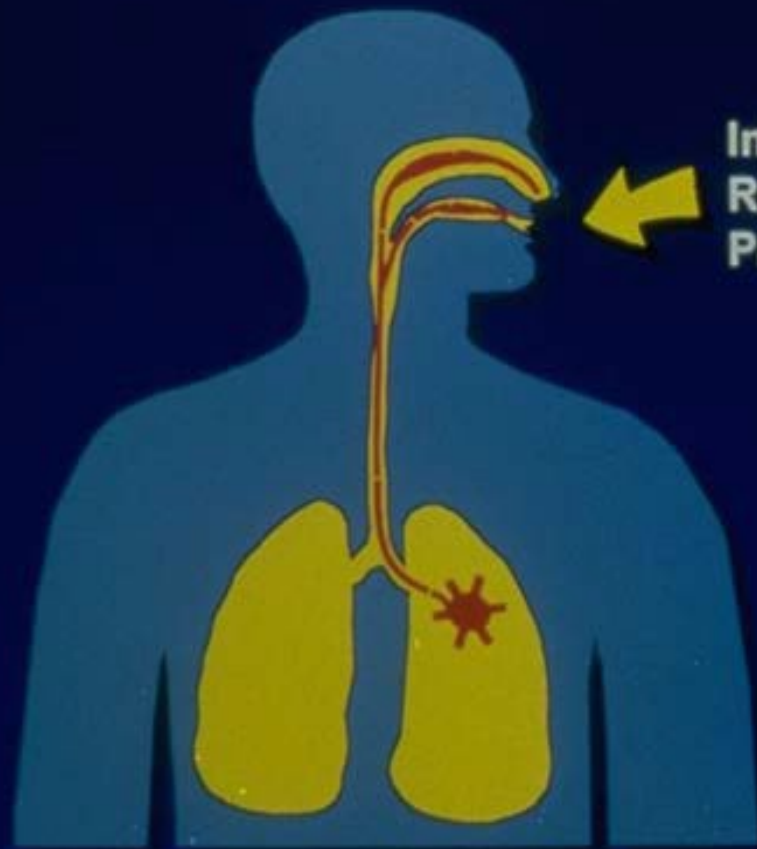


# Health effects of radon

- Radiation emitted from radon enters lungs and causes cellular damage that can lead to cancer.



# How Radon Causes Lung Cancer



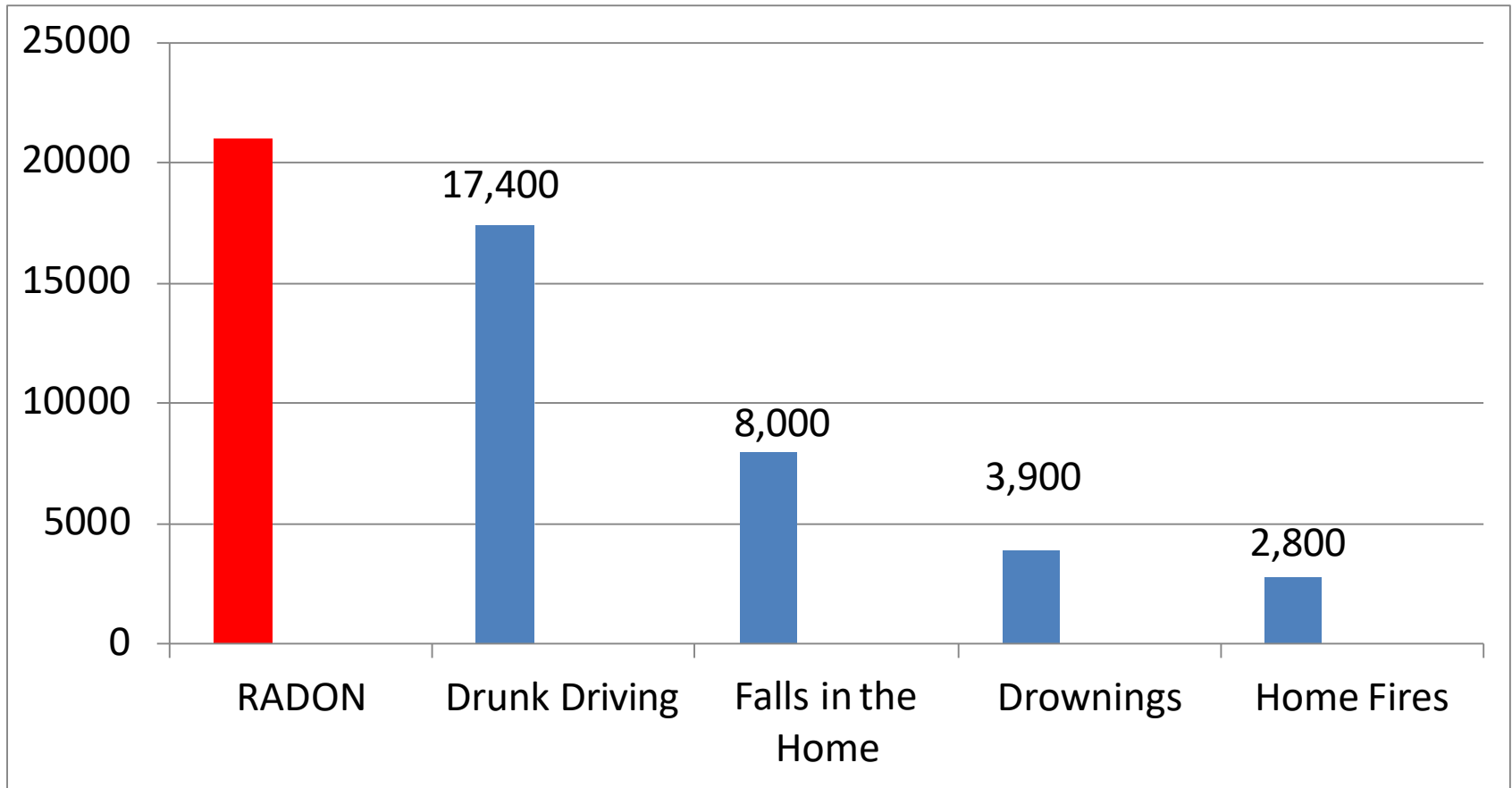
Inhalation of  
Radon Decay  
Products

Alpha  
Particle



Radiation Damage  
to DNA

# # of Deaths Per Year in U.S.



# How does radon enter homes?

- Radon enters homes through cracks and openings in the foundation.
- Radon enters homes through unsealed sump pumps, and concrete cold joints.

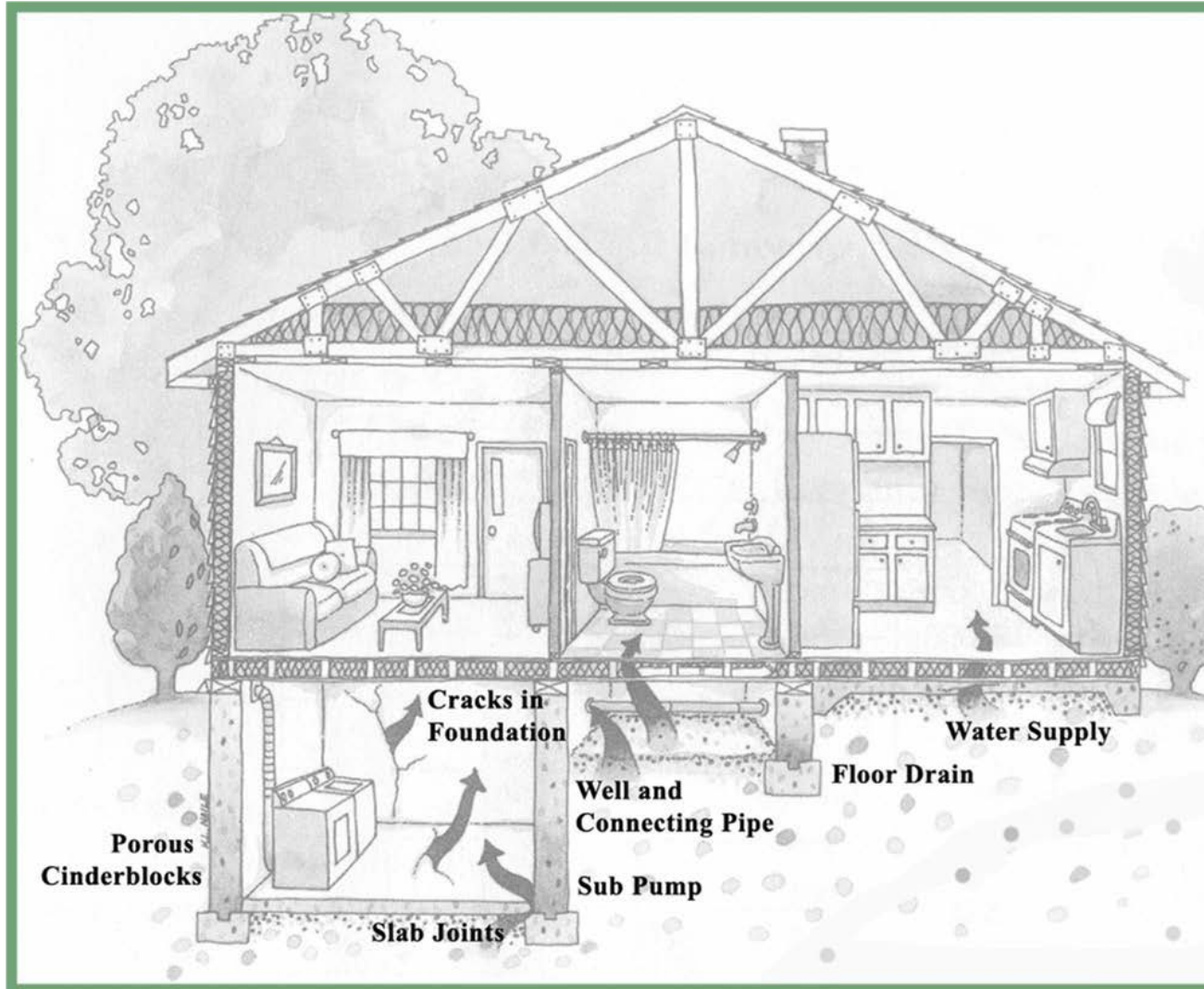


# How does radon enter homes?

- Homes have lower air pressure than the surrounding soil. This creates a vacuum effect allowing radon to enter the home even through hairline cracks.



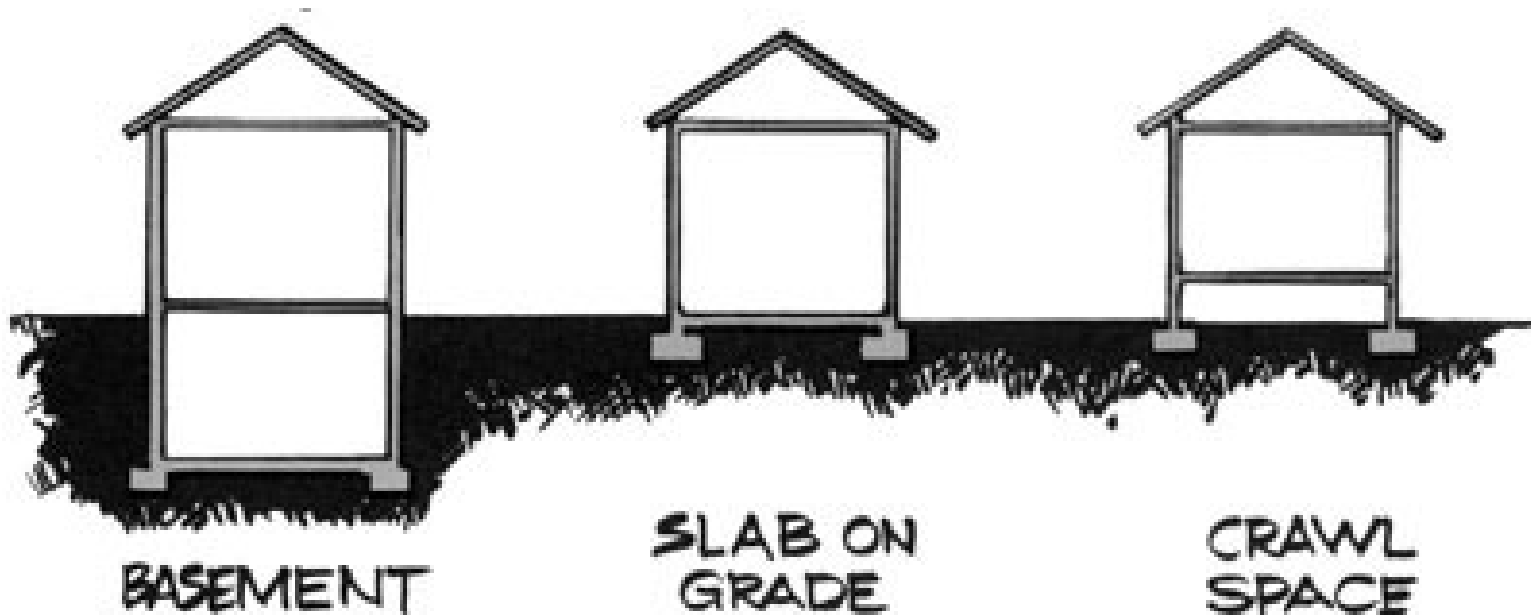
# How Does Radon Enter My Home





# But I Don't Have a Basement

- **ANY** building in **contact** with the ground can have elevated radon levels.



# How does radon enter homes?

- Radon can also enter homes in groundwater. (need 10,000 pCi/L in water to create 1 pCi/L in air)
- Public water supplies in Iowa have not been shown to have radon concentrations high enough to be of concern.



# Testing for Radon

- Testing for radon can be done using do-it-yourself kits or by a certified radon measurement specialist.
- For real-estate transactions, testing should be completed by a certified radon measurement specialist.



# Testing for Radon

- Short-term do-it yourself kits are available for less than \$10 dollars .
- It takes only a few minutes to read instructions and place kit.
- Short-term tests are typically run for 2 to 7 days.



# Testing for Radon

- Long-term test kits are available for less than 30 dollars.
- Long-term kits are typically placed in the home for three months (90 days) to one year.



# Testing for Radon

Test kits may be available for purchase from the following:

- Your local county health department
- Many big box home improvement stores or hardware stores
- The Iowa Radon Hotline at 1-800-383-5992 or at [www.lung.org/radon](http://www.lung.org/radon).



# Testing for Radon

- If you hire someone to test your home they must be certified through the Iowa Department of Public Health.
- A list and interactive map of Iowa certified Radon Measurement Specialists can be found at: [www.idph.iowa.gov/radon/test](http://www.idph.iowa.gov/radon/test)



# Testing for Radon

- Do-it-yourself test kits are easy and should only take a few minutes of your time.
- Read the instructions carefully prior to placing test kit.





# Testing for Radon

- Place the test kit on the lowest part of your home where you regularly spend time. If you don't spend much time in the basement, consider testing the first floor of home.



# Testing for Radon

- Family rooms, dens, and bedrooms are ideal test locations.
- Test kit should be hung from ceiling within the normal breathing zone (2 to 6 feet from floor.)



# Testing for Radon

- Windows and doors should be shut during the time the short-term kit is placed except for normal entry/exit of the home.



# Testing for Radon

- Do not place near a heat source.
- Do not test areas of high humidity such as bathrooms and kitchens.
- Do not place in a draft. Do not operate a fan in the room where a test kit is placed.



# Testing for Radon

- For short-term tests, it is recommended that a second short-term test is run during to verify the first test
- Test in a different season if results are below EPA action level 4 pCi/L.



# Testing for Radon

- For long-term kits, conduct during part or all of winter months to determine highest concentrations of radon in home.



# What do the results mean?

- If results are below the EPA action level 4 pCi/L.
  - Continue to monitor by retesting every 5 years or if building conditions change.
  - EPA recommends considering fixing your home even if level is between 2 and 3.9 pCi/L.



# What do the results mean?

- If results are 2 to 3.9 pCi/l, levels are below EPA action level (4.0 pCi/l).
  - Continue to monitor by retesting every 5 years or if building conditions change.
  - Consider fixing your home at this level.





# What do the results mean?

- If results are 4 pCi/L or higher, conduct a follow up test, either a long-term test or a second short term test:
  - For a better understanding of your year-round average radon level, take a long-term test.
  - If you need results quickly, take a short-term test.



# What do the results mean?

- If you followed up with a long-term test kit and the result is 4 pCi/L, fix your home
- If you followed up with a second short term test the higher your short term results, the more certain you are that you should fix your home. Consider fixing your home if the average of your first and second test is 4 pCi/L or higher.



# What do the results mean?

- If results are 8 pCi/L or above for a short-term test, immediately conduct another short-term test.
- If confirmation results are in this range, actions should be taken to reduce radon levels.



# What do the results mean?

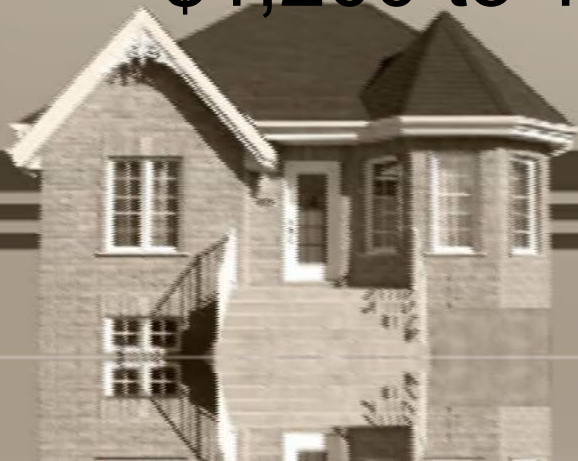
Assessment of Risk from		
	For every 1,000 people exposed to this radon level <sup>1</sup> , about this many will die of lung cancer:	
	never-smokers	smokers
20 pCi/L	36	260
10 pCi/L	8	150
8 pCi/L	15	120
4 pCi/L <sup>2</sup>	7.3	62
2 pCi/L	3.7	32
0.4 pCi/L <sup>3</sup>	0.7	6.4
1.	Assumes lifelong exposure at this level	
2.	Recommended EPA action level.	
3.	Approximate average outdoor radon level.	

- Reducing radon from 20 pCi/L to 2 pCi/L reduces lung cancer death about 90% for both smokers and non-smokers.
- Put another way, it would reduce lung cancer deaths in nonsmokers from 1 in 28 to 1 in 270.
- It would reduce lung cancer deaths in smokers from 1 in 4 to 1 in 31.

\*Mortality estimates in this presentation are from the EPA publication *Assessment of Risk from Radon in Homes* (2003)

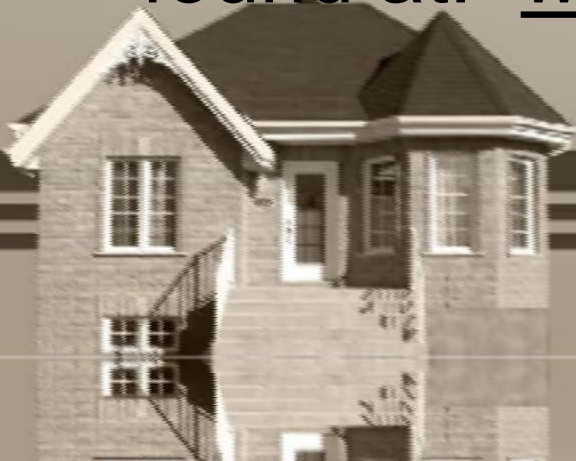
# Reducing Radon Levels

- Since there is no known safe level of radon, there can always be some risk. But the risk can be reduced by lowering the radon level in your home.
- Most homes today can be reduced to 2 pCi/L or below.
- EPA estimates cost of mitigation to be \$1,200 to 1,500.



# Reducing Radon Levels

- Install an active mitigation system.
- Iowa allows homeowners to install, but it is recommended that it be completed by a credentialed radon mitigation specialist.
- A list and interactive map of Iowa credentialed Mitigation Specialists can be found at: [www.idph.iowa.gov/radon/fix](http://www.idph.iowa.gov/radon/fix)



# Radon Mitigation System

- A typical radon mitigation system involves installing a suction pipe through basement floor or sump pump lid, gaining access to soil below.



# Radon Mitigation System

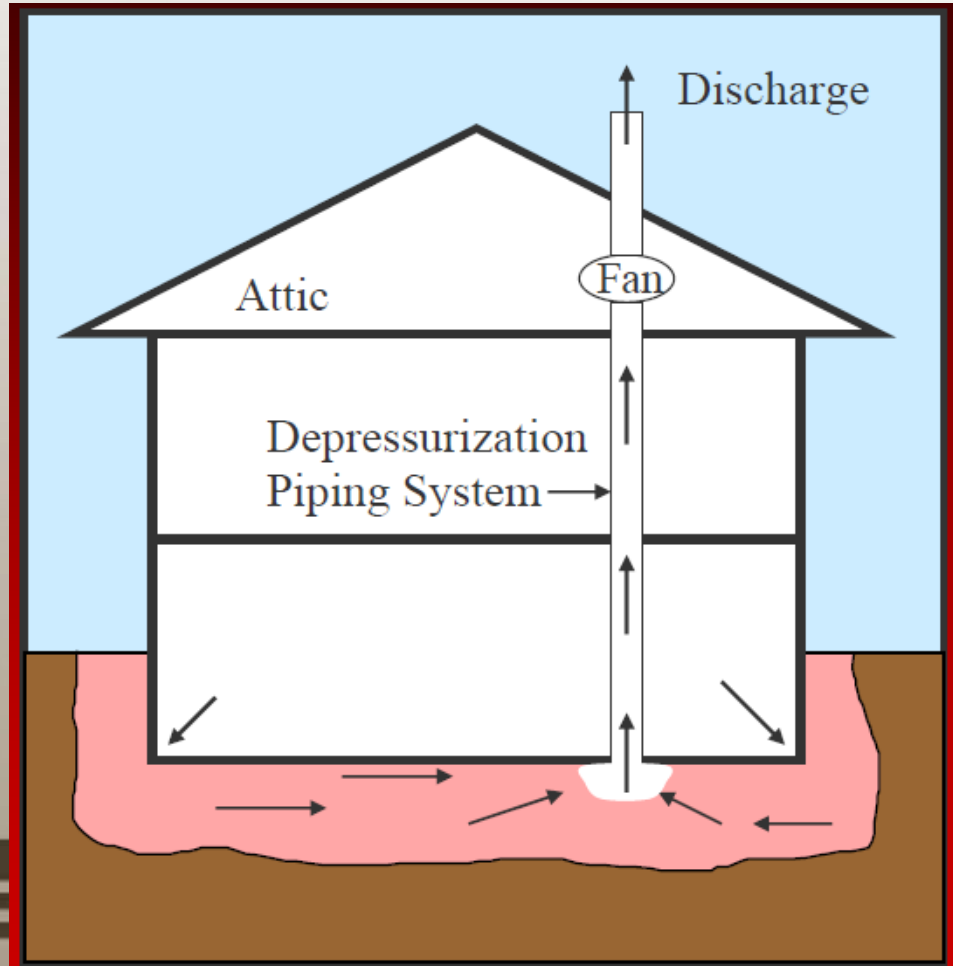
- A constantly running inline fan creates a low pressure zone under the floor drawing radon out and discharging it to the outside air above the eave of the house, where it dissipates harmlessly.





# Radon Mitigation System

Basic mitigation system example



# Reducing Radon Levels

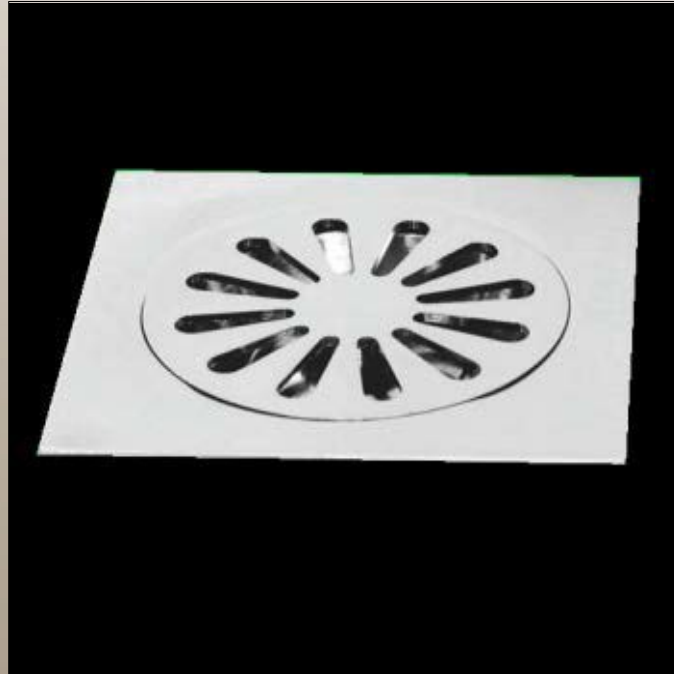
- Seal sump pumps.



Sealed sump pit lids are available in building supply stores. In many cases, installing a sealed sump lid is the most cost-effective radon control measure.

# Reducing Radon Levels

- Ensure basement floor drains are working properly.



# Reducing Radon Levels

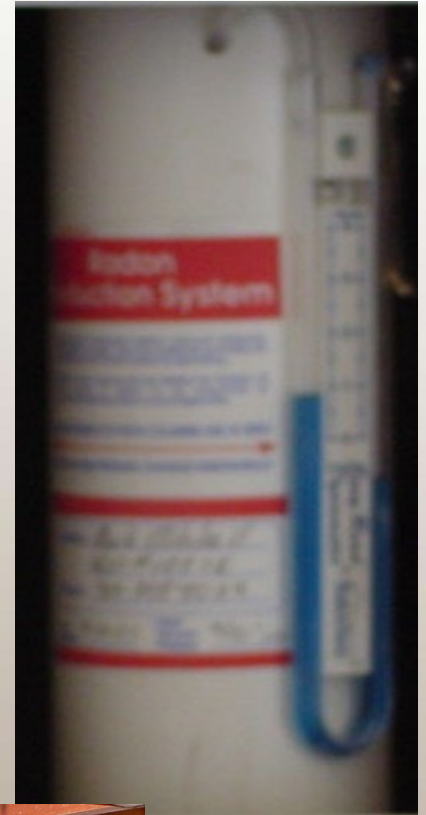
- Seal cracks in basement walls, floor, masonry joints, and floor/wall joints.
- Seal crawl spaces.



# Reducing Mitigation: Inside



This is a component of a  
**Radon Removal System.**  
Do Not alter or disconnect.



# Reducing Mitigation: Outside

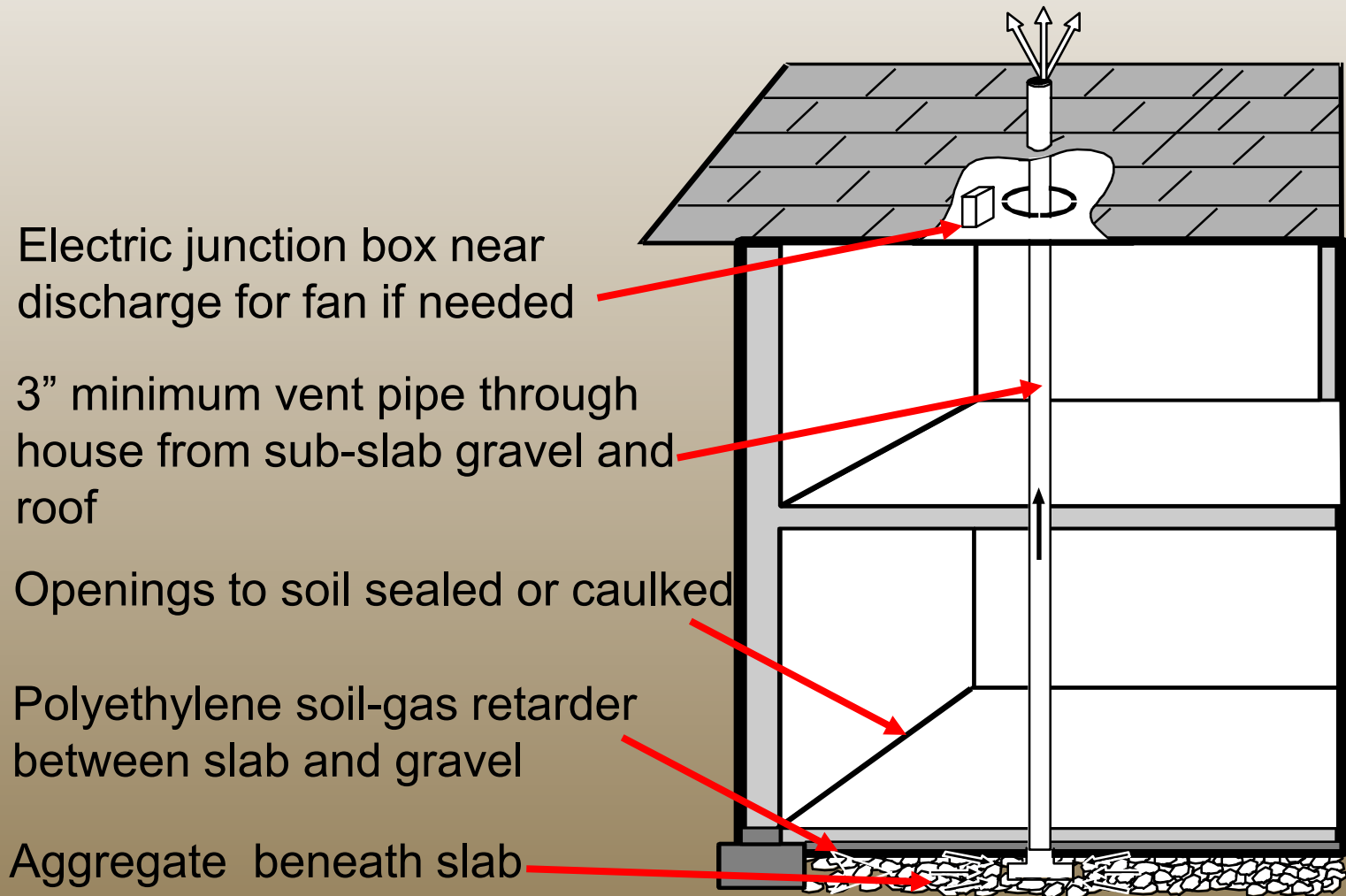


# New Construction

- Passive radon mitigation systems can be added to new homes for a cost of less than \$800.
- Radon Resistant New Construction (RRNC) guidelines can be found on the IDPH or EPA websites.



# Typical RRNC Passive Soil Depressurization (PSD) System



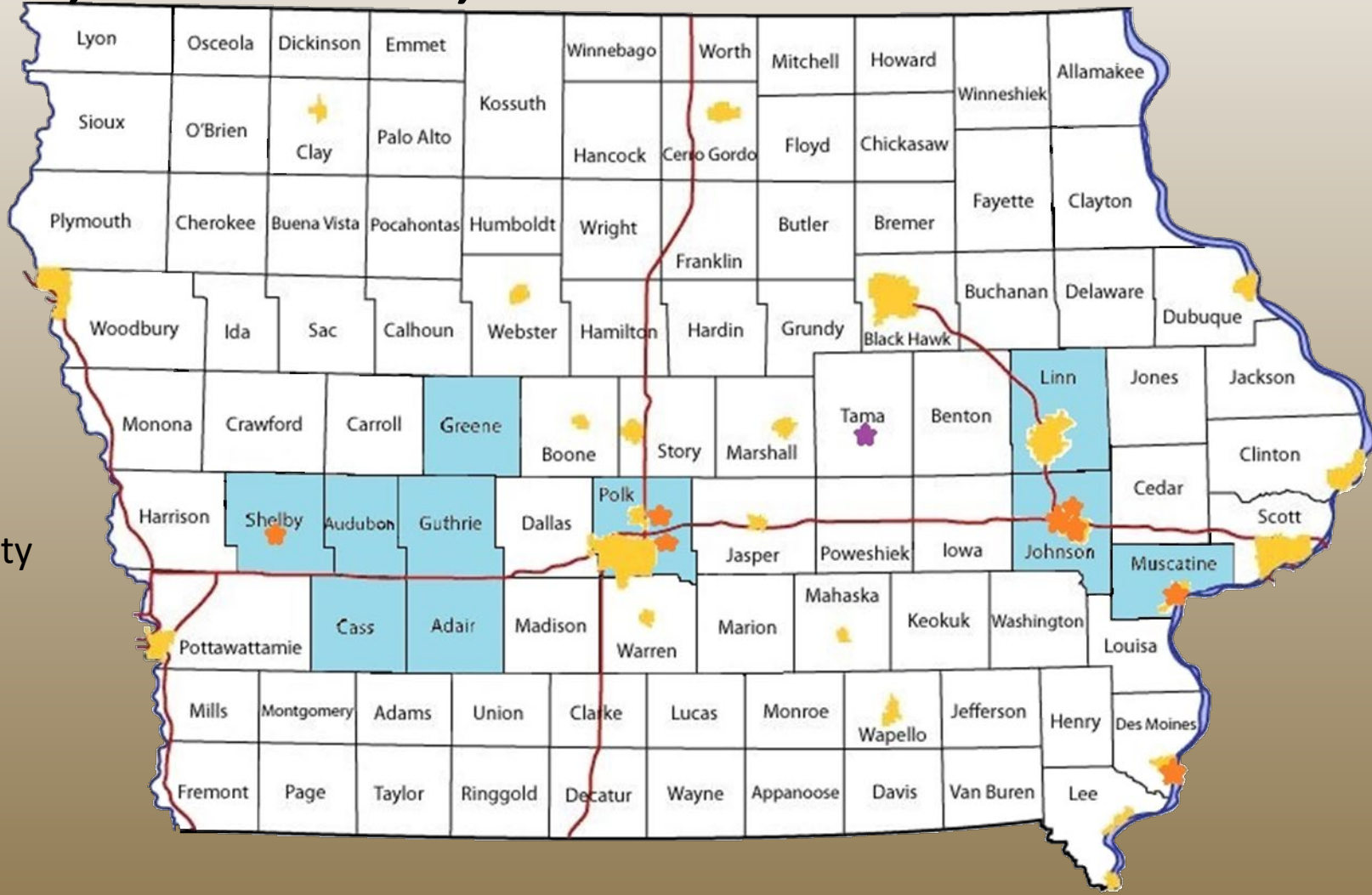


# RRNC Ordinances

RRNC – IRC Appendix F Adoption:

✓ 8 Cities, 10 Counties, Sax & Fox Tribe

- ★ = City
- = County
- ★ = Tribe



# Radon Laws in Iowa

- Anyone who is paid to do radon testing, analyzing, or install mitigation systems must be certified or credentialed by Iowa Department of Public Health (Iowa Code Chapter 136B.)



# Radon Laws in Iowa

- DHS licensed child care centers must be tested for radon within one year of initial licensing and every two years after initial testing. Install mitigation if levels test above 4 pCi/L.



# Radon Laws in Iowa

## Iowa Home Sale Disclosure Law:

- Seller must disclose known testing for radon and the result.
- Seller must provide home buyer an IDPH produced radon fact sheet to make them aware of the potential presence & danger of radon in the home they're considering purchasing.



# Radon Laws in Iowa

- **City of Iowa City**
  - ✓ **July 1, 2021, requires radon testing in all single family detached and duplex rental properties as part of the rental inspection process**
  - ✓ **Radon found to be  $\geq 4$  pCi/L must be mitigated.**



# Questions?

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Website: [ww.idph.iowa.gov/radon](http://ww.idph.iowa.gov/radon)

## **Iowa Radon Hotline: 1-800-383-5992**

- Managed by the American Lung Assoc., can answer general question about radon, radon measurement or mitigation, purchase test kits.
- Website: [www.lung.org/radon](http://www.lung.org/radon)

