MCLB ALBANY TOWNHALL MEETING

Radon Information Town Hall

Agenda: 23 March 2023

1. Background and results-Col Fitzgerald, Commanding Officer, MCLB Albany
2. What is Radon-LT Bauernfeind PhD., Radiation Health Officer, Kings Bay
3. Radon Health-CDR (Dr.) Abitria MD., Occupational Health, Kings Bay
4. Mitigation and Way-Ahead, Mr. Elias Rollie-Harvens, Director, Installations and Environment, MCLB Albany
5. Closing- Col Fitzgerald, Commanding Officer, MCLB Albany

RADON EXPOSURE AND ASSOCIATED MEDICAL RISKS

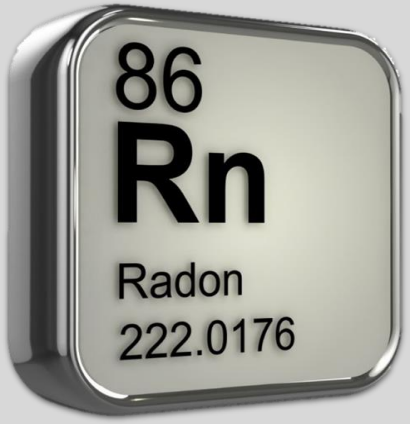
United States Marine Corps Logistics Base Albany Georgia

23 March 2023

Overview

- What is Radon and where does it come from?
- Associated Radon Exposure Limits
- Medical Risks Associated with Radon
- How to Mitigate Radon Exposure

What is Radon?



Radon is a highly radioactive, naturally occurring, colorless, odorless gas.

According to the EPA, radon gas is approximately 7.5 times heavier than air and influenced by changes in pressure and air flow.

What is Radon?

- Reported in activity per volume → .
- Activity = disintegrations per second. (Clicks heard on a detectors. Curies or Ci is the unit for activity.

- A quantitative measurement of potency.

Amount	Multiples and submultiples	Prefixes	Symbols
1,000,000,000,000,000,000	10^{18}	exa	E
1,000,000,000,000,000	10^{15}	peta	P
1,000,000,000,000	10^{12}	tera	T
1,000,000,000	10^{9}	giga	G
1,000,000	10^{6}	mega	M[a]
1,000	10^{3}	kilo	k[a]
100	10^{2}	hecto	h
10	10	deka	da
0.1	10^{-1}	deci	d
0.01	10^{-2}	centi	c[a]
0.001	10^{-3}	milli	m[a]
0.000,001	10^{-6}	micro	μ[a]
0.000,000,001	10^{-9}	nano	n
0.000,000,000,001	10^{-12}	pico	p
0.000,000,000,000,001	10^{-15}	femto	f
0.000,000,000,000,000,001	10^{-18}	atto	a

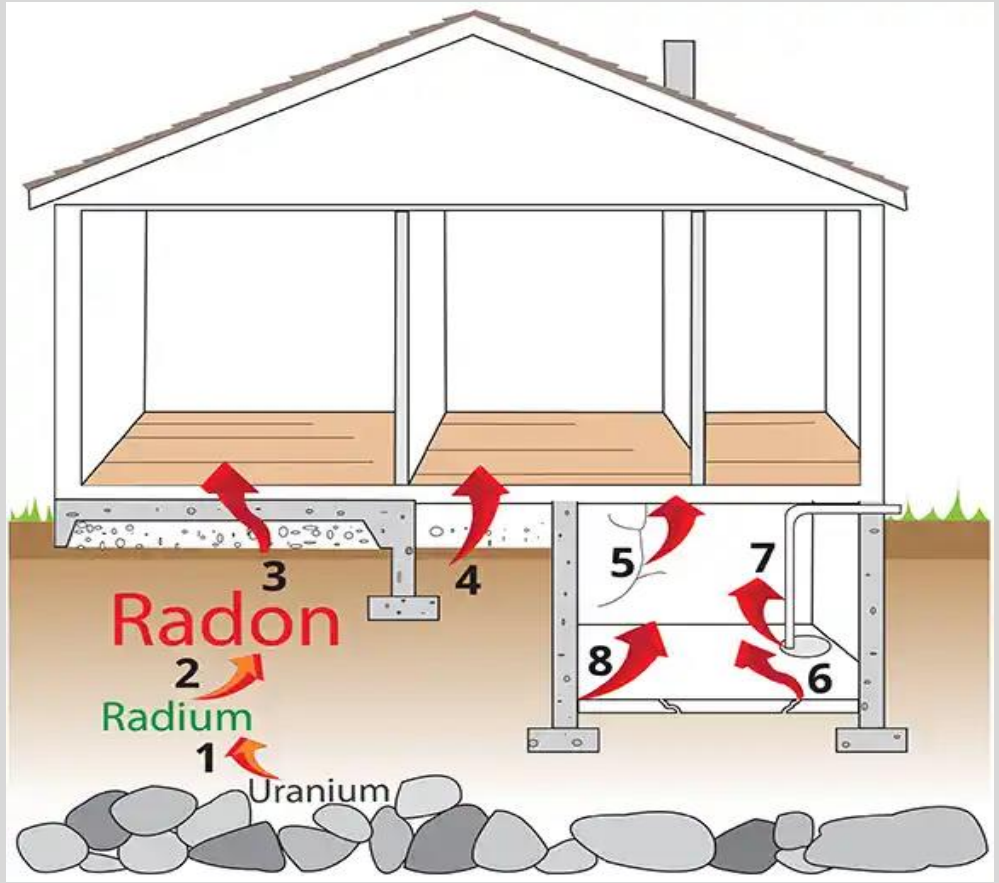
[a] Most commonly used.

- Utilizes metric system for prefixes.

- Radon levels are expressed as pCi/L

Where does Radon Come From?

- Radon comes from the decay of naturally occurring uranium found in the water, rocks, and soil.
- Well water may also be a source.
- Occupationally- Mining, Water treatment plants, and work with radioactive materials.



https://extension.unr.edu/publication.aspx?PubID=2645

Associated Radon Exposure Limits

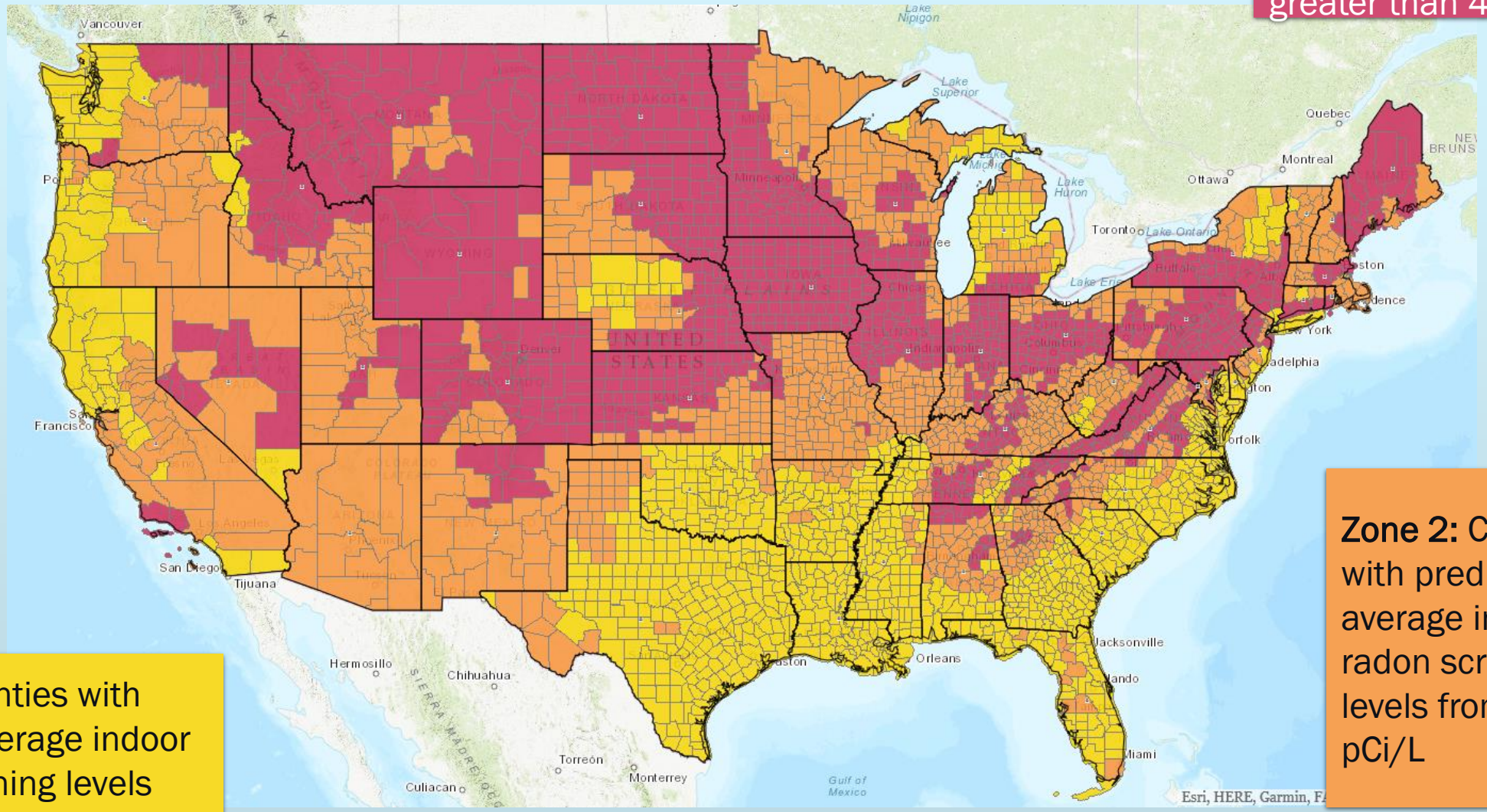
- **EPA** "action level" is > ***4 pCi/L*** for a lifetime residential (24/7) exposure.
  -Navy Standard for buildings
- **OSHA** standard: ***100 pCi/L*** for work areas occupied 40 hours per week. If exceeded, employers must reduce amount of time spent in space. Signage required for any space with levels of ***25 pCi/L.***

Cat.	Radon Levels (pCi/L)	Action
1	0 < 4	No action required
2	4 < 20	Mitigation within 2 yr
3	20 < 200	Mitigation within 6 mo
4	> 200	Mitigation within 3 wk

Dr. Paul Gillooly, NMCPHC

RADON LEVELS IN THE UNITED STATES

Zone 1: Counties with predicted average indoor radon screening levels greater than 4 pCi/L



Zone 2: Counties with predicted average indoor radon screening levels from 2 to 4 pCi/L

Zone 3: Counties with predicted average indoor radon screening levels less than 2 pCi/L

https://www.epa.gov/radon

Medical Risks Associated with Radon Exposure

Inhalation

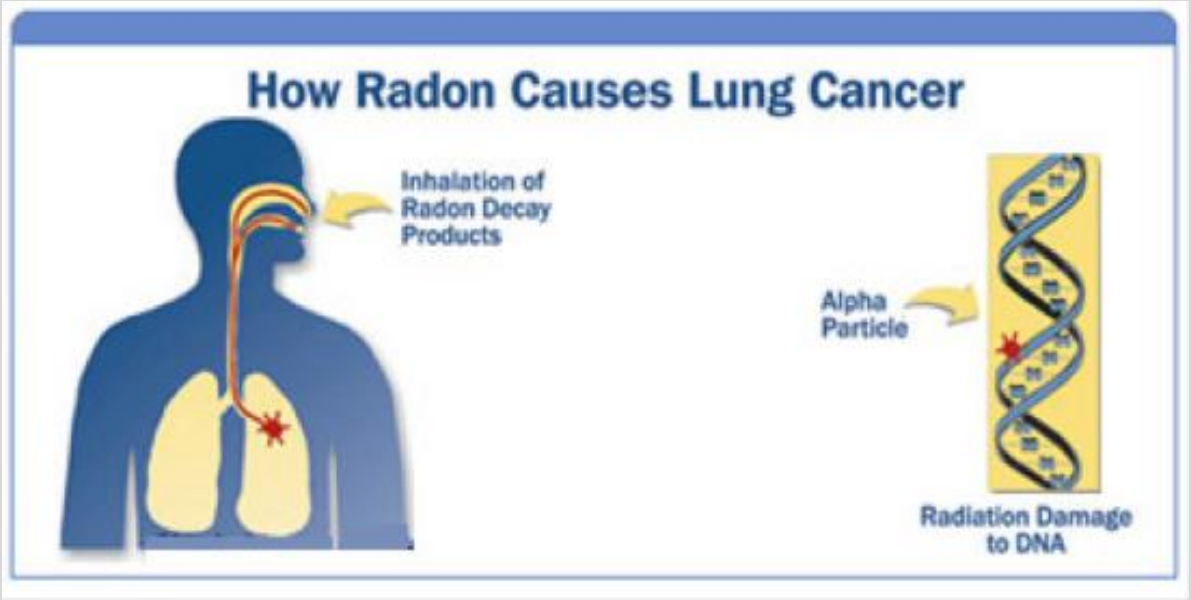
- Primary route for general and occupational population

Oral

- Minor route for general population

Dermal

- Minor route for general population



https://www.mr-radon.ca/radon-whats-all-the-fuss-about/

Medical Risks Associated with Radon Exposure

Lung cancer

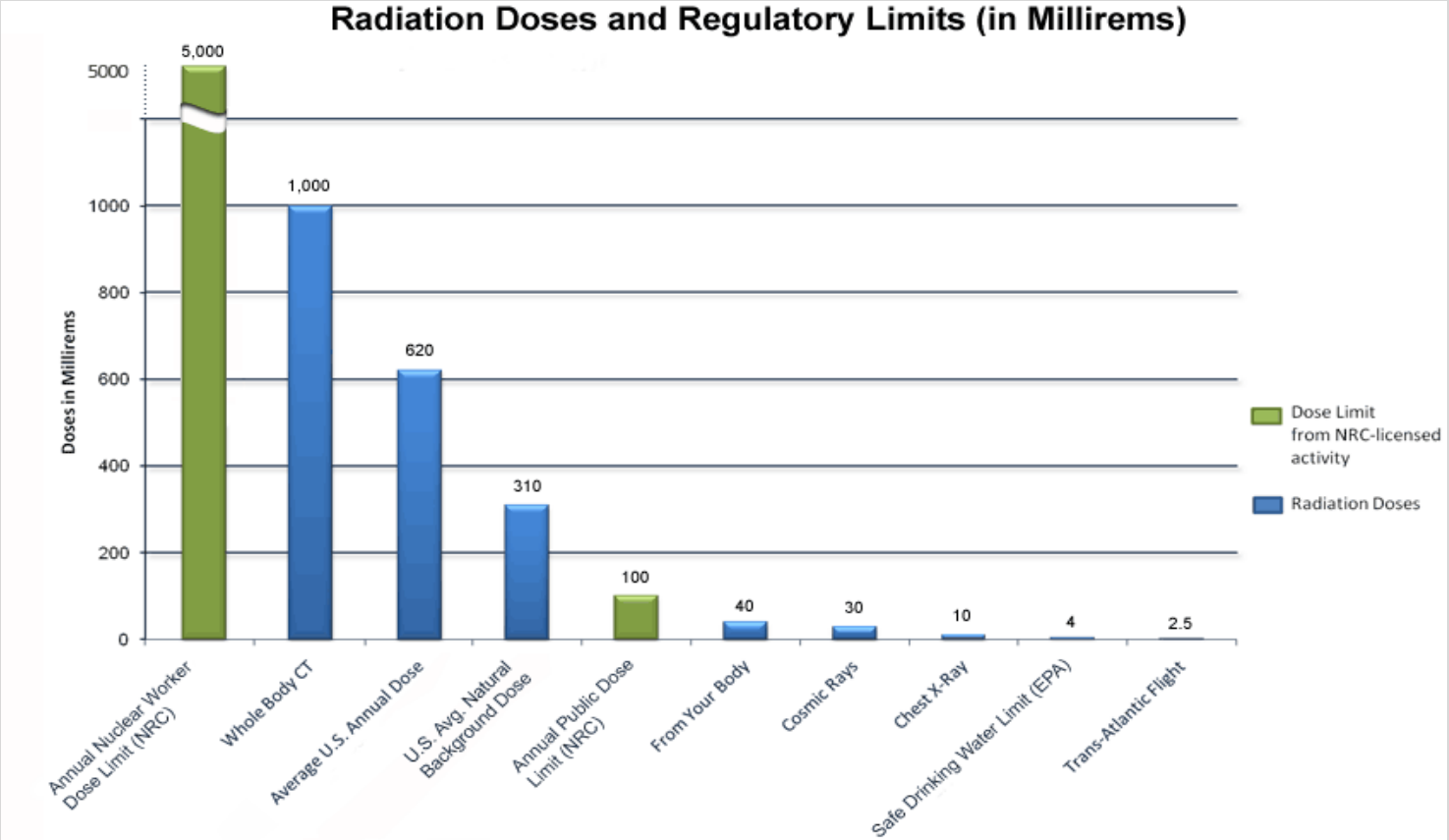
- Only significant health effect associated with exposure
- Second leading cause in U.S.
  - 15,000 – 22,000 deaths annually
  - Radon and progeny

Increased risk in underground miners and populations with home exposures

Combination of radon exposure and smoking → greater risk of lung cancer than either factor alone

- Most radon-related lung ca develop in smokers
- Significant number occur in non-smokers also

Medical Risks Associated with Radon Exposure



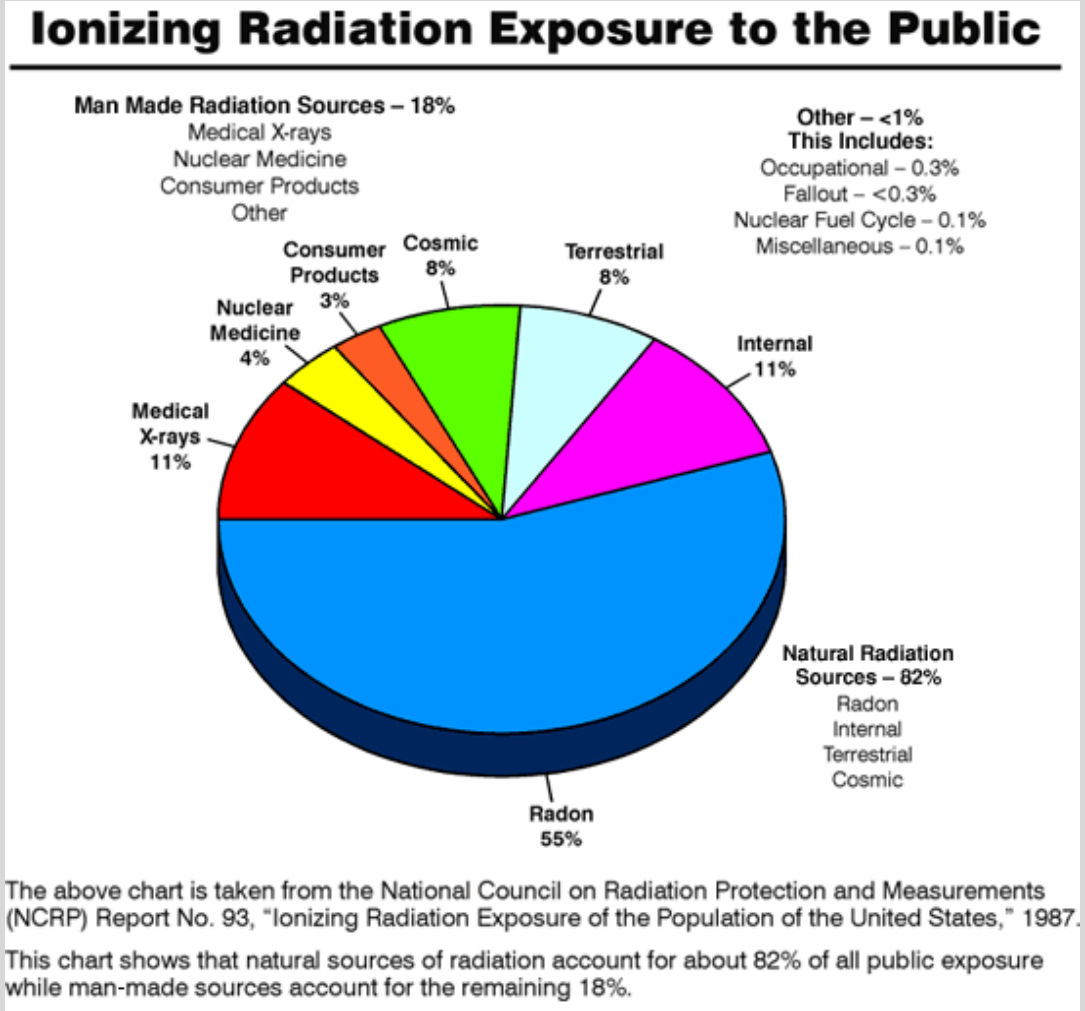
Medical Procedure Doses	
Procedure	Dose (mrem)
X-Rays-single exposure	
Pelvis	70
Abdomen	60
Chest	10
Dental	1.5
Hand/Foot	0.5
Mammogram (2 views)	72
Nuclear Medicine	400
CT	
Full body	1,000

https://www.nrc.gov/images/about-nrc/radiation/factoid2-lrg.gif

Medical Risks Associated with Radon Exposure

Natural Radioactivity in Food		
Food	^{40}K (pCi/kg)	^{226}Ra (pCi/kg)
Bananas	3,520	1
Carrots	3,400	0.6 – 2
White Potatoes	3,400	1 – 2.5
Lima Beans (raw)	4,640	2 – 5
Red Meat	3,000	0.5
Brazil Nuts	5,600	1,000 – 7,000
Beer	390	---
Drinking Water	---	0 – 0.17

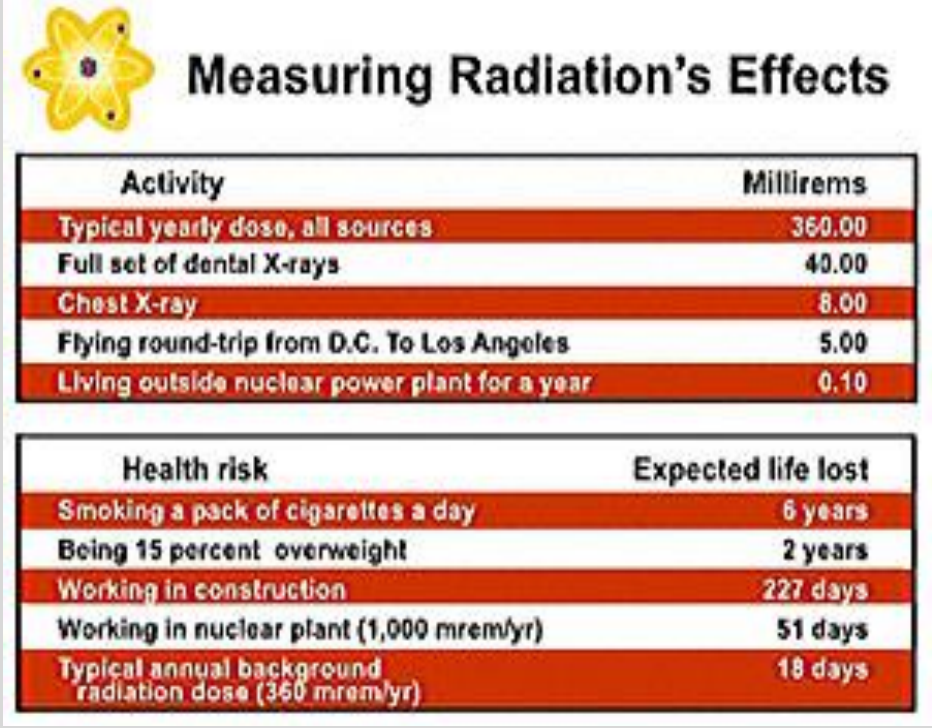
https://www.nrc.gov/about-nrc/radiation/around-us/doses-daily-lives.html



Medical Risks Associated with Radon Exposure

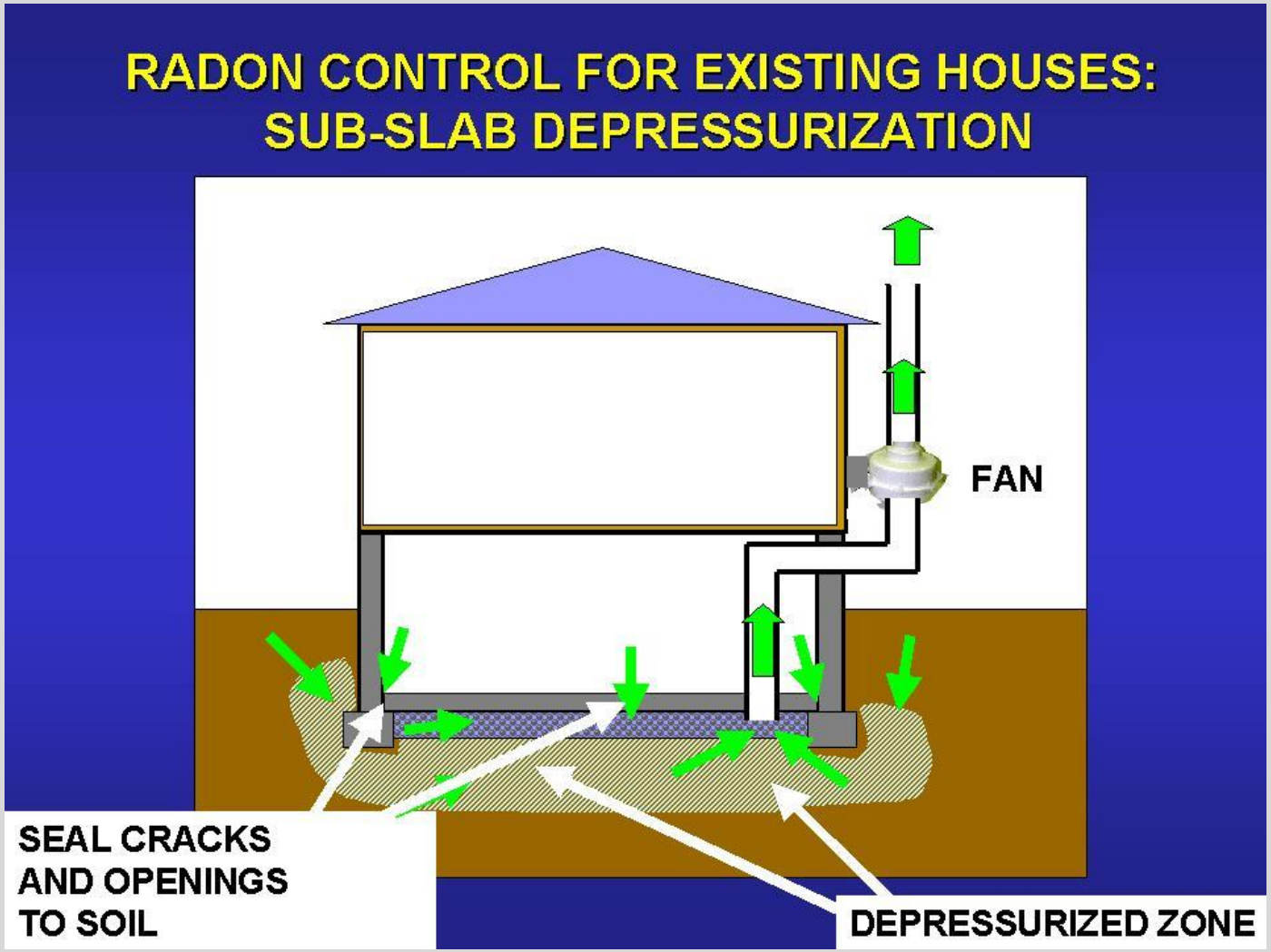
Occurrence	*Risk*	*Chances*
Dying from appendicitis in a modern hospital	0.0038	1 in 263
Lifetime risk of lung cancer in a *nonsmoker*	0.0014	1 in 714
Lifetime risk of death in fire or from smoke inhalation	0.0009	1 in 1116
Lifetime risk of fatal cancer after a typical CT scan	0.0005	1 in 2000
Dying in a motor vehicle accident after driving 40,000 miles in a car	0.0005	1 in 2000

https://radiology.ucsf.edu/patient-care/patient-safety/radiation-safety/risks-of-radiation



https://www.nrc.gov/about-nrc/radiation/rad-health-effects.html

How To Mitigate Radon Exposure



- Fix the airflow issues, due to its density radon is effected by movement and changes in airflow.
- Seal cracks in foundation, due to its size a hermatic seal is required to prevent it from entering.
- Radon Mitigation System → Dedicated system that redirects the radon from the entering the building.

https://sosradon.org/files/sosradon/reducing-radon/reducing-radon-full.jpg

MCLB ALBANY TOWNHALL MEETING

Radon Mitigation Plan

Radon Testing

Mitigation Requirement

Mitigation Part 1

Mitigation Part 2

Mitigation Part 3

Continued Monitoring

Table 1. Corrective action timeline [a]

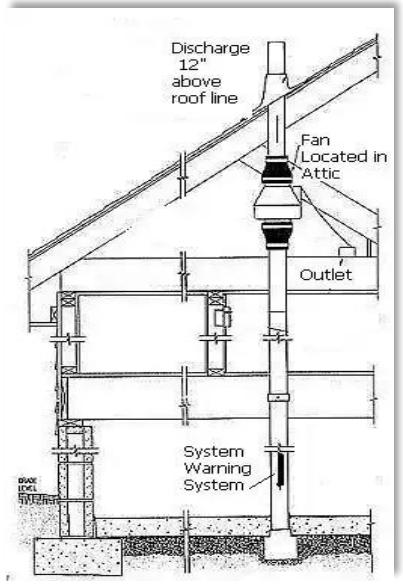
Category	Radon level (pCi/L)	Action
1	0 to <4	No action required
2	4 to <20	Mitigation within 2 years
3	20 to <200	Mitigation within 6 months
4	≥200	Mitigation within 3 weeks

Certified expert to design and install Active Soil Depressurization System (ASD)

Seal cracks and floor to prevent radon infiltration

HVAC replacement to increase outdoor air and positive pressure

Test after each mitigation part and at least every 2 years



Mitigation Parts 2 and 3

Part 2

- Verify existing floors are properly sealed
- Seal all floor/wall junctions and cracks in floor
  - Verify floor penetrations are properly sealed
  - Sealing improves indoor Air Pressurization

Part 3

- HVAC modifications
  - ➢ Increase Outside Air - Indoor Air Dilution
  - ➢ Modify Return Air ventilation
  - ➢ Update Sensors, Controls and Sequence of Operations
  - ➢ Increase Indoor Air Capacity for Pressurization
  - ➢ Re-Test, Adjust and Balance
  - ➢ Re-Commission
  - ➢ Preventative Maintenance

CLOSING COMMENTS

- MCLBAlbanyRadon@usmc.mil

- Or, in the Global as: “MCLB Albany Radon”

Questions