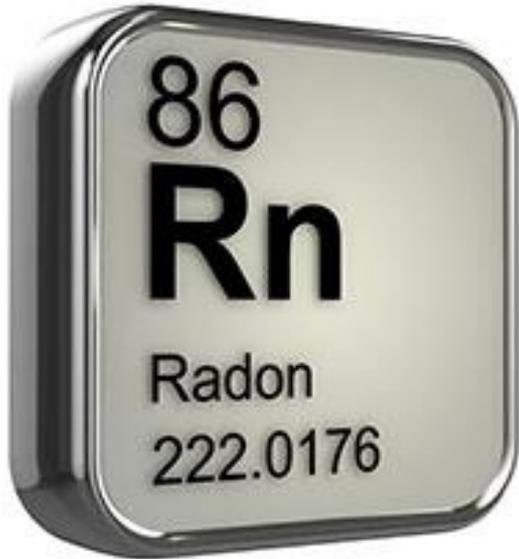


Radon Aware Training For Real Estate Professionals



Tony Fourcroy
Air Quality Programs

- Public Health Radon Reduction Roadmap (PHR3)
 - Boulder County Public Health – 2015
 - Front range public health agencies

- Promote radon awareness
 - Real estate community
 - Building industry
 - Policy makers



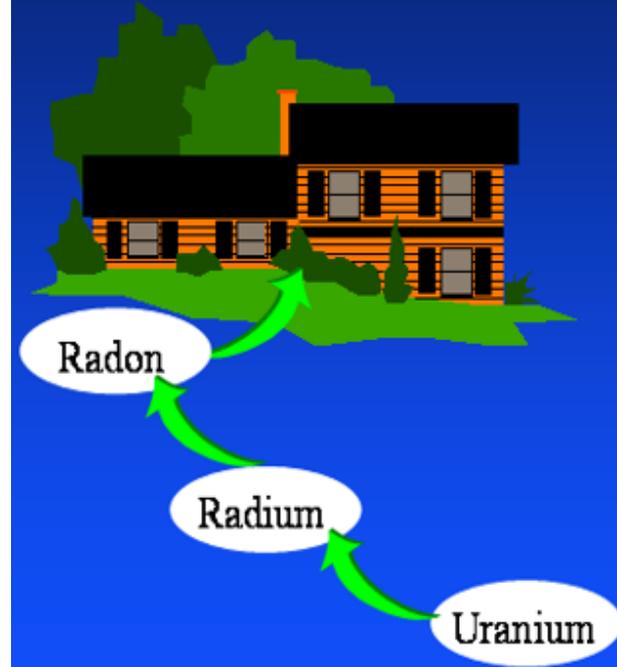
www.radonawarecolorado.org

- What is radon?
- What are the health risks?
- Testing and Mitigation
- What do Real Estate Professionals need to know?

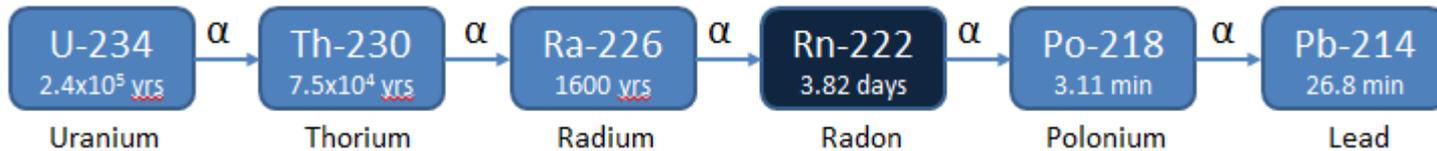
What is Radon?

What is Radon?

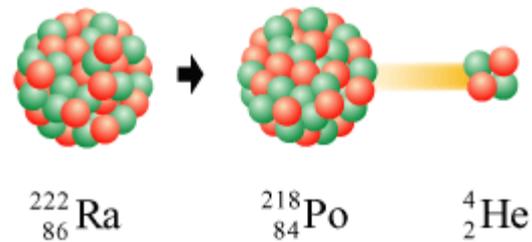
- Senseless radioactive gas
- Uranium decay product
- Found in rock, soil and ground water
- No symptoms or allergic reactions



Radon is a radioactive gas that comes from the natural decay of uranium that is prevalent in our soils



Radon decomposes into radioactive particles that become lodged in your lungs



Alpha particle decay



<https://www.youtube.com/watch?v=VFVZU2YwwJ4>

How is radon measured?

- Curie (Ci): radioactive decay of Ra-226 over 24-hour period (pico= 1 trillionth)
- pCi = 2.22 radioactive decays/min
- 4 pCi/L = 12,787 decays/liter/day

The EPA *Action Level* is 4 pCi/L



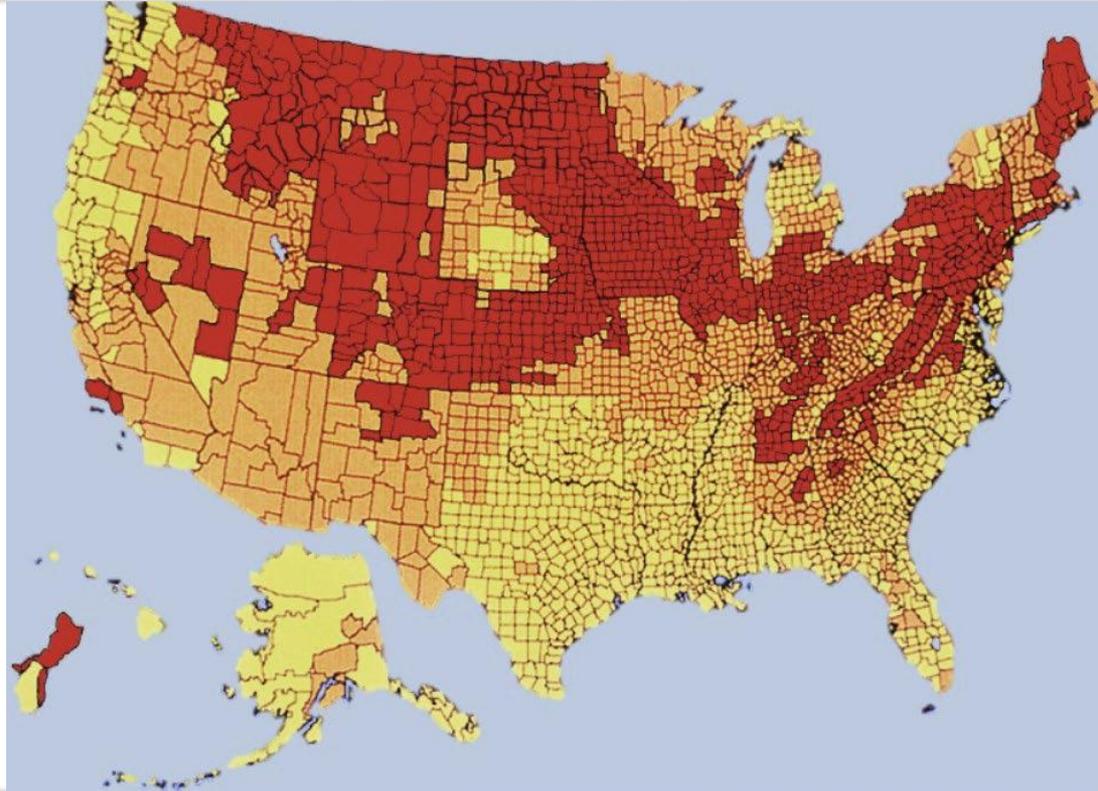
Marie Curie (1867-1934)
Theory of Radioactivity

Where is Radon Found?

EPA Radon Zone Map (1993)

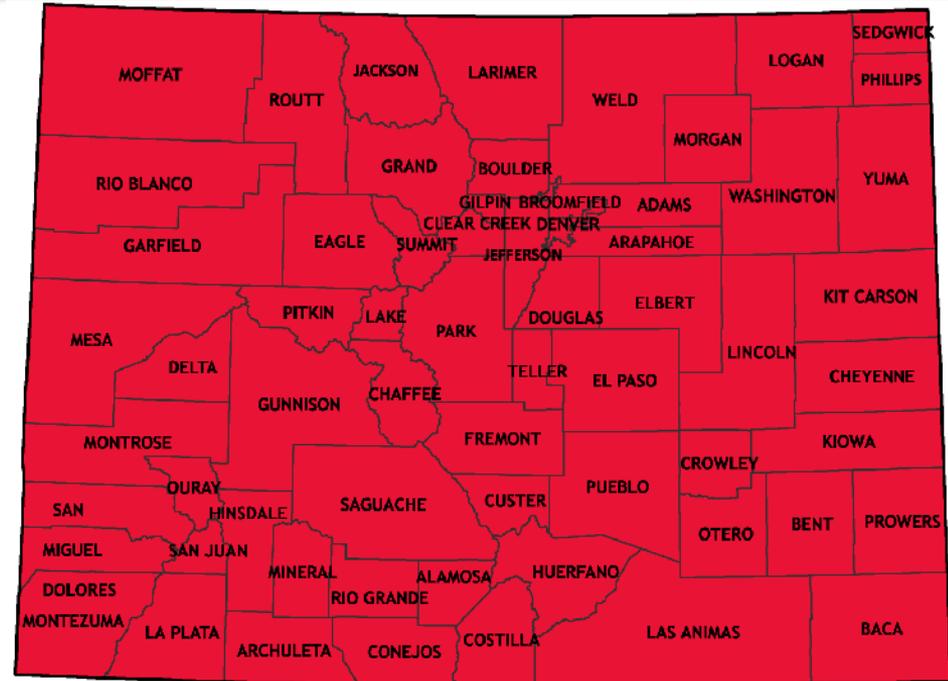
Areas with potential for elevated
indoor radon levels

	Zone 1	➤ Average Radon > 4 pCi/L
	Zone 2	➤ Average Radon 2-4 pCi/L
	Zone 3	➤ Average Radon < 2 pCi/L



CDPHE Zone Classification

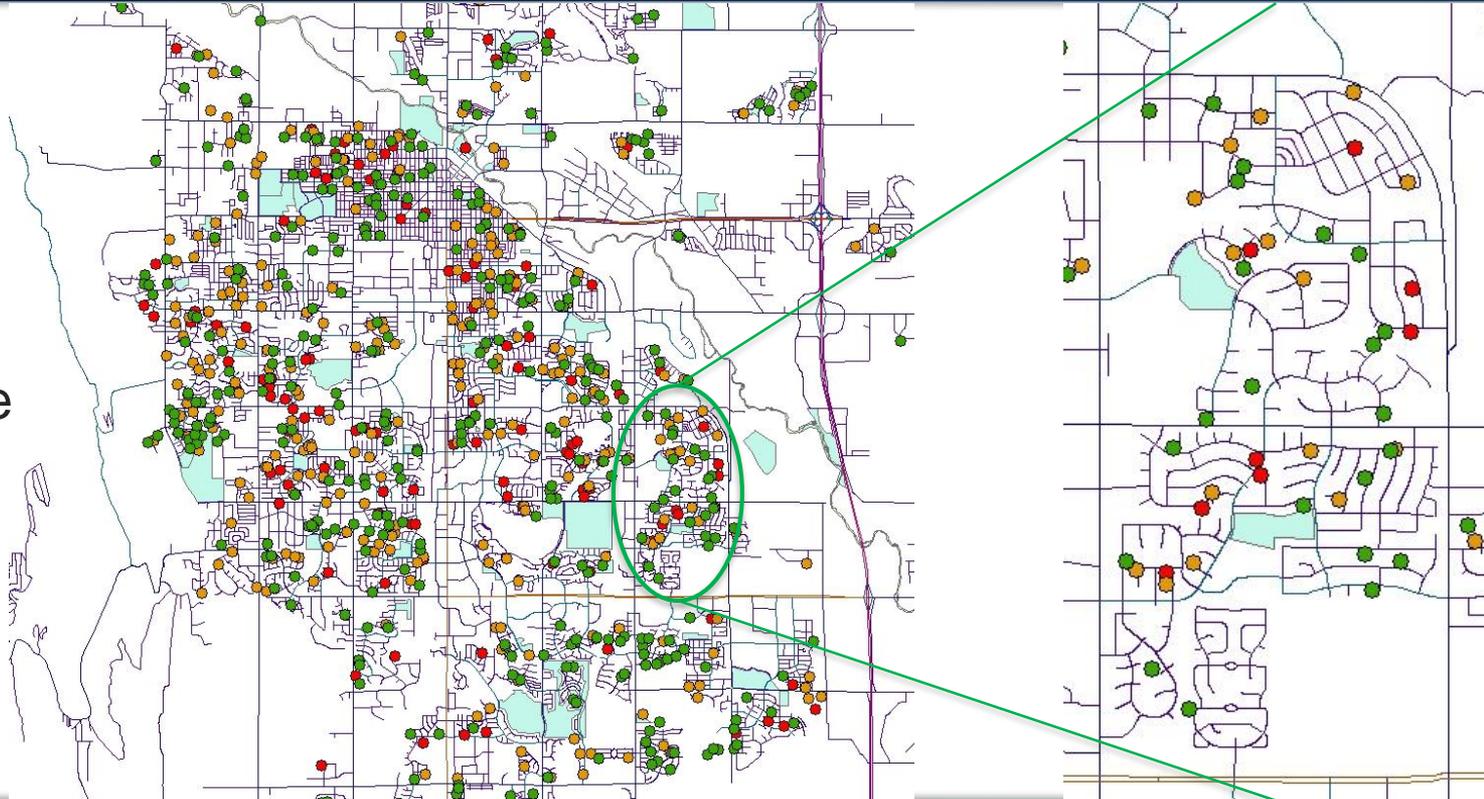
- Every county is Zone 1
- Colorado ranks 7th in the nation for highest potential radon risk



Source: CDPHE Radon Outreach Program and Colorado Environmental Public Health Tracking

Almost half of all homes test above 4.0 pCi/L

2018	
pCi/L < 4.0	52%
4.0 < pCi/L < 10.0	34%
pCi/L > 10.0	14%



What Are the Health Risks?

Radon is a Class A Carcinogen

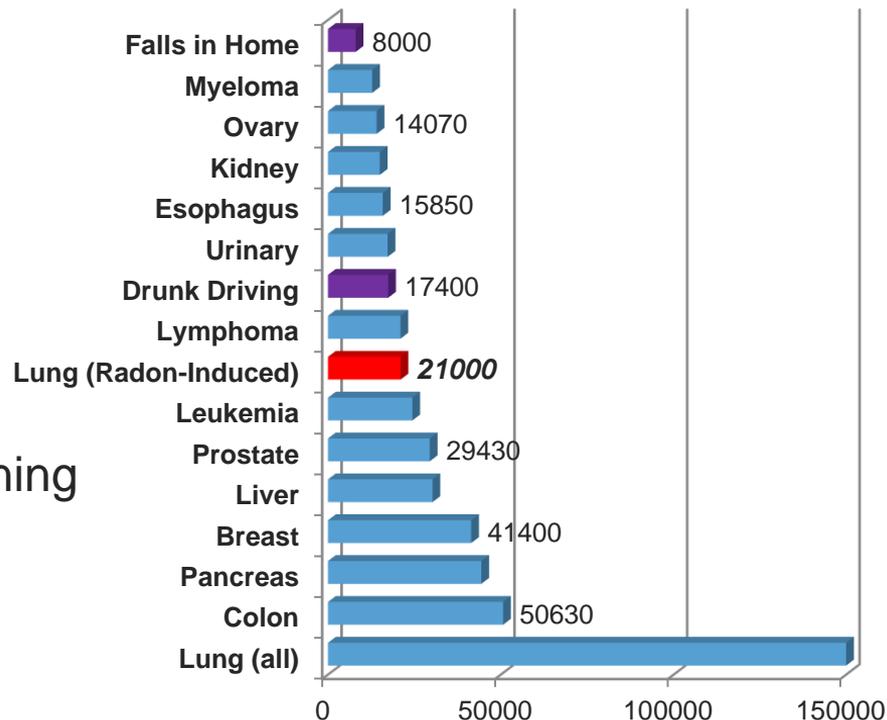
- Asbestos, benzene, tobacco
 - Radiation (UV, Ionizing)
- 2nd leading cause of lung cancer
- No noticeable side effects

$$\textit{Risk} = \textit{Level} * \textit{Exposure}$$



Radon Induced Lung Cancer

- 21,000 deaths per year (U.S.)
- More than
 - Drunk driving + house fires + CO + drowning
 - Breast + prostate + colon + liver cancers



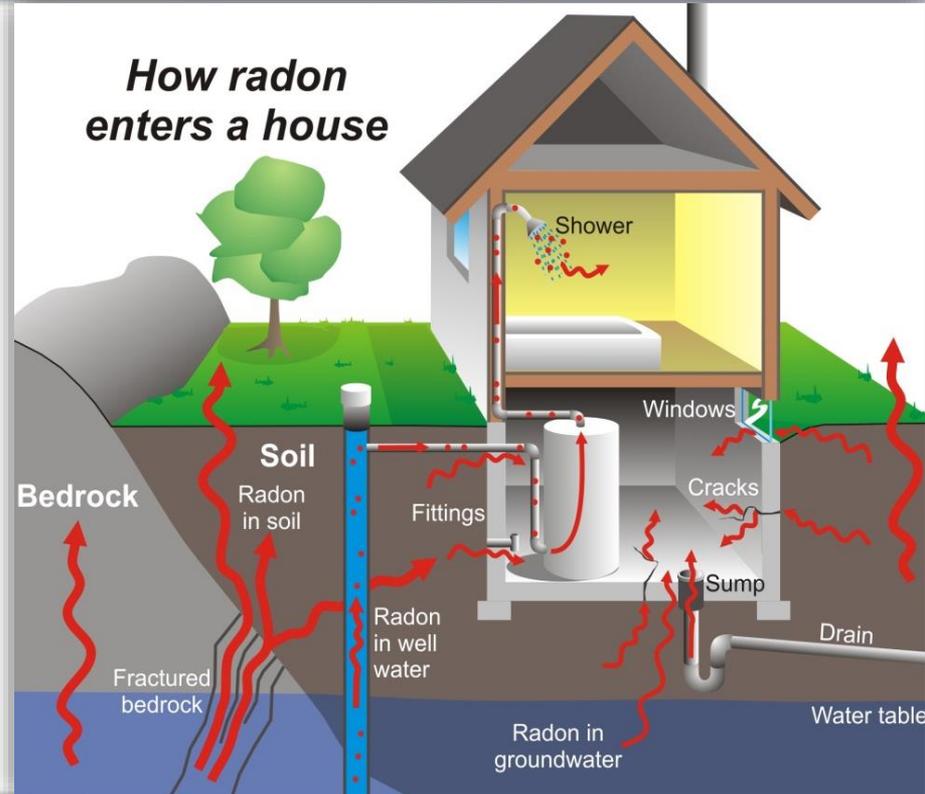
- First reported 1879 – *Miner's Disease*
- 1949: Uranium mines study in Colorado Plateau
- 1995: *Lung Cancer in Radon-Exposed Miners and Estimation of Risk from Indoor Exposure*
(11 studies of radon-exposed miners)
- 2001: *Review of Residential Radon Case-Control Epidemiologic Studies in the U.S.*
(7 residential North American Studies)
- 2005: *Radon in Homes and Risk of Lung Cancer*
(13 European studies)



How Does Radon Get Into Homes?

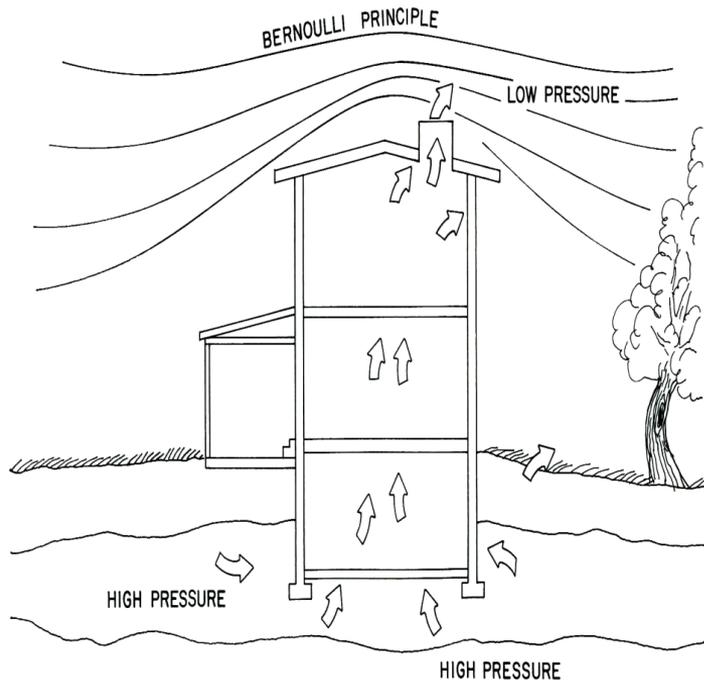
How Does Radon Get Into Homes?

- Foundation joints and cracks
- Plumbing protrusions
- Sumps and crawlspaces
- Well water
- Granite and building materials?

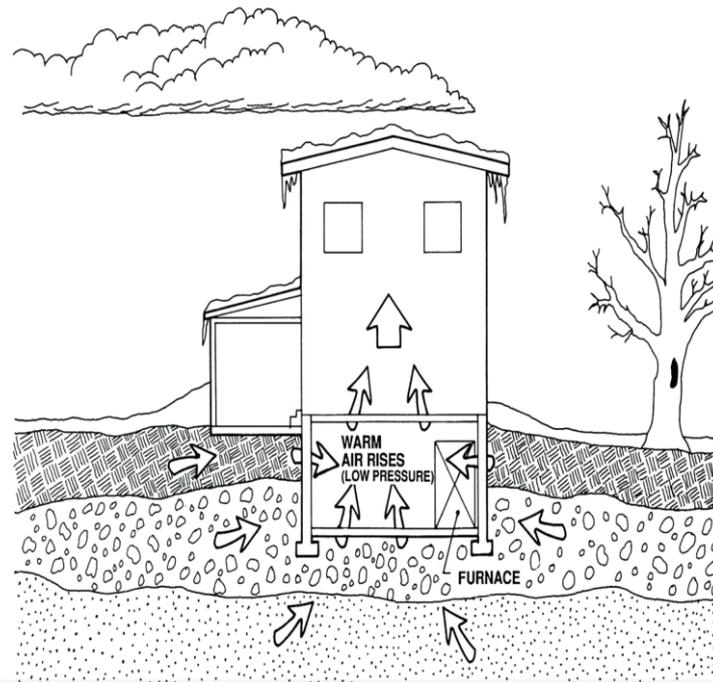


Air Pathways and Pressure Differentials

RADON ENTRY—WIND EFFECT



RADON ENTRY—STACK EFFECT (Heating House in Winter)



Test the home even if ...

- No basement (slab or crawlspace)
- Basement is unused or unfinished
- Townhouse or condo
- Already has a mitigation system
- Neighbor has already tested



Testing for Radon

Continuous Radon Monitor (CRM)

- 48 hour minimum test
- Closed house conditions
- Track temperature and pressure
- Preferred method for real estate



Short Term Test Kit: 3-7 days

- Snapshot of current radon levels
- Inexpensive - \$6
- Closed House Conditions
- Time Sensitive



- Average radon level over test period
- Inexpensive - \$20
- Normal living conditions in home
- A 1-year test is considered the most accurate method to test a home



- Lowest occupiable level
- Not in closet, kitchen, bathroom, crawlspace or attic
- Away from doors, windows, ext. walls, vents and fans
- Closed-house conditions
- Avoid severe weather events



- Start 12 hours prior to testing
- Constant ventilation and temperature
 - Windows and doors closed
 - No Attic fans, window A/C unit, swamp cooler, fireplace
- Central Heating and AC operating normally
- Radon mitigation fans operating

KEEP ALL EXTERIOR DOORS AND WINDOWS CLOSED!

(except for entry and exit, interior doors between rooms can remain open)

Sample

RADON TEST IN PROGRESS

DO NOT REMOVE THIS NOTIFICATION

(Open doors and windows invalidate this test, thus delaying the process)

The following conditions must be maintained:

- Do not touch, cover, move or alter the performance of the radon detector(s).
- Do not operate any whole house fans(s). Do not use any fireplaces(s) or wood stoves(s) unless they are the primary heat source.
- Operate heating and air conditioning normally. Turn off and keep off any equipment which supplies fresh air to the dwelling, such as swamp coolers, unless it is vented supply air to a combustion appliance.

NOTE:

Exhaust fans such as dryer, range hood, or bathroom fan can be operated normally.

Any exhaust fan or any combustion appliance such as whole house attic ventilating fan may decrease the pressure in the dwelling, which can affect the radon concentration.

Test Period from: _____ to: _____

Responsible Individual: _____

Date: _____

“People should not have long-term exposure to indoor radon levels of 4.0 pCi/L or more. This an economic guidance rather than a level below which no risks exists” (EPA)

- 6176 pCi/L Highest recorded level in US (PA - 2016)
- 598 pCi/L Highest recorded level in Larimer County (80545 - 2013)
- 4.0 pCi/L ***EPA Action Level***
- 2.7 pCi/L WHO action Level
- 2.0 pCi/L Target level for mitigation
- 1.3 pCi/L Average indoor radon level
- 0.4 pCi/L Average outdoor radon level

Radon Mitigation

- Ventilation
- Positive Pressure
- Depressurization



- Sub-slab collection pit
- 3-4" PVC pipe penetrating slab
- Optional fan

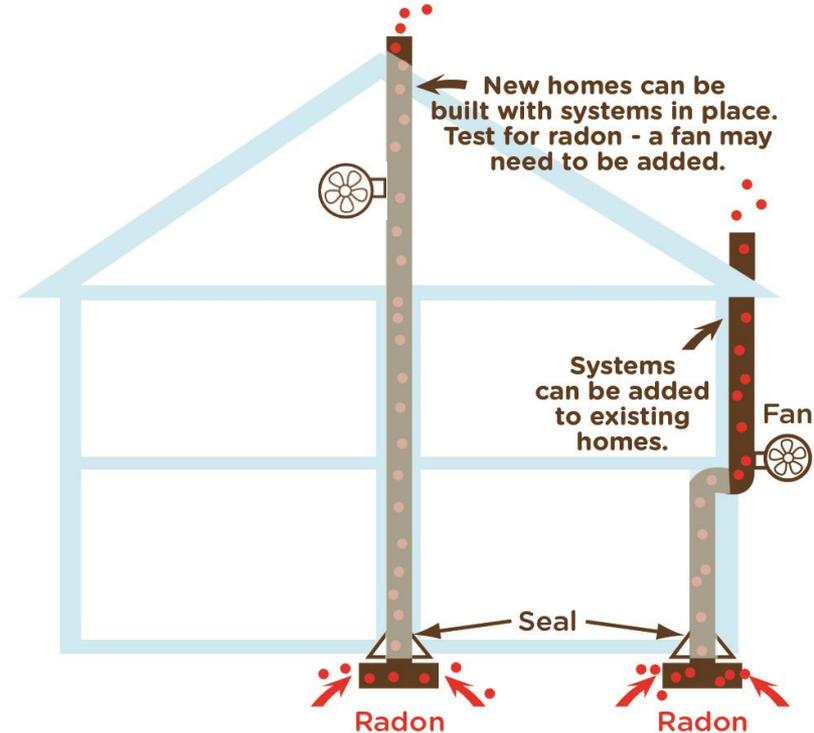


- Plastic membrane sealed around the edges
- PVC pipe under membrane
- Optional fan



Passive vs Active System

- Passive RRNC can reduce radon potential by 50%



- Discharge Point
 - 10 feet away from openings
- Fan Location (fans can leak!)
 - Outside or above living space
- Moisture reduction benefit!

www.coloradoradon.info

-> Measuring and Mitigating Radon in Colorado



Radon Resistant New Construction (RRNC)

International Residential Code (IRC) Appendix F – Radon Control Methods

➤ Fort Collins 1st to adopt (2005)

All new single-family and duplex housing must be equipped with a radon reduction system during construction



Appendix F of the International Residential Code adopted in Colorado as of 4/15/2019

Cities/Towns:

Aspen
Breckenridge
Boulder
Carbondale
Cedaredge
Clark
Crested Butte
Dillon
Durango
Frisco
Ft Collins
Golden
Gunnison
Hahn's Peak Village
Hayden
Lake
Lakewood
LaVeta
Louisville
Longmont
Milner
Mount Crested Butte
Oak Creek
Orchard City
Pagosa Springs
Phippsburg
Ridgway
Sheridan
Silverthorne
Snowmass Village
Steamboat Springs
Sterling
Superior
Toponas
Trinidad
Vail
Walsenburg
Yampa

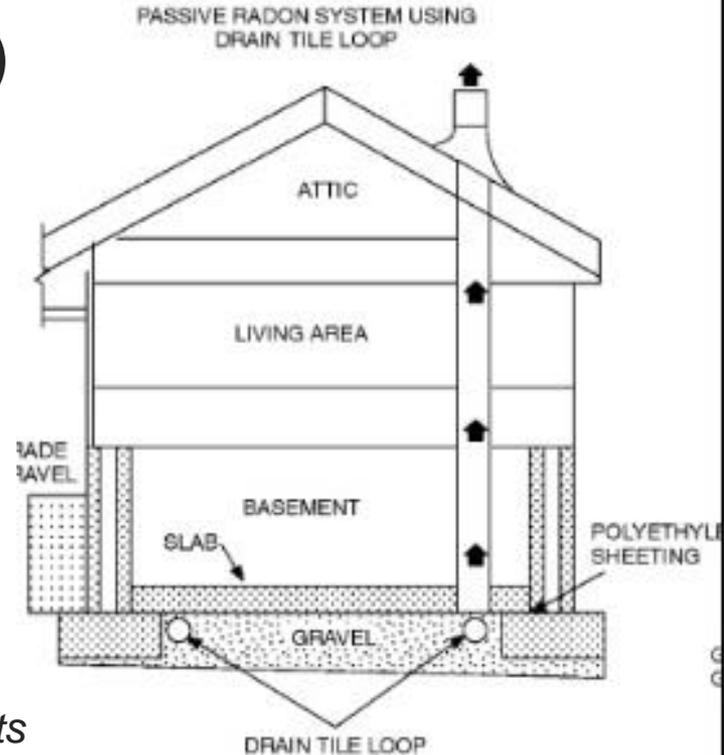
Counties:

Archuleta County
Boulder County
Eagle County
Elbert County
Gunnison County
Huerfano County
Jefferson County
La Plata County
Las Animas County
Logan County
Montrose County
Pitkin County
Routt County
San Miguel County
Summit County

Multi-family Radon-Resistant New Construction required:

Ft Collins

- Gas Permeable Layer (4" gravel)
- Plastic Sheeting
- Sealing and Caulking
- Vent Pipe
- Junction Box



Techniques vary for different foundations and site requirements

Real Estate Transactions

What Should Homebuyers & Sellers Know?

- Testing and Mitigation not required
- Colorado: Disclosure is required
- Fort Collins: Seller *required* to provide radon information
- Fort Collins: Appendix F - Radon Resistant New Construction

Colorado Seller's Property Disclosure

N.	ENVIRONMENTAL CONDITIONS If you know of any of the following EVER EXISTING on any part of the Property check the "Yes" column:	Yes
1	Hazardous materials on the Property, such as radioactive, toxic, or biohazardous materials, asbestos, pesticides, herbicides, wastewater sludge, radon, methane, mill tailings, solvents or petroleum products	<input type="checkbox"/>

Radon Information for Buyers

RADON

Buying and Selling a Home in Fort Collins

What you need to know about radon gas

WHAT IS RADON?
Radon is an invisible, odorless, radioactive gas emitted during the natural decay of uranium in the soil. Homes pull in radon gas through cracks and openings in basements, crawl spaces and sides. Levels vary between homes and have nothing to do with age, quality or seepage.

WHY IS RADON A CONCERN?
According to the EPA, radon is the second leading cause of lung cancer. There is no known "safe" exposure level. The EPA recommends mitigating over 4 pCi/L, and also recommends considering mitigation for levels between 2 pCi/L and 4 pCi/L.

HOW DO I TEST FOR RADON?

- The City of Fort Collins sells low-cost short and long-term radon test kits. You can buy them at the following location:
Fort Collins Senior Center 1200 Raintree Dr.
- Have a Healthy Homes Assessment. These free assessments provide a comprehensive look at factors in your home related to indoor air quality, health and safety. Each assessment includes a free short-term radon test kit. Visit fcgov.com/healthyhomes to arrange an assessment.

City of Fort Collins
Environmental Services

RADON

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City of Fort Collins
Environmental Services

RADON

and
REAL ESTATE
TRANSACTIONS

in Colorado

May 2018

IS YOUR HOME SAFE FROM RADON?

What is radon? Radon is a naturally occurring invisible, colorless gas that comes from the natural radioactive breakdown of uranium in soil, rock, and water.

- Uranium decays and creates radium
- Radium decays and creates radon gas

Radon can enter any home
Radon is drawn in through cracks and gaps in the foundation.

Radon occurs naturally in soil
Due to the geology of Colorado, homes in our state have higher levels of radon than the national average.

200 chest x-rays
That's more than three per week, per person, per year.

Radon causes cancer
Every year in the U.S., over 20,000 people die from lung cancer caused by radon.

Testing for radon is easy
Ask your home inspector about radon and request a radon test.

Fixing the problem is easy and inexpensive
Radon decays into radioactive particles, that, when inhaled, can damage the DNA in sensitive lung cells. The damaged cells can become cancerous.

Contact Your Health Department
Colorado Department of Public Health & Environment

fcgov.com/airquality/files/radon_rack_card_english.pdf
fcgov.com/airquality/files/radon_rack_card_spanish.pdf

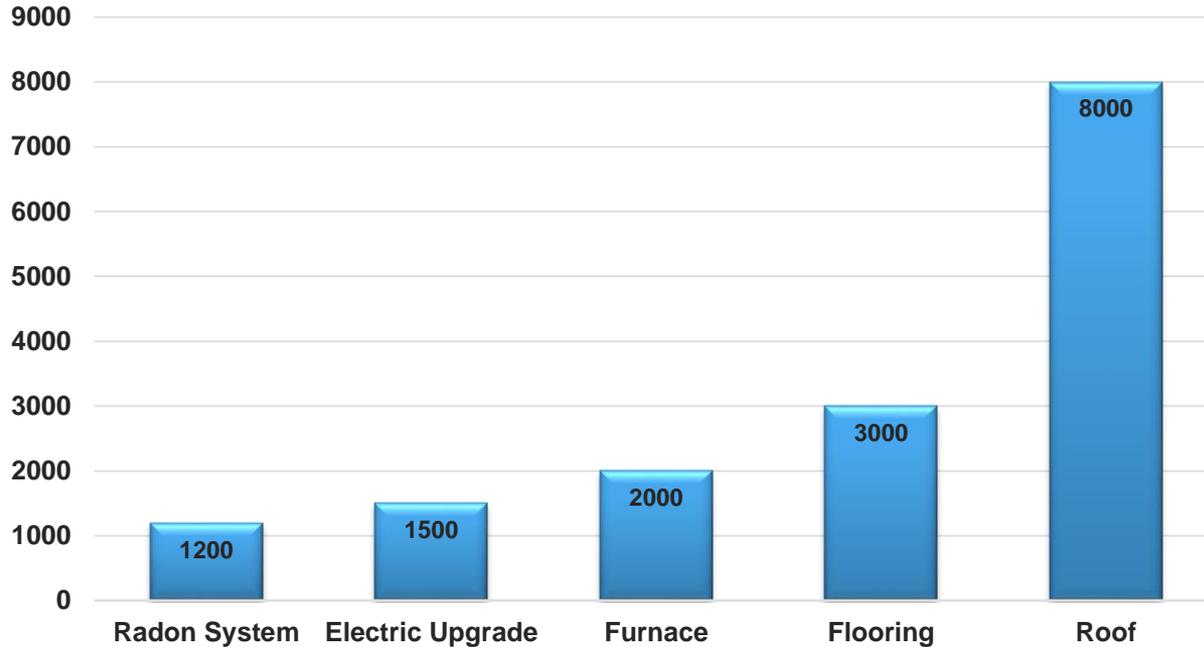
colorado.gov/pacific/cdphe/radon-and-real-estate

bouldercountyradon.org

- Real estate transaction vs. Homeowner testing
- Testing is typically done as part of the home inspection
- Timeframe for testing & mitigation
- Negotiation:
 - Who will test, what type of test, where to test
 - How seller and buyer will share test results and costs
 - What mitigation measures will be taken and who pays

Elevated radon level doesn't mean you need to walk away from the deal.

Improvement Cost Comparisons



[epa.gov/radon/consumers-guide-radon-reduction-how-fix-your-home](https://www.epa.gov/radon/consumers-guide-radon-reduction-how-fix-your-home)

Hire a Certified Radon Professional

- Colorado is not regulated with regards to radon professionals

- National Radon Proficiency Program (NRPP) certification
 - Training and competency exam
 - Quality assurance procedures – testing protocols
 - Proof of annual instrument calibration and performance
 - Continuing education requirements
 - Re-certify every 2 years
 - <https://certifiedradonpros.org/co.html>

Local Certified Radon Professionals

<u>Business</u>	<u>Professional</u>	<u>City</u>	<u>Testing</u>	<u>Mitigation</u>
Aspen Construction	Gil Paben	Fort Collins		yes
Breathe Clean Colorado	Richard Kaplan	Bellvue	yes	
Bwise Radon Testing and Mitigation	Bryson Wise	Loveland		yes
Certified Radon Technologies	Adam Michels	Fort Collins		yes
ColoRadon	Kent Molin	Wellington		yes
Drennen Custom Contracting	J Arnold Drennen	Fort Collins	yes	yes
Drennen Custom Contracting	Scott Drennen	Fort Collins		yes
Drennen Custom Contracting	Daniel Stephenson	Fort Collins	yes	
Elite Home Solutions	David Hicks	Loveland	yes	
Evergreen Radon and Construction Services	Doug Stoll	Fort Collins	yes	yes
Nova Consulting Group	Janine Mushock	Loveland	yes	
Radon Home Measurement & Mitigation	Dr. Leo Moorman	Fort Collins	yes	yes
Refresh Air Quality Maintenance	Jared Reib	Fort Collins	yes	
Spring Canyon Inspections	John Haug	Fort Collins	yes	
Strong Heating & Cooling	Brandon Strong	Fort Collins		yes

➤ Criteria

- Attend radon aware informational session
- Provide clients with up-to-date information
- Encourage use of certified radon professionals

➤ Recognition

- Radon Aware listing and certificate

radonawarecolorado.org



More information and resources
fcgov.com/radon

*Together, we can help Colorado residents create
healthy homes.*

Fort Collins Radon Website: Information, FAQ and Resources

- <https://www.fcgov.com/radon>

Radon Information Handout for Buyers and Sellers

- For Collins (English): <https://www.fcgov.com/airquality/files/radon Rack Card English.pdf>
- Fort Collins (Spanish): <https://www.fcgov.com/airquality/files/radon Rack Card Spanish.pdf>
- Boulder County: <https://assets.bouldercounty.org/wp-content/uploads/2019/03/colorado-radon-infographic.pdf>

National Radon Proficiency Program (NRPP) – Certified Radon Professionals

- <https://certifiedradonpros.org/co.html>

Radon Aware Real Estate Professionals

- <https://www.bouldercounty.org/environment/healthy-home/become-a-radon-aware-real-estate-professional/>