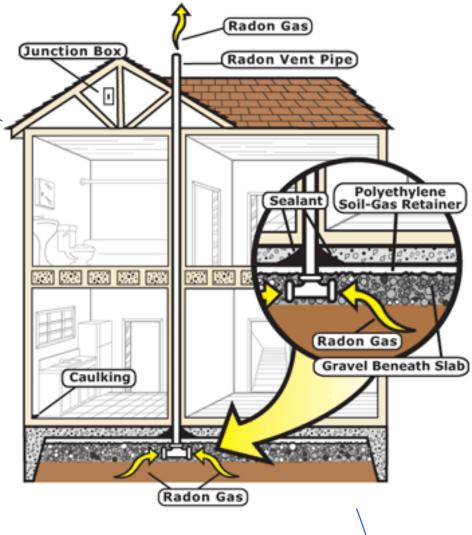
Radon-Resistant New Construction **Basics** for Code **Officials**



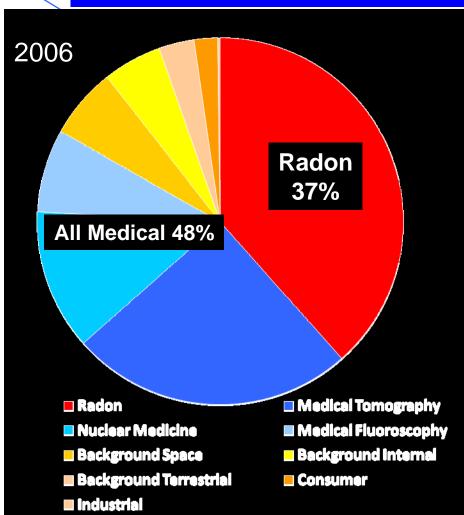




Radon Exposure in Homes Is Significant

Average annual radiation source exposures for US citizens

- **Radon 222 Naturally** Occurring **Radioactive Gas** Element
 - Not Detected by **Human Senses**
 - o Indoor concentrations are created by the way we design, build, and operate buildings where we live, learn, and work







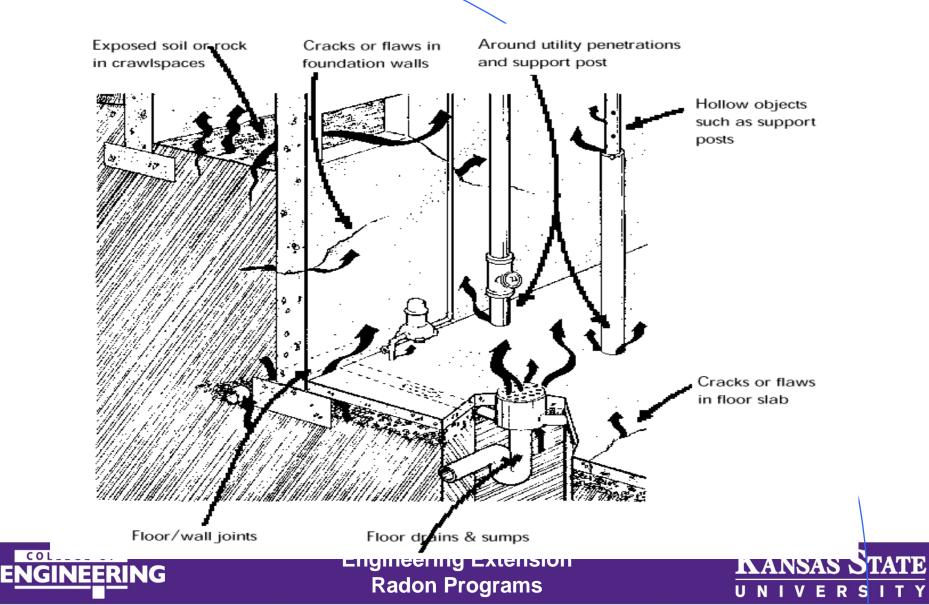
Basic Facts

- Radon is Everywhere!
- The only way to know the radon level is to test it can't be predicted
- Your house may be low, your neighbor's may be high
- 95-99 out of 100 high homes can be fixed with fan powered soil suction systems
- 2nd leading cause of Lung Cancer!



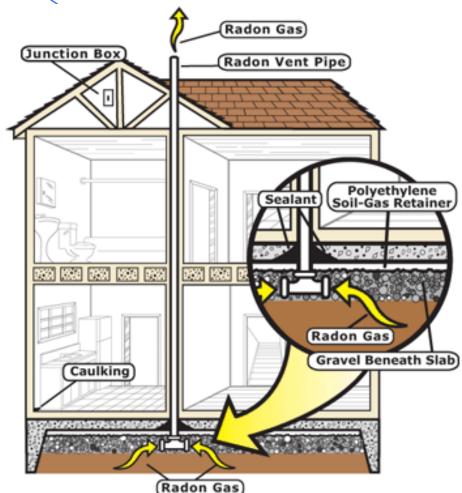


How Radon Enters Your Home



What Does It Take to Build the House Radon Resistant?

- Foundation gas collection system
- Pipe to convey gas through roof
- A closed barrier between soil gas and indoor air
- Provision to add fan if needed

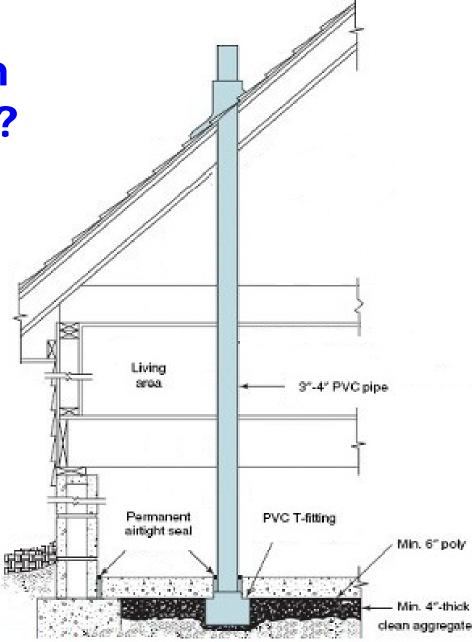






How Is the System Supposed to Work?

- It is designed to vent radon from beneath the structure by use of a vent pipe routed through the conditioned space of a building, connecting the sub-slab area with outdoor air.
- When air in the pipe is more buoyant that outside air, the air escaping the pipe creates a slight vacuum (pressure differential) to pull soil gas towards the outside
- Known as Passive Soil Depressurization - PSD



KANSAS STATE

55 degrees NIVERSITY



Two Major Reasons Passive Soil Depressurization is Used

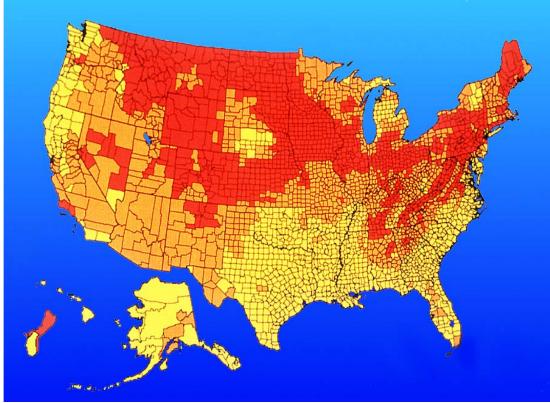
- 1. To reduce indoor radon concentrations
 - In general, about 50% reduction over the course of a year is expected <u>if</u> properly installed
- 2. To make the house easy to fix if further radon reduction is needed
 - By activation with a fan
 - Stack must easily accessible outside conditioned space for fan installation
 - Power must be available near fan
 - Major openings between soil and occupied space must be sealed





International Residential Code (IRC) Appendix F: RRNC (Initially intended for Zone 1) • Adoption is

1993 EPA Radon Zone Map



Adoption is encouraged for all zones as risk has increased since 1993

- EPA Radon Zones
 - Red = High potential
 Zone 1 > 4.0 ave.
 - Orange = Medium potential Zone 2, 2.0 to 4.0
 - ave.Yellow = Low
 - potential Zone 3 < 2.0 ave.





IRC Appendix F: Section 103 Requirements (Overview)

- 1. General
- 2. Subfloor Preparation
- 3. Soil-Gas Retarder
- 4. Entry Routes
- 5. Passive Submembrane Depressurization (PSD) Systems: Crawlspace
- 6. PSD Systems: Basements and Crawlspace

- 7. Vent Pipe Drainage
- 8. Vent Pipe Access
- 9. Vent Pipe Identification
- 10.Combination Foundations
- 11.Building Depressurization
- **12.Power Source**





PSD Can Work But ... It Needs To Be Done Correctly

- If not done correctly . . .
 - May not provide much, if any, radon reduction
 - Can make future activation, if needed, difficult, impractical, or impossible
- It is *highly important* to test all new homes for radon, even those with PSD
 - PSD does not guarantee < 4 pCi/l but . .
 - It does reduce indoor radon and it provides a system ready for activation if needed





RRNC Landscape

- State and local codes can require RRNC for homes in high radon-prone areas but most don't
- IBC needs an RRNC appendix
- IRC needs a better RRNC appendix
- Everyone who touches housing homeowners, tenants, realtors, builders, code officials, radon professionals – has a self interest in RRNC done right the first time





Resources/ Handout for You http://sosradon.org/rrnc

Radon Resistant New Construction (RRNC)

- •Why Consider RRNC?
- •Installing Radon-Resistant Features
- •RRNC What Do I Give My Builder? RRNC Codes and Standards •RRNC Fact Sheets

https://www.epa.gov/radon/building-codes-radon-resistantnew-construction-rrnc

http://www.nehacert.org/CDPHE/ColoRRNCVideo.html

COLLEGE OF ENGINEERING **Engineering Extension Radon Programs**

Building In Radon Control

Radon is a tasteless, colorless and odorless gas

occuring naturally in soil and rock. Radon is a leading cause of lung cancer, second easy pathway for the radon to migrate towards the vent piping, where it only to cigarette smoking Installing a radon system during

construction of a structure doesn't cost a lot, and enhances the value of the property. How a radon system works.

Crushed stone under the house provides an

OPVC Pipe carries radon from under the slab to above the roof. A straight run of piping redu friction losses. Piping MUST NOT be in an exterior wall; interior locations allow the thermal conduction of heat to cause air in the pipe to rise. Attic section needs space for the fan if required. Proper venting requires

Plastic Sheeting

is placed on top of

The plastic is part of

the subslab, and also

Ensure plastic is not punctures during pouring or working of

is a moisture

concrete

blocking layer.

an air barrier between the basement and

the crushed stone.

the pipe to extend above the root Four inch PVC pipe is best for system quietness and efficiency

levels even without a fan, but it may not be enough. A fan may be required. A simple radon test will provide the answer.

needed later.

Electrical Junction

Box in case a radon fan is

NEC requires a plugged fan to be within 6 feet of an outlet. Vent

pipe and junction box placemen O Seal and Caulk all

openings in the concrete floor.

rom being drawn drawn unde

is drawn upwards and released safely into the atmosphere.

Ð

The mitigation system will lower radon



move freely underneath the house. Ô Four to six inches of washed and clean 2B stone is best Important, After the home is occupied, only home owners or state certified radon

A radon test should be preformed immediately after the house is occupied, and a fan installed if results are greater than 4 pC/L.

For further information: IRC 2006 Appendix F, or Pa. Dept. of Environmental Protection, Radon Division, or www.state.pa.us PA Keyword:radon or 1-800-23RADON



Contacts

- Bruce Snead, Kansas State University, Manhattan, KS bsnead@ksu.edu
- Gary Hodgden, Executive Stakeholder Chair for the ANSI/AARST Consortium on National Radon Standards gary@aair.com



