

RADON EXPOSURE

Commission to Study Environmentally- Triggered Chronic Illness

October 23, 2019

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Healthy Homes Radon Program



NH DIVISION OF
Public Health Services

Improving health, preventing disease, reducing costs *for all*
Department of Health and Human Services

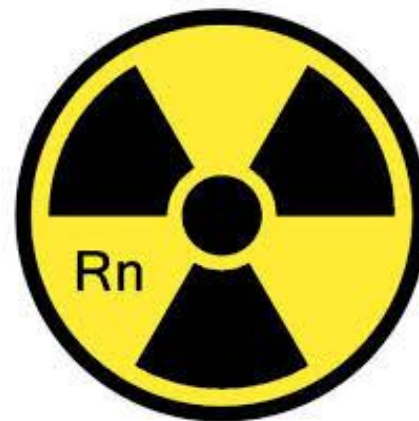
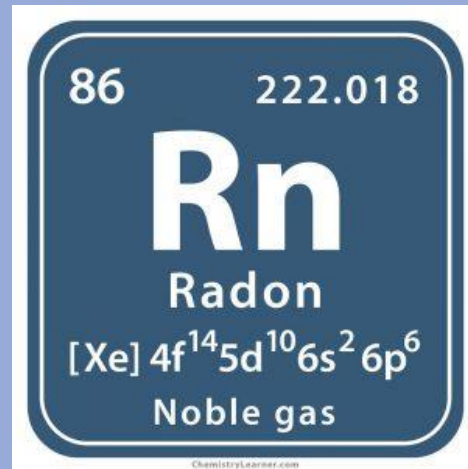


Objectives

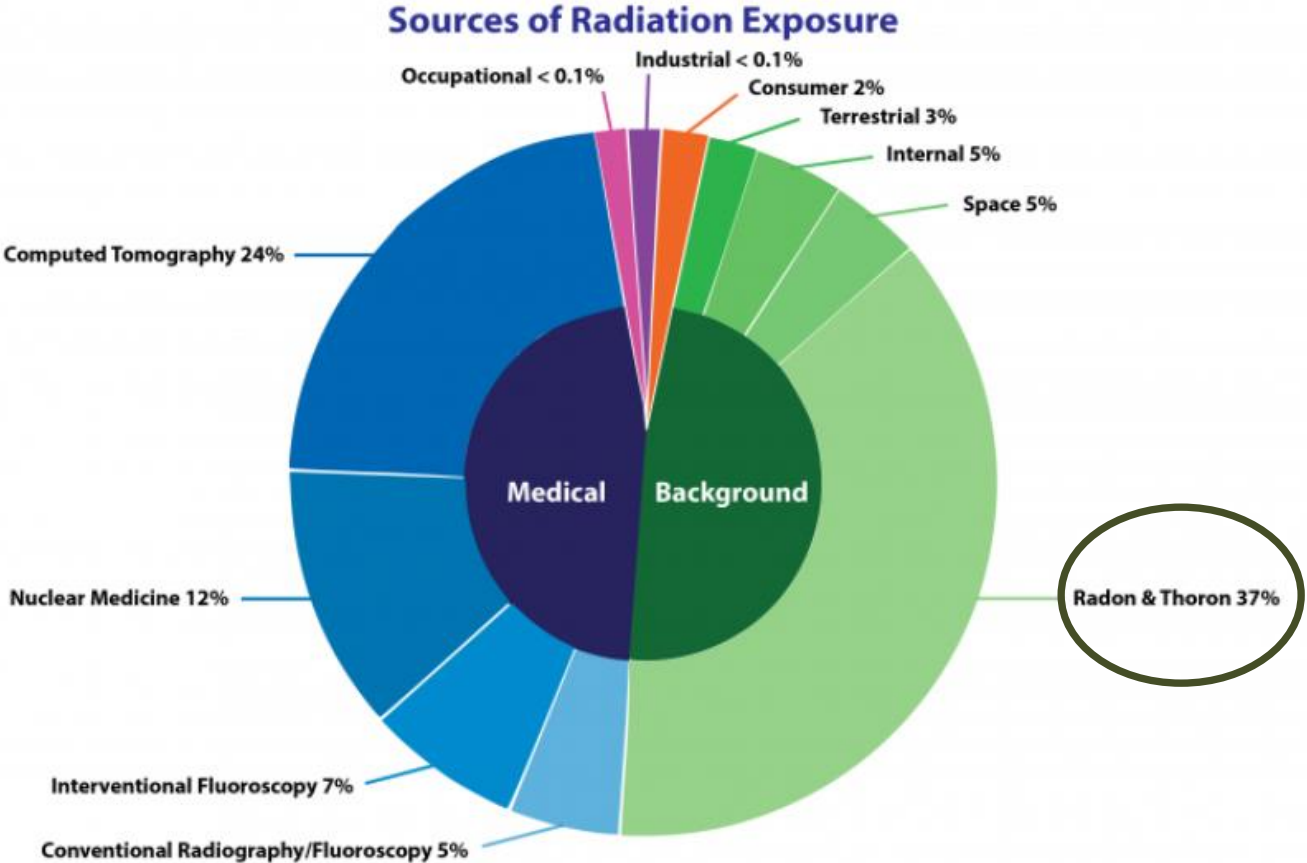
- What is radon?
 - Air and water
- What are the known health risks of radon?
- Where is radon in NH?
- How can I test for radon?
- How is exposure to radon reduced in homes and schools?

Properties of Radon

- Radioactive
 - unstable, it wants to change
- Naturally occurring
 - Always some level of Radon
- Nobel gas
- No odor, no taste, no color
 - Only way to know you have it is to test for it



Radon is the Largest Exposure of Natural Radiation



What are the Health Risks of Radon?

- Lung cancer through inhalation

Surgeon General Health Advisory

“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. It is important to know that this threat is completely preventable. Radon can be detected with a simple test and fixed through well-established venting techniques.”

January 2005

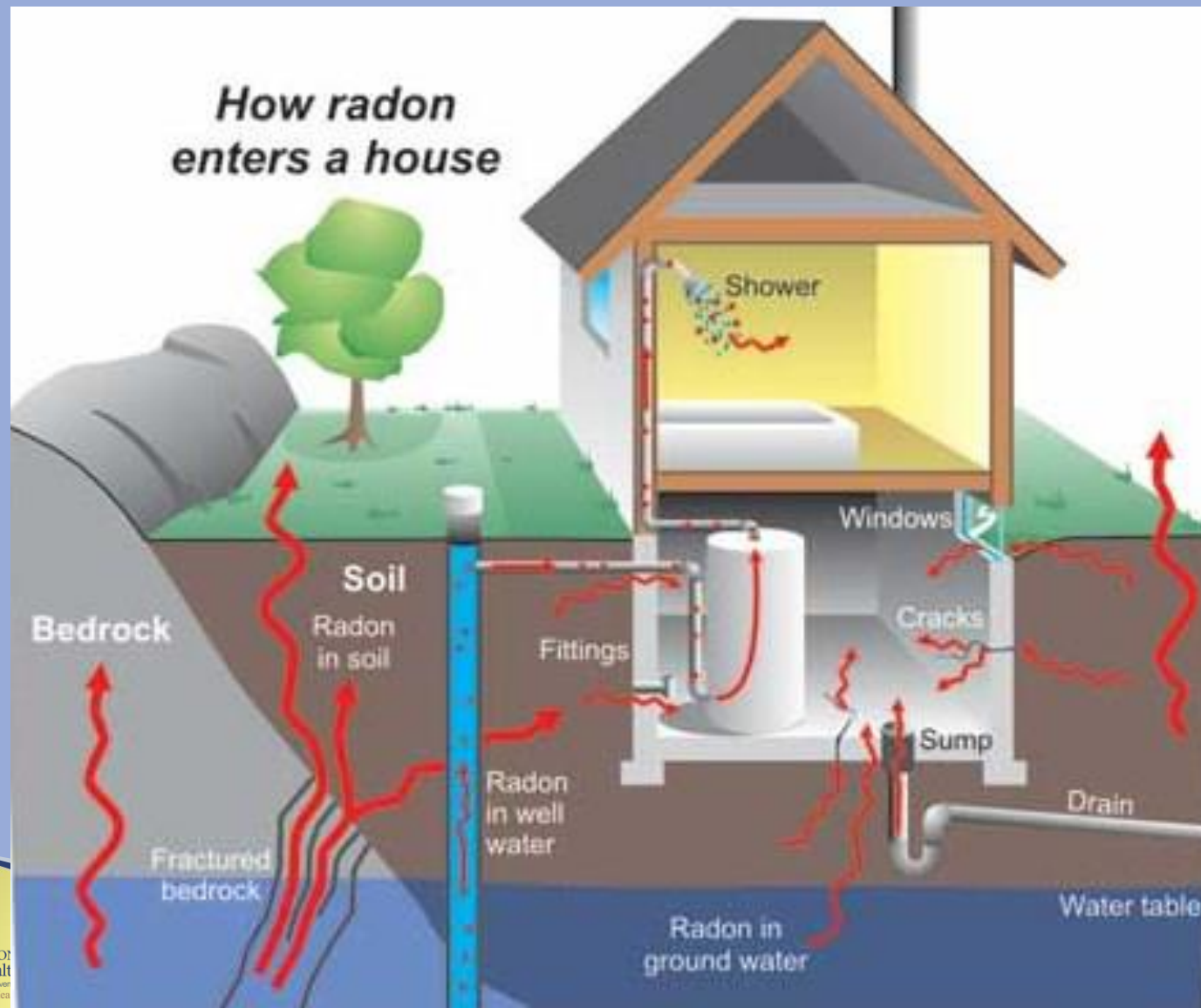
What are the Health Risks of Radon?

- Lung cancer from inhalation of radon
- Stomach cancer through ingestion of water
- Other cancers are being studied

Radon is a Serious National Health Problem

- Environmental Protection Agency
- American Lung Association
- National Academy of Sciences
- World Health Organization
- Health Canada
- Public Health England

How Radon Enters Your Home



Short and Long-Term Testing

- Short term testing
 - 48 hours to 90 days
- Long term testing
 - 91 days or more

Short-Term Testing

● Advantages

- Quick screening method
- Easy to use
- Inexpensive
- No power requirement

● Disadvantages

- Influence by environmental conditions
- Short testing period



Long-Term Testing

● Advantages

- Better “average” radon level
- Environmental conditions not an issue

● Disadvantages

- Takes longer
- Devices can be forgotten about or lost
- Not as good for low concentrations of radon





1028

CONTINUOUS RADON MONITOR

 **SUN NUCLEAR**
corporation

Control panel with six numbered buttons and a small circular button:

- 1 STATUS (with left arrow)
- 2 SETUP (with right arrow)
- 3 AVG (with 'print' and 'EDIT' labels)
- 4 CUR (with 'clear' and 'SAVE' labels)
- 5 ON (with 'PIN' label)
- 6 ALT

 This device complies with FCC Part 15.209. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may be received, including interference from authorized radio communication services.

 This product is made of plastic and is not recyclable in most areas.

 This product is not to be disposed of as unsorted municipal waste.

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MODEL 1028
U.S. PAT. #4,871,914

PC PORT

PRINTER PORT





Testing Protocols

- Duplicate tests required
 - Short term
- 48 hour minimum
 - Short term
- Lowest livable level
- Avoid severe weather
 - Short term
- Low traffic rooms, away from drafts, extreme heat, high humidity, and direct sunlight

Testing Protocols

- If hung from ceiling, hang at least 20” from ceiling
- At least 20” from the floor
- More than 3’ from exterior doors, windows or other openings to the outside
- 12” or more from exterior walls
- At least 4” from other objects such as another testing device

What is the Action Levels for Radon in Air

- 4 picocuries per Liter - 4pCi/L
 - Based on available technology to reduce radon, not just the health risk

Reducing Airborne Radon in Your Home

Active Sub-Slab Depressurization





Reducing Airborne Radon in Large Buildings

HVAC Adjustments / Balancing



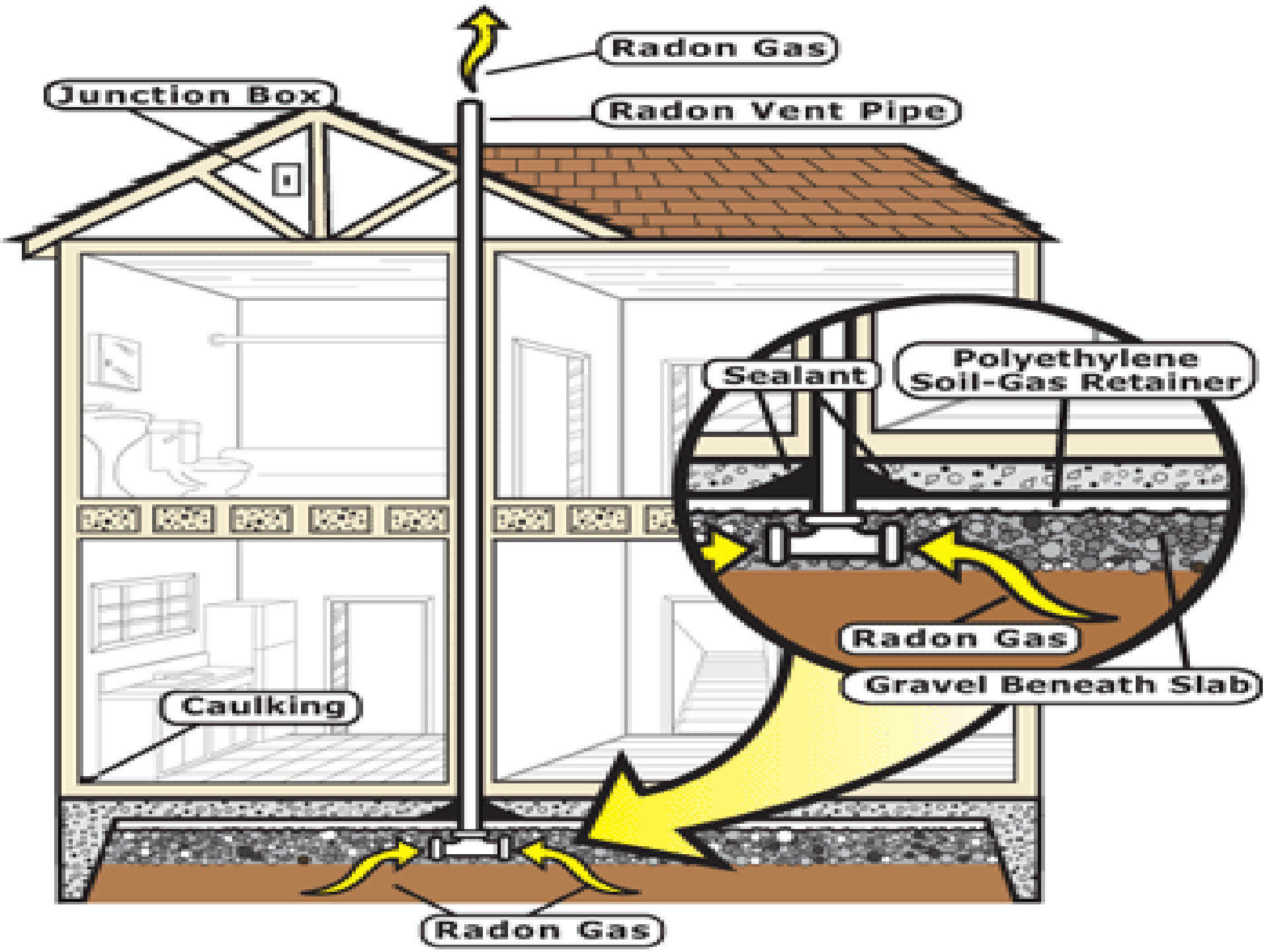


Radon Resistant New Construction

- Most effective way to address radon
- Build in radon resistant and reduction measures
- Still need to test to confirm low radon levels
when home construction is finished

Radon Resistant New Construction

- Radon reduction designed HVAC systems
- 4” layer of gravel under the foundation
- Install vapor barrier
- Passive depressurization system
- Install radon fan if needed



Radon in Water

- Ingestion of radon in water has a much lower health risk
- Inhalation risk from water depends on level of radon in water
- For every 10,000 pCi/L of radon in water about 1 pCi/L gets into air
- Health risk from radon in water is lung cancer (inhalation) and stomach cancer (ingestion)

Radon in Water Advisory (NHDES)

- There are no federal or state standards for radon in drinking water NHDES recommends the following
 - For private wells where radon is $\geq 10,000$ pCi/L, treatment is recommended in conjunction with mitigation of air
 - For private wells where radon is between 2,000-10,000 pCi/L, treatment may be advisable if the air concentration exceeds 4pCi/L

Radon in Water Sample Collection

- Remove aerator and screen from faucet
- Run water for 5 minutes
- Use a glass vial with a Teflon lined septum
- Fill sample vial to just above the top
- Replace cap and avoid having bubbles in the sample
- Mail or take sample to lab



Radon in Water Mitigation

- Aeration
 - Bubbles or sprays water to release radon which is then vented outside above roof of home
- Granular Activate Charcoal (GAC)
 - Traps radon in charcoal (not recommended for high levels of radon due to radioactive build up in filter)





Legislation in Other States

Schools and Childcare

Regulation	CT	D.C.	DE	MA	MD	ME	NJ	NY	PA	RI	VT	NH
School Testing Required	✓						✓			✓		
School Mitigation Required	✓						✓	✓		✓		
School Construction Building Code	✓						✓					
Testing Required for Child Care Facilities					✓		✓			✓		
Mitigation Required for Child Care Facilities					✓		✓					

Radon in Air in New Hampshire Homes

Summary of Radon Testing Behavior in New Hampshire

County	Number of Tests ^b	Number of Elevated Tests ^c	Percent Elevated	Median All Tests (pCi/L)	Median Elevated Tests (pCi/L)
BELKNAP	1,066	166	16%	1.4	6.0
CARROLL	1,418	586	41%	3.0	8.9
CHESHIRE	1,349	204	15%	1.3	6.4
COOS	1,487	585	39%	2.9	9.8
GRAFTON	2,406	521	22%	1.9	6.7
MANCHESTER	278	85	31%	2.5	7.6
MERRIMACK	2,810	631	22%	1.8	7.1
NASHUA	259	90	35%	2.7	7.5
HILLSBOROUGH ^a	5,421	1,727	32%	2.4	7.2
ROCKINGHAM	5,660	2,026	36%	2.7	7.3
STRAFFORD	2,347	960	41%	3.0	7.7
SULLIVAN	975	114	12%	1.3	5.9

^aEstimates for Hillsborough County exclude Manchester and Nashua.

^bRadon data accessed through cooperation with DES 1988-2011 (n=25,476).

^cElevated tests are defined as those greater than the EPA recommended level (4.0 pCi/L).

Source: <https://wisdom.dhhs.nh.gov/EPHT>

Elevated Radon in Homes Across NH
(1988-2011; n=25,476)

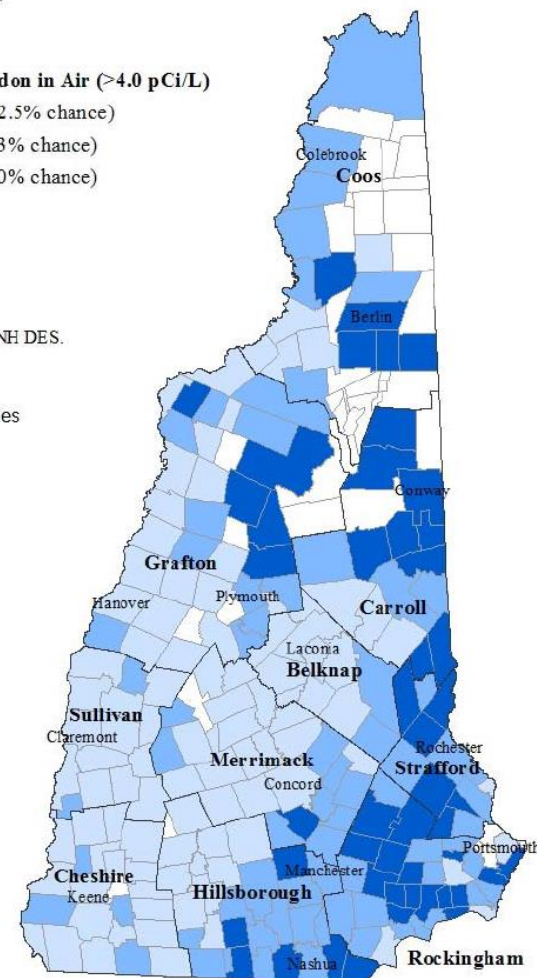
Probability of Elevated Radon in Air (>4.0 pCi/L)

- 1 in 8 homes tested (12.5% chance)
- 1 in 3 homes tested (33% chance)
- 1 in 2 homes tested (50% chance)

- No Data
- County

Source: Radon data provided by NH DES.
Map created by NH EPHT.
December 2015.

0 5 10 20 30 40 Miles



Radon in Schools Historical Data

- Historical school radon data from 2006-2011 via NHDES Radon Program
- Voluntary air radon testing data from 19 NH schools in 15 different towns. 5 schools tested have closed since the testing
- Multiple rooms in each school tested, focused on basement or ground level rooms that are occupied on regular basis
- NHDES followed up with each school by issuing a Radon
- Report with information on the hourly and average radon levels for each room, suggested possible mitigation actions and retesting if results were above 4 pCi/L

Radon in Schools Historical Data

- 208 rooms tested in 14 schools
- 12 rooms had elevated average radon levels
- 6% of all school rooms tested were at or above the EPA Action Level for radon of 4 pCi/L
- 21% of schools tested had at least one room above the EPA Action Level for radon of 4 pCi/L

Radon in Schools Historical Data

Town	# of Schools Tested	# of Rooms Tested	# of Rooms with Average Radon Levels > 4 pCi/L ^a	Highest Room Average Radon Conc (pCi/L)
Alton	1	10	0	1.3
Brentwood	1	12	0	1.7
Freedom	1	11	3	4.8
Hanover	1	18	0	2.6
Hillsborough-Deering	1	26	0	2.3
Hopkinton	1	8	0	0.4
Keene	3	46	0	2.9
Laconia	1	15	8	17.7
Lyme	1	17	0	2.6
Lyndeborough	1	13	1	9.9
Pelham	1	17	0	0.9
Wilton	1	15	0	1.8
Total	14	208	12	--

Notes:

School Radon data collected and analyzed from 2006-2011 by NHDES.

*Unknown at this time whether mitigation efforts were pursued after this testing

What are the Key Takeaways?

- Radon is naturally-occurring radioactive gas
- Radon is the second leading cause of lung cancer
- Radon exposure can be reduced
- The only way to know if radon is present is to test

Questions?

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