

Origin, Characteristics, and Entry of Radon Gas

Radon gas is a naturally occurring gas found in all homes. Radon gas is considered a Class A Carcinogen. Radon gas is the second leading cause of lung cancer. For more information on health effects, local radon levels or radon resistant new construction please visit our website “Newsletters” or “Reference Material” pages.

Origin:

Radon-222 (radon gas) is considered a radioactive “Noble Gas”. A Noble Gas does not chemically react and it has no electrical charge. It is a naturally occurring, colorless, odorless and tasteless gas that is undetectable by the human senses.

- The origin of Radon-222 is as follows:
 1. It begins as a solid material Uranium-238
 2. Uranium-238 changes to another solid material Radium-226. The process takes 4.47 billion years.
 3. The solid Radium-226 then changes to a gas Radon-222. The process takes 1,620 years.
 4. The gas Radon-222 has a half life of roughly 3.8 days. For example, a radon gas reading of 10 pCi/L will in 3.8 days average 5 pCi/L. In 7.6 days, the average would be 2.5 pCi/L and so forth.
- The pCi/L used to measure Radon-222 levels describes the disintegrations per minute within a liter of air of radon decay particles.

Characteristics:

Radiation is classified on mass and speed.

- There are three types of radiation: Alpha, Beta and Gamma.
 - Alpha radiation is like an atomic cannonball. It is massive in size, moves slowly, and has low penetration. This is the most destructive to human lungs.
 - Beta radiation is an atomic rifle shot that is smaller in mass, moves a little faster, and has greater penetration.
 - Gamma radiation is an atomic laser with no mass that moves at the speed of light, and has deep penetration.
- Radon Decay Products (RDP) in Radon-222 is chemically active, radioactive, electronically charged particles which also contain heavy metals. RDPs static electric charge (Alpha radiation particles) is the primary source of cell damage in lungs. Similar to Radon-222 it is a naturally occurring, non-detectible by human senses. Humans inhale alpha radiation particles. The particles discharge their static electric radiation on lung cells thereby impacting, damaging and/or destroying lung cells. The energy is strong enough to pit or etch a plastic surface.
- The Bronchial Epithelium is the area in the lung most directly affected by the release of damaging Alpha radiation particle energy. The damaged lung cells occasionally mutates into lung cancer cells and spreads.

Entry:

There are natural and manmade conditions that affect the amount of radon gas (Radon-222) entering a structure.

- Pathways – soil porosity and type along with cracks, holes, and other openings in foundation materials provide an easier path for radon to enter. Radon gas entry is 15 times greater at perimeter areas (foundation to floor intersections) compared to center of slab areas.
- Driving Forces – Radon movement to interior areas is increased by higher ground source concentrations (radon strength), higher ground barometric pressure and lower atmospheric barometric pressure (windy days, storms). Because each of these factors can fluctuate quickly, electronic testing with hourly readings over approximately 48 hours provides more information on short term levels.
- The stack effect and reverse stack effect created inside homes will pull or push radon gas into structures.
- Outside physical barriers such as frozen ground, rain water or concrete/asphalt pavement around buildings seals the top layers or surfaces of soil, thus preventing normal radon gas escape and increasing interior radon levels.

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