

# Radon

## A Community Health Concern



### **Presented by:**

Jacob Persky, CIH  
Intern – Healthy Places Coalition  
Kane County Health Department  
MPH Student – Benedictine University

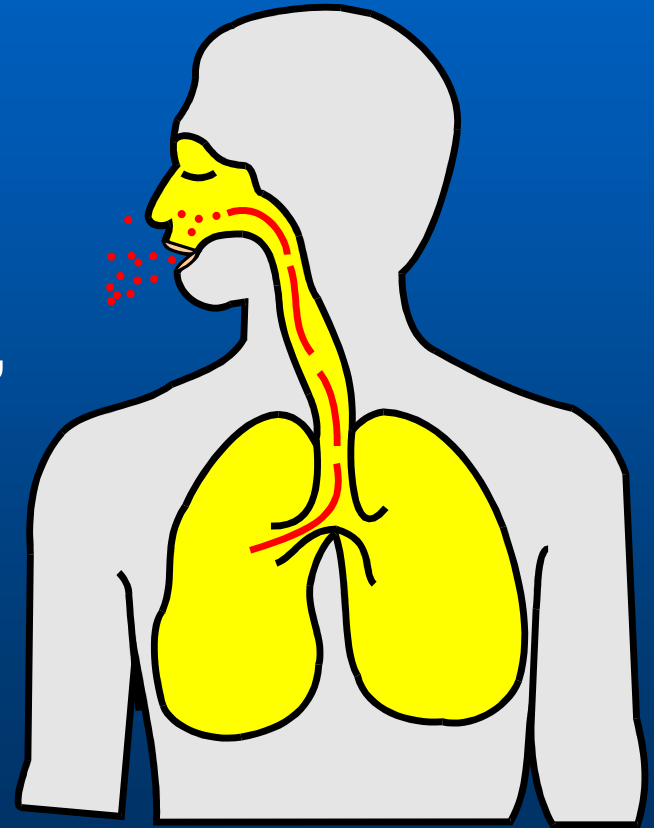
Presentation adapted from IEMA documents publically available at:  
<http://www.state.il.us/iema/radon/availpub.asp>

# What is Radon?

- Radon is an indoor air pollutant.
- Radon is a colorless, odorless radioactive gas that comes from naturally occurring uranium in the soil.
- Radon gas seeps into homes where it can be inhaled.

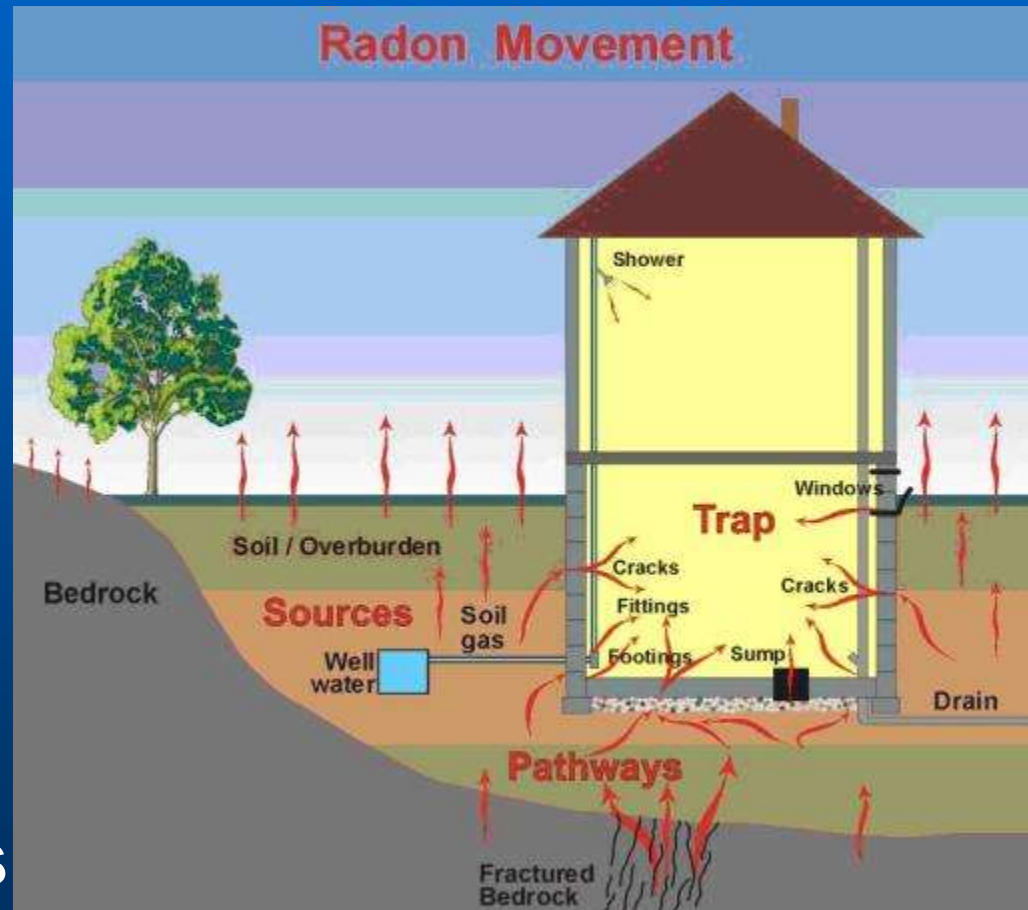
# Radon Exposure

- Radon and Radon Decay Products (RDPs) are breathed in and the Radon is exhaled.
- Because they are solid particles, RDPs remain in lung tissue and are trapped in the bronchial epithelium and emit alpha particles which strike individual lung cells and may cause physical and/or chemical damage to DNA.



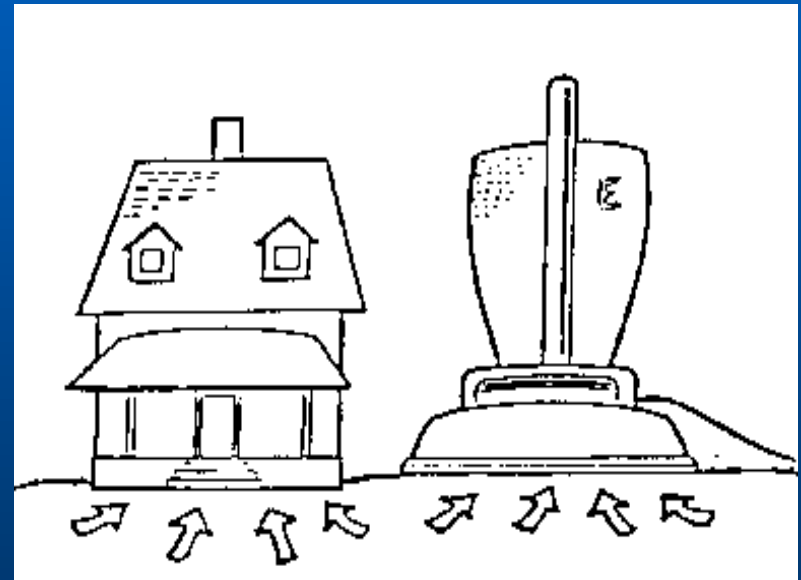
# Common Entry Points

- Foundation Wall Joint
- Crawlspace
- Sump Pits
- Cracks in Floors
- Utility Penetrations

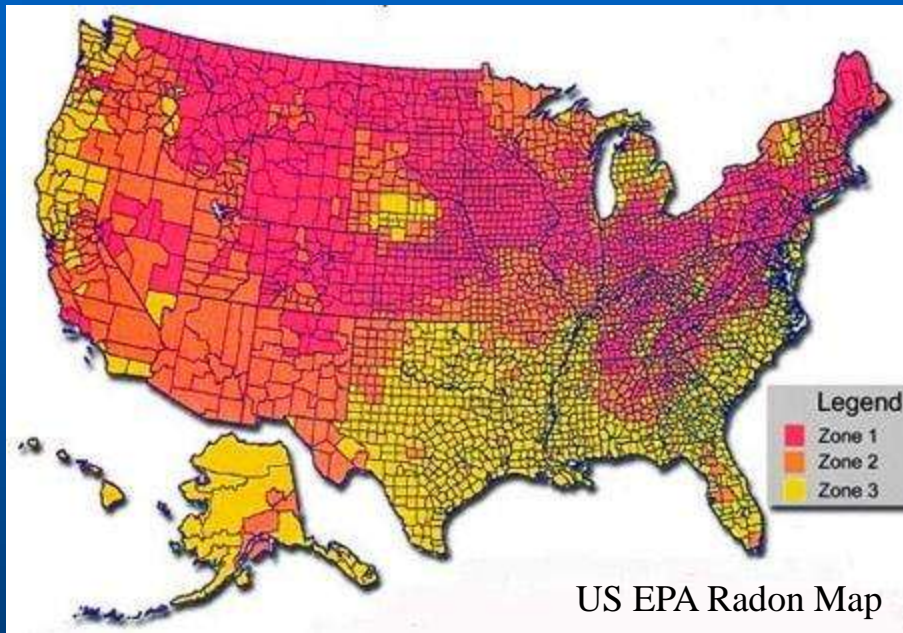


# Pressure Differentials and Radon Entry

- Air pressure differentials between the building and outside air causes radon from the soil to be drawn into the house resulting in elevated indoor radon levels.



# Radon is found everywhere



- Every county in Illinois has had a high radon test
- 36% of the homes according to the Status Report for Radon in Illinois are above the USEPA Action Level.



# Statewide Results from IEMA Professional Licensee measurements

**104,884 Homes Tested**

**37,710 of the homes tested were  $> 4.0$  pCi/L**

**36%** of the homes tests were  $> 4.0$  pCi/L

**Average Radon Concentration 4.4 pCi/L**





# Average Indoor Radon Concentration By zip code in Kane County



Zip Code	Number of homes tested	Number of homes tested $\geq 4$ pCi/L	Percentage of homes $\geq 4$ pCi/L
60110	46	20	43%
60118	64	31	48%
60119	168	62	37%
60120	48	25	52%
60123	176	63	36%
60134	944	149	16%
60136	21	5	24%
60140	27	12	44%
60181	37	20	54%
60174	570	118	21%
60175	602	108	18%
60177	201	53	26%
60505	32	12	38%
60506	294	36	12%
60510	528	124	23%
60511	5	4	80%
60542	212	52	25%
60554	128	56	44%
60568	2	1	50%

**KEY**

**Illinois County by Zip Code**

**% Greater than 4 pCi/L**

- up to 25%
- 25 to 50%
- 50 to 100%

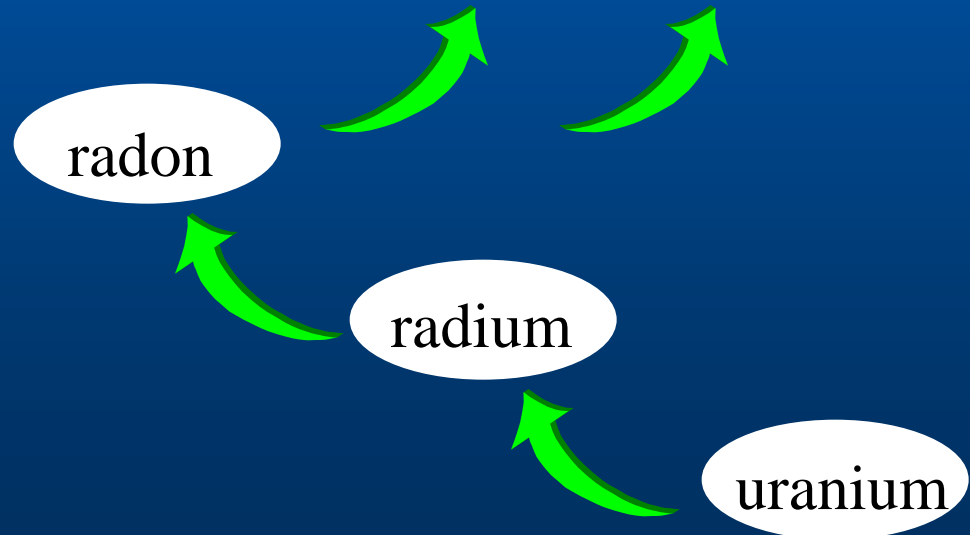
# How did radon originate in Illinois?

- **Glaciers from Canada deposited uranium in the soil.**
- **Radon results from the uranium deposits.**

# Radon Entry



Radon enters through any opening between the building and the soil.



# Abbreviated Uranium-238 Decay Series

**Uranium-238 (solid)**  
*4.47 billion years*



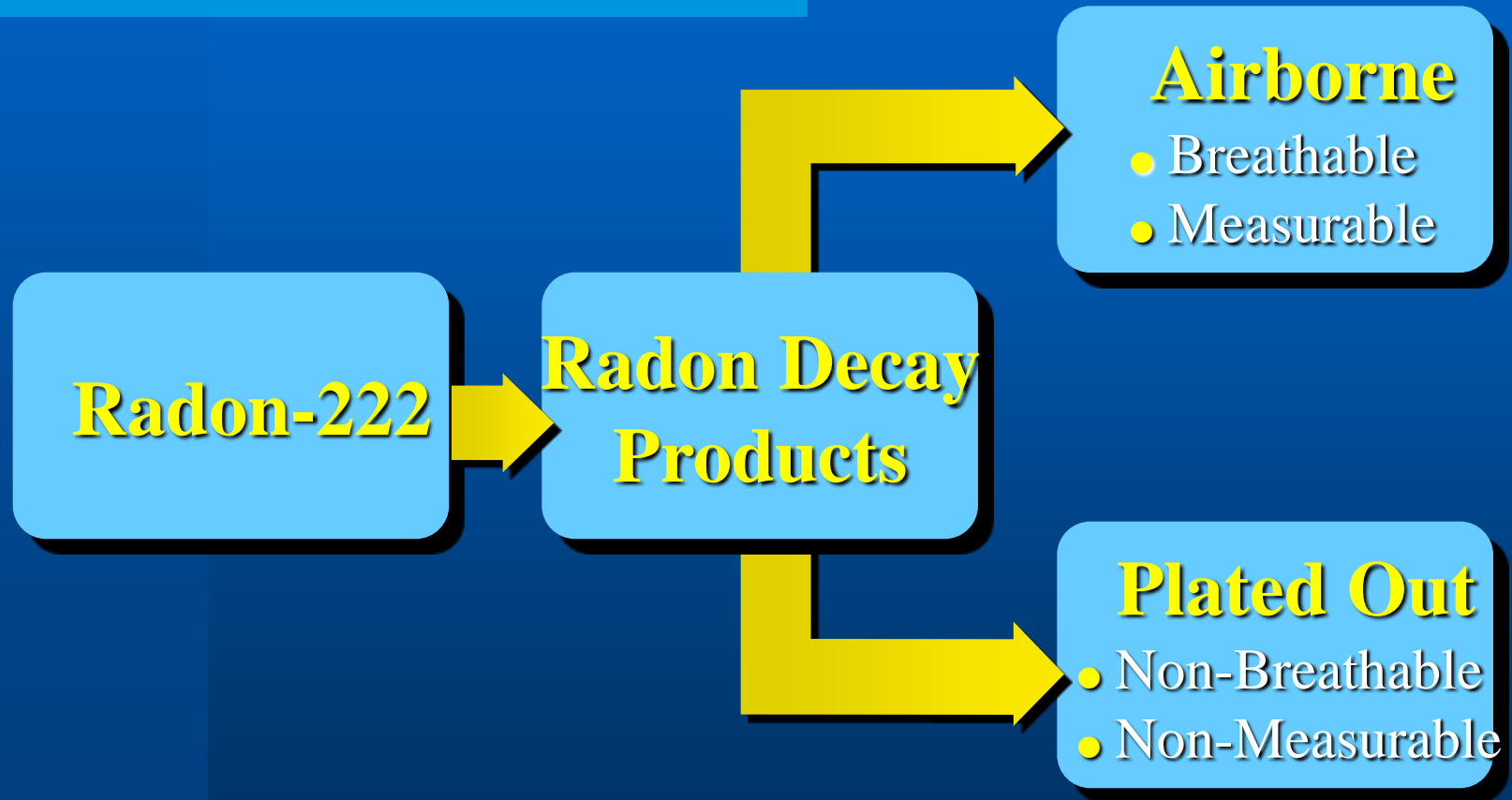
**Radium-226 (solid)**  
*1,620 years*



**Radon-222 (gas)**  
*3.8 days*

- Uranium decays to Radium and then to Radon.
- Uranium and Radium as solids are trapped in soil, but radon gas can move.
- The decay rate is expressed by “half life”.

# Fate of Indoor Radon



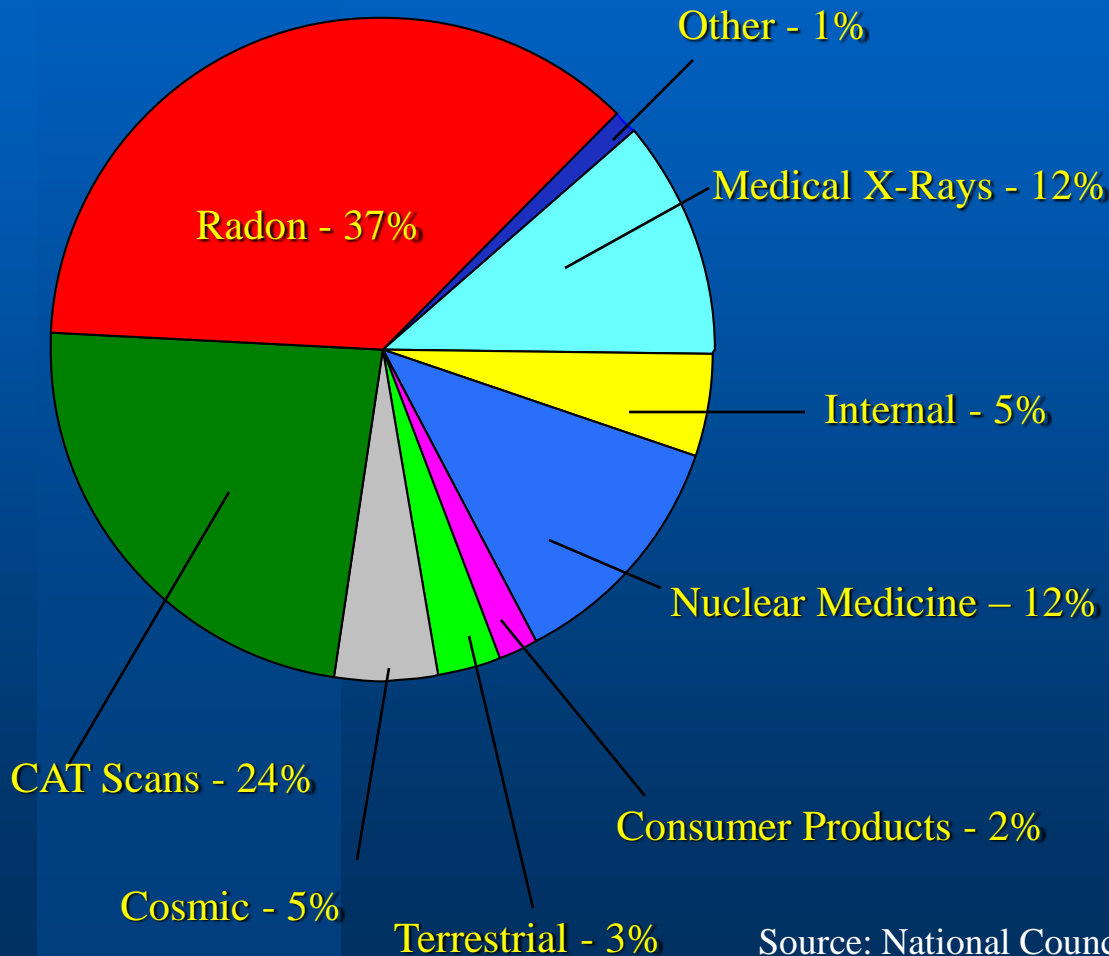
# Radon Risk Estimates

- **USEPA's 2003 Assessment of Risks from Radon in Homes estimates radon causes about 21,000 lung cancer deaths per year.**
- **The Illinois Emergency Management Agency and the USEPA estimate that as many as 1,160 Illinois citizens are at risk of developing radon related lung cancer each year.**

# Surgeon General's Warning

- **“Indoor radon is the second-leading cause of lung cancer in the United States and breathing it over prolonged periods can present a significant health risk to families all over the country.”**

# Sources of Radiation Exposure to US public 2009



- Average Exposure 620 mrem
- Assumes average indoor radon concentration of 1.3 pCi/L.
- Radon is by far the greatest single source of radiation exposure to the general public.

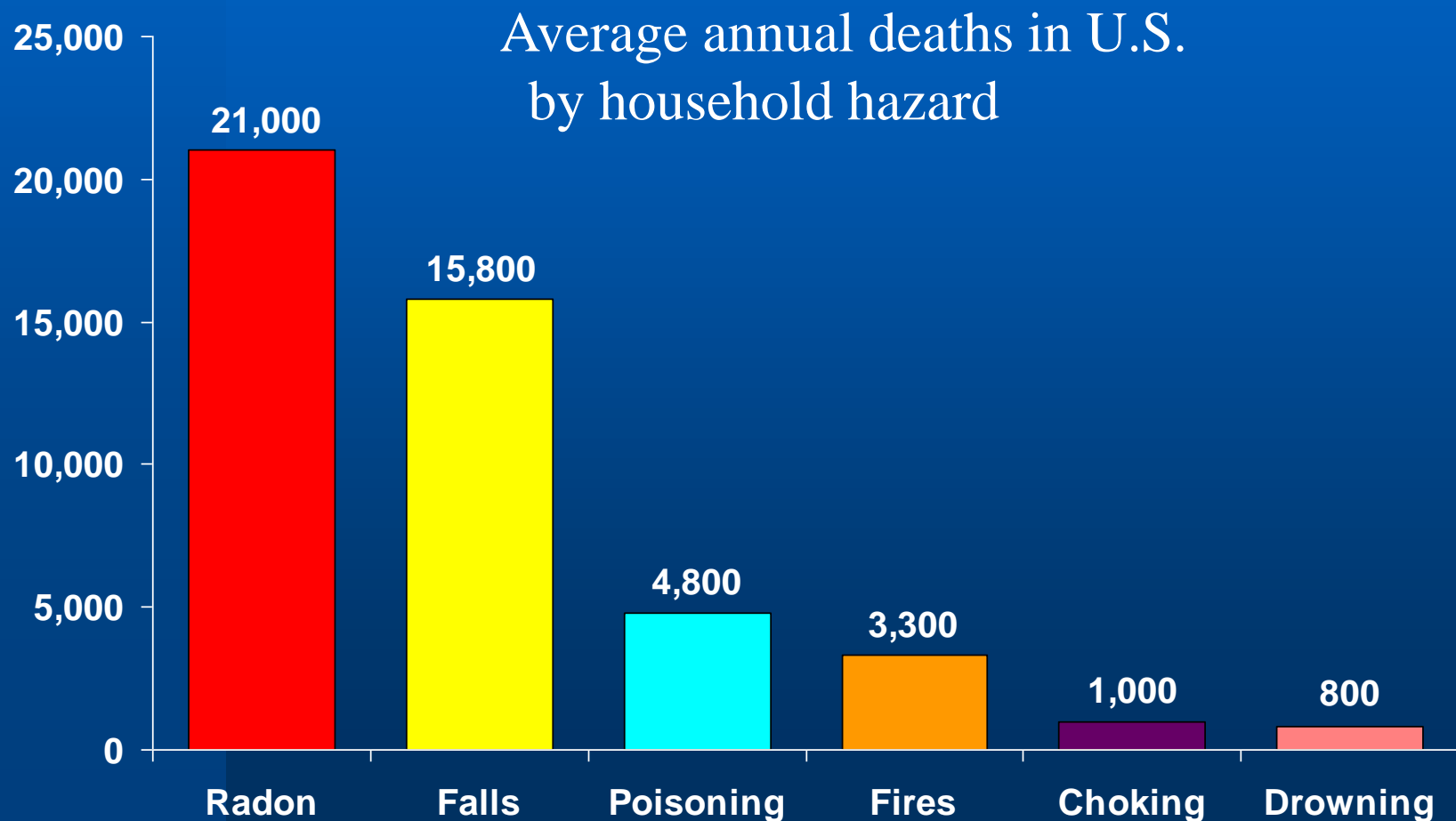
Source: National Council on Radiation Protection (NCRP Report 160)



# Radon Risk in Perspective

- Comparative Risk Assessments by EPA and its Science Advisory Board have consistently ranked Radon among the top four Environmental risks to the Public
- In 1998 Harvard Risk in Perspective, by John Graham, ranked Radon the #1 risk in the Home

# Home Safety Council Risks



# Test!

- **The only way to know the radon level in a building is to test.**
- **Basement, crawl space, slab on grade or foundation combinations can have a radon problem.**

# Who can test?

- The **occupant** of a dwelling may test their own home. Test kits are available from hardware and department stores or directly from laboratories listed on the IEMA website [www.radon.illinois.gov](http://www.radon.illinois.gov).
- If hiring someone to measure radon levels, the individual must be a **licensed professional** by the IEMA Radon Program.

# Rooms to Test

- **Measurements shall be made in rooms that can be regularly occupied by individuals, such as family rooms, living rooms, dens, playrooms and bedrooms.**



# Radon Action Level

- The USEPA set an action level for indoor radon concentration of **4.0 picocuries of radon per liter of air (pCi/L)**.
- USEPA selected **4.0 pCi/L** because of the technological and economical bases.
- Risk at **4.0 pCi/L** about seven (7) people out of a thousand could get lung cancer.\*

***\*A Citizen's Guide to Radon (2005).***

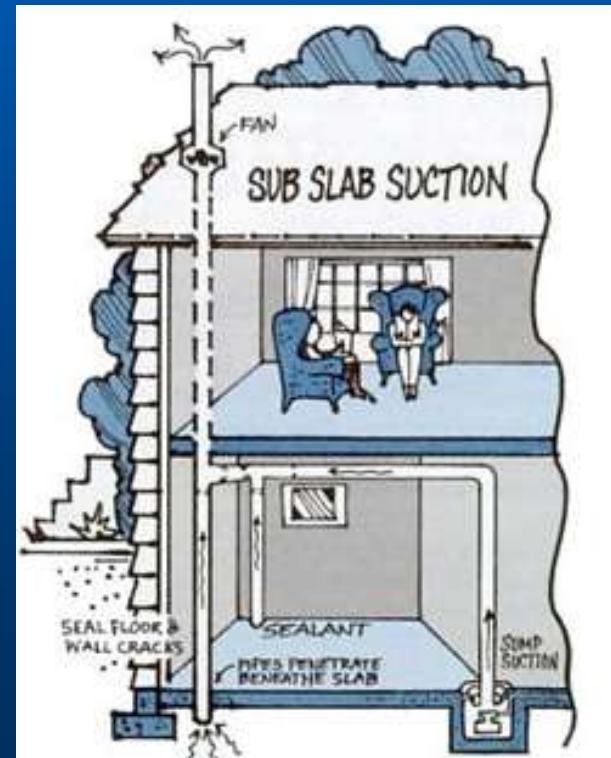
# If Tests Are Above 4.0 pCi/L

- IEMA provides a list of Professional Radon Mitigators trained to reduce radon levels.
- Professional Radon Mitigators and Technicians must meet specific requirements to obtain a license with IEMA.



# Mitigation Systems Reduce Radon by:

- Collecting radon prior to its entry into the building and discharging it above the highest eave.



# Radon Resources

- Patrick Daniels – (217) 782-1325  
[patrick.daniels@illinois.gov](mailto:patrick.daniels@illinois.gov)
- Cindy Ladage – (217) 785-9889  
[cindy.ladage@illinois.gov](mailto:cindy.ladage@illinois.gov)
- [www.radon.illinois.gov](http://www.radon.illinois.gov)
- [http.takeactiononradon.illinois.edu.](http://takeactiononradon.illinois.edu)