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 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.
Average Indoor Radon Concentration by County
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
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 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”.

Uranium-238 (solid)  
4.47 billion years

Radium-226 (solid)  
1,620 years

Radon-222 (gas)  
3.8 days
Fate of Indoor Radon

Radon-222 → Radon Decay Products

Airborne
- Breathable
- Measurable

Plated Out
- Non-Breathable
- Non-Measurable

Radon Decay Products

Non-Breathable
Non-Measurable

Breathable
Measurable
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)
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

Average annual deaths in U.S. by household hazard

- Radon: 21,000
- Falls: 15,800
- Poisoning: 4,800
- Fires: 3,300
- Choking: 1,000
- Drowning: 800
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.
Initial screening

- IEMA recommends first testing with a short term test.
  - Less than 90 days, but usually between 2-7 days.
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
- Cindy Ladage – (217) 785-9889
  cindy.ladage@illinois.gov
- www.radon.illinois.gov
- http.takeactiononradon.illinois.edu.