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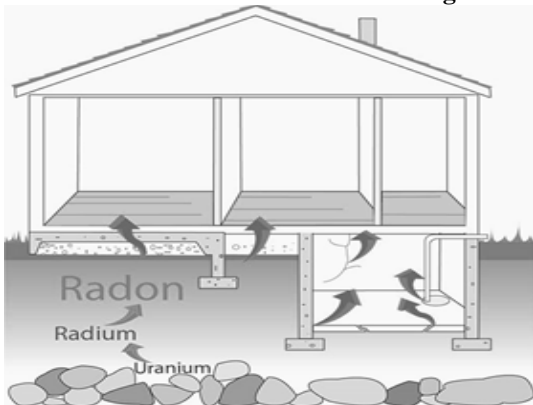
## Radon in Alaska — Current Knowledge and Recommendations

### Background

Radon is an odorless, colorless, radioactive gas that is generated by the decay of naturally occurring uranium in the earth's crust. When it decays, radon primarily emits alpha particles. As we breathe, these particles are deposited on the cells lining the airways where they can damage DNA and cause cancer. Radon is the second leading cause of lung cancer after tobacco smoke and the leading cause of lung cancer in nonsmokers in the United States.<sup>1</sup>

Drawn in by negative indoor air pressure, radon can enter buildings through the following routes: cracks in the foundation and walls that are in direct contact with the ground, construction joints, gaps in suspended floors, gaps around service pipes, and cavities inside walls (Figure). The radon is then distributed throughout the structure by way of the stack effect and ventilation systems. Because they are closer to the source, people living in basements and ground floor housing are generally at higher risk for radon exposure than residents living on higher levels. Radon can also be found in tap water; most of the risk from radon in water comes from radon released into the air when water is used for showering and other household purposes. The Environmental Protection Agency (EPA) recommends radon mitigation when the radon level in the air is  $\geq 4$  pCi/L (picocuries per liter).<sup>2</sup>

**Figure. Routes of Radon Intrusion in Housing**



Source: University of Nevada Cooperative Extension, Nevada Radon Education Program.

### Radon Measurement Data for Alaska

Alaska radon measurement data have been obtained mainly from a longstanding project conducted by the University of Alaska Fairbanks (UAF) Cooperative Extension Service (made possible through the EPA Radon Outreach Program).<sup>3,4</sup> Through UAF's radon program, radon test monitors have been placed in many homes across Alaska over the past 24 years. Of the 3,200 valid UAF test results collected to date, 684 (21%) had a reading  $\geq 4.0$  pCi/L, which is EPA's action level; levels were highest in the Fairbanks area (Table). Zip codes with the highest proportion of radon levels  $\geq 4.0$  pCi/L include 99737 (Delta Junction–East), 99743 (Healy/Denali National Park), and 99712 (Fairbanks–Two Rivers; Table).

### Discussion

Radon is an under-recognized health risk that warrants widespread attention. Many homes in communities throughout Alaska have tested positive for radon concentrations that exceed the EPA action level of 4 pCi/L (Table). Locations with the highest proportion of concerning levels included Delta Junction, Healy, and Two Rivers in Interior Alaska.

Factors that lead to higher radon levels in homes include:

- the amount of uranium in the underlying rocks and soils;
- routes for radon to pass from the soil into the home (e.g., cracks in foundation cement or basement walls); and

- the rate of exchange between indoor and outdoor air, which depends on the air-tightness of the building and home ventilation habits such as opening and closing of windows and doors.

**Table. Distribution of Alpha Track Measured Radon Levels  $\geq 4.0$  pCi/L in Alaska — 1990–2014\***

Community	Zip Code	% $\geq 4$ pCi/L	# of samples	Median [Radon]	Maximum [Radon]
ANC-Downtown	99513	18%	17	1.7	5.8
ANC-Hillside	99507	7%	15	1.6	4.4
ANC-Midtown	99503	5%	44	0.7	8.8
ANC-Trnagn Arm	99516	24%	17	1.4	13.1
DeltaJn-East	99737	67%	15	4.8	15
DeltaJn/Ft Greely	99731	10%	51	1.6	8.1
DeltaJn/Healy Lk	99706	19%	15	3.3	21.6
Eagle River	99577	8%	13	1	5.1
FAI-College	99708	49%	276	3.7	1355
FAI-College	99775	24%	41	1.8	148.1
FAI-Downtown	99710	43%	53	3.5	95
FAI-Downtown	99701	35%	31	2.1	48.1
FAI-Goldstream	99709	40%	334	3.3	205.7
FAI-Post Office	99707	38%	37	2.5	32.4
FAI-Two Rivers	99712	59%	210	4.8	104.3
Fortymile Country	99780	58%	32	4.1	13.1
Healy/DnaliNatIPk	99743	62%	34	5.6	33.5
Healy	99755	29%	14	2.8	8.8
Homer	99603	27%	11	2	4.2
Juneau	99801	2%	41	0.3	6.3
Juneau	99811	2%	1412	0.6	13.8
Kodiak	99619	40%	25	3	8.9
Nome	99762	58%	12	5.1	13.6
North Pole	99705	20%	40	1.7	12.7
Palmer	99645	28%	46	2.2	22.7
Salcha	99702	11%	79	2.3	25.3
Soldotna	99669	20%	10	2.4	6.8
Wasilla	99654	32%	25	2.4	9

\*Note: only zip codes having  $>10$  radon test results are presented. Some people living in rural areas might have mailed radon kits from a post office that is near but not in their community.

FAI=Fairbanks; ANC=Anchorage

### Recommendations

1. All Alaska residents should test their homes for radon.<sup>1</sup> Short-term charcoal test kits are available from hardware, "big box" building, and safety product vendor stores. Long-term alpha track kits can be purchased from any UAF Cooperative Extension office or online from various vendors.<sup>4</sup> Some home inspectors will perform testing over a 72-hour period.
2. Home owners should consider radon exposure reduction strategies if radon levels are  $\geq 4$  pCi/L. The primary method used is a vent pipe system and fan, which pulls radon from beneath the house and vents it to the outside.<sup>1</sup> Sealing foundation cracks and other openings are also helpful strategies.<sup>1</sup>
3. Health care providers should inform smokers that their risk for developing lung cancer is even higher if their homes have elevated radon levels.<sup>1</sup>
4. Home buyers and renters should ask about radon levels before they buy or rent a home.
5. Call the UAF Cooperative Extension (800-478-8324) or the Section of Epidemiology (907-269-8000) with any questions related to radon.

### References

1. EPA. A citizen's guide to radon. Available at: <http://www.epa.gov/radon/pdfs/citizensguide.pdf>
2. EPA. Consumer's guide to radon reduction. Available at: <http://www.epa.gov/radon/pubs/consguid.html#testmean>
3. EPA. State Indoor Radon Grant (SIRG) Program. Available at: <http://www.epa.gov/radon/sirgprogram.html>
4. UAF. Cooperative Extension Service. Energy and Housing Program. Radon. Available at: <http://www.uaf.edu/ces/energy/radon/>