

Vapor Intrusion

An Explanation

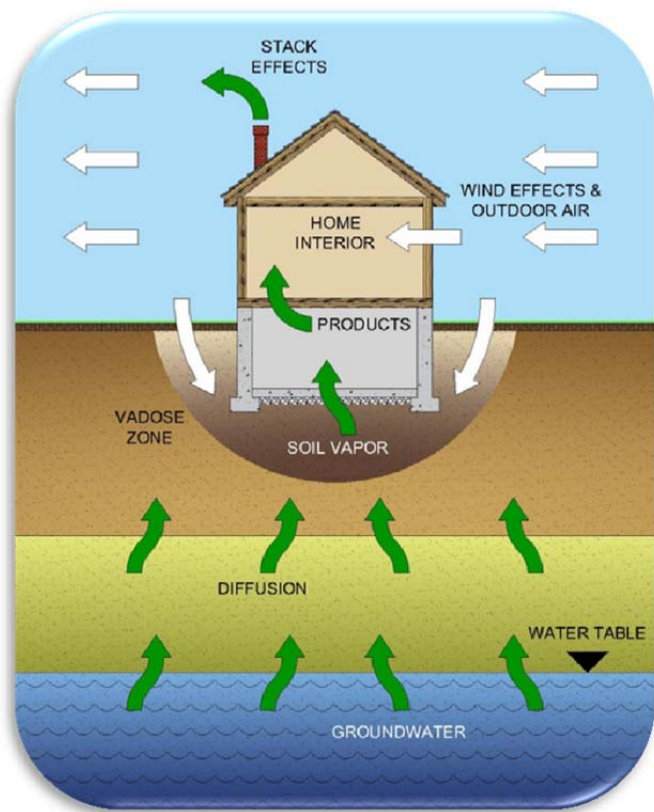
What is soil vapor?

Soil vapor, or soil gas, is the air found in the spaces between soil particles below the ground. If the soil, or the groundwater flowing near or through the soil, contains volatile chemicals (substances that readily evaporate), the soil vapor can contain those same chemicals. Soil vapor can be analyzed for volatile chemicals, just as soil and groundwater samples can be analyzed for those substances.

What is vapor intrusion?

Because of a difference in pressure, soil vapor can enter buildings through cracks in slabs or basement floors and walls, and through openings for utility lines. Heating, ventilation or air-conditioning (HVAC) systems may draw soil vapor into the building. This intrusion is similar to how radon gas can seep into buildings.

The drawing below shows the concept of the vapor pathway. There are many factors that can affect whether and how much vapor may enter a building,



including the type of soil beneath the building, building size and construction, operation of HVAC systems, the difference in pressure between the air inside and outside the building, and weather. If groundwater is the source of volatile chemicals, the depth to groundwater and levels of chemicals present in the groundwater are also factors.

How is potential vapor intrusion investigated?

The first step is to identify whether volatile chemicals are present in the soil and/or groundwater near a building. If levels of chemicals in the sampled soil or groundwater exceed regulatory screening criteria, soil vapor can be measured to determine whether these same chemicals are present at a level that could potentially impact indoor air. The United States Environmental Protection Agency and the Pennsylvania Department of Environmental Protection generally do not recommend indoor air sampling as a first step because indoor air quality is also impacted by chemicals in outdoor air that can enter the building, and by common household products stored indoors. Examples of these products include cleaning fluids and lubricants, recently dry-cleaned clothes, and new carpeting or furniture. These products may emit vapors that could affect the sampling results.

If a chemical is found in soil vapor, does that mean it's entering nearby buildings?

Not necessarily. As noted above, many factors affect whether vapors from below the surface can make their way into structures. In some cases, the building foundation, or the presence of dense, clay-like soils can serve as a barrier to vapor intrusion, although there is no way to determine this by visually examining a building.

What steps can be taken to prevent vapor intrusion?

The most common solution is to install a vapor mitigation system (known as a sub-slab depressurization system). This system functions much like a radon mitigation system, removing soil vapor from below the basement or foundation before it enters the home. Soil vapor is then vented to the air outside the home at a point above the roof. The system uses minimal electricity and does not affect heating and cooling efficiency. It also prevents radon from entering the home.

For more information

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