Why Do Radon Levels Inside a Home Fluctuate So Much?

Air Pressure Differentials Caused by Building Induced Soil Suction & Stack Effect from Heating

- Buildings can create vacuums that suck in soil gases/radon. These vacuums (referred to as Air Pressure Differentials APD's) may be very small. But even small APD's between the house air pressure and the soil gas pressure - can greatly change radon readings inside a home.

- When indoor air is warmer than outside air, it rises up and exits through the upper portion of the house. This air is replaced by soil gases which contain radon. The warmer the house and the colder it is outside – the greater is the stack (chimney) effect drawing radon into a home.

- APD’s and the stack effect are the greatest factors causing radon levels to rise or fall inside a home. Because APD’s and the stack effect are usually higher at night and lower during the day – indoor radon levels are usually higher at night and lower in the day (diurnal APD/stack effect).

Use of Home Air Exhaust Devices

- When exhaust devices push air out of a home, the home’s partial vacuum is increased - causing more soil gases and radon to be sucked in.

- Estimated air flows (cubic feet per minute – cfm) of home devices that exhaust air to the outside:
  - Open wood fireplace 170cfm
  - Central vacuum cleaner 110cfm
  - Clothes dryer 100cfm
  - Bathroom fan 24-90cfm
  - Open wood stove 65cfm
  - Gas combustion appliances 21-72cfm
    (furnaces, space heaters, ranges, water heaters, etc.)
  - Air-tight wood stove 30cfm

Rain, Winds and Other Natural Forces

- Light rain and gentle winds have little effect on indoor radon concentrations.
- Severe storms and high winds can have a great effect on indoor radon levels.
- Rain can block soil pathways and either raise or reduce indoor radon concentrations.
- Indoor radon concentrations are usually higher during heavy rain events and winter seasons.
- High winds can raise or lower indoor radon. When wind blows on side of house with most door(s)/window(s), it creates more positive indoor pressure which pushes radon out. When it blows on side with least door(s)/window(s), it creates more negative indoor pressure, which sucks more radon in.
- Barometric pressure changes can change soil gas pressures and amount of radon entering a home.
- Indoor radon levels are usually higher in the wintertime because: 1. - the heating system is pulling air up and out of the home (stack effect); and 2. - frozen ground/soil saturation caps/blocks soil gas/radon from normal exiting into the atmosphere from outside soil - causing soil gas/radon pressures to rise. Thus entering the home becomes the pathway of least resistance for soil gas/radon to follow.
- Daily radon variation (sometimes 2-3 fold) is usually greater in the summer than in the winter, because of more variations in soil surface temperatures during the summer than in the winter.
- An activated sump pump can pump some radon out with the water (and lower indoor radon levels).