

## THE ATTENUATION FACTOR

While measurements of the concentrations of contaminants in indoor air are the most direct way to know the **exposure point concentrations** (what people breathe), to estimate the amount of vapor that might enter a building, scientists and engineers have used what they call **attenuation factors**. This is useful in any investigation, and absolutely necessary in new development—that is, where a new building is planned.

The most common attenuation factor is the ratio of the concentration of the gas in indoor air to the concentration of the gas in the subsurface source (soil gas). It is usually labeled with the Greek letter **alpha** ( $\alpha$ ) and sometimes a subscript to show if it applies to an exterior soil-gas ( $\alpha_{sg}$ ) or a subslab ( $\alpha_{ss}$ ) sample. While one can calculate an attenuation factor using the theoretical relationship between measured groundwater contamination and indoor air concentrations, it is generally more reliable to use a subslab-soil-gas-to-indoor-air attenuation factor. Often those conducting investigations measure soil gas contamination concentrations and use  $\alpha$ —either an observed  $\alpha$  based upon historical data collected by U.S. EPA, or a calculated  $\alpha$  using the theoretical formulas in the Johnson-Ettinger model—to predict indoor air concentrations. Typically, for chlorinated compounds the attenuation factors for sub-slab to indoor air ( $\alpha_{ss}$ ) range from 1/50 (.02) to 1/10,000 (.0001), although much higher and lower values have been found.

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