

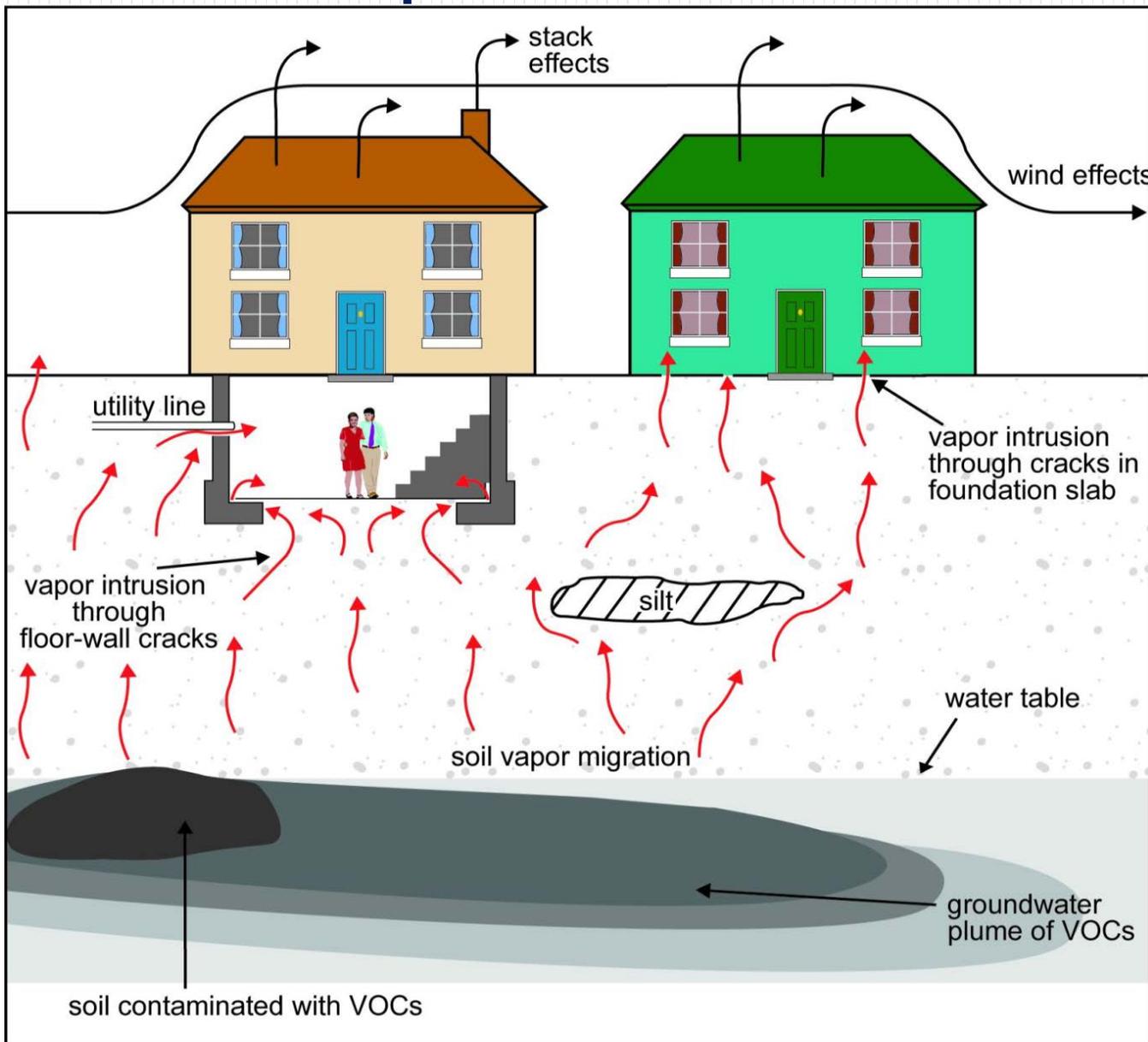


# Vapor Intrusion (VI) and Health Concerns

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# VI Conceptual Model



This figure depicts the migration of volatile organic compounds (VOCs) from contaminated soil and groundwater plumes into buildings.

Volatile chemicals are shown to enter buildings through cracks in the foundation and openings for utility lines. Atmospheric conditions and building ventilation are also shown to influence vapor intrusion.

# VI Background

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- VI is an evolving science and many years ago was not considered as a pathway of exposure. For years, only direct-contact exposures, such as the drinking water pathway, were addressed; however, many of these same sites are now being re-evaluated for potential VI risk.
- In addition, scientific knowledge of chemical toxicity is increasing, and for some contaminants, levels that were previously thought to be safe are now known to pose health risks.

# Exposure Concerns

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Vapor Intrusion – The exposure concern is inhalation of volatile chemicals (chemicals that readily evaporate into air) from the contamination.

- It is important to note that we are exposed to chemicals in everyday life and volatile chemicals are around us everyday in both indoor and outdoor air because of widespread use.

# Potential Health Effects from Chemical Exposure

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In general, exposure to a chemical does not necessarily mean that health effects will occur.

Whether or not a person experiences health effects depends on several factors including:

- the toxicity of the chemical,
- the concentration of the chemical a person is exposed to,
- the route of exposure (oral, dermal, inhalation),
- the frequency and duration of exposure (short-term or acute versus long-term or chronic), and
- the health and sensitivity of the individual.

# Potential Health Effects from Trichloroethylene (TCE) Exposure

For a number of years, there was scientific debate over TCE toxicity. As a result, there were varied draft toxicity values recommended over time. It was not until 2011 that toxicity values for TCE were finalized.

Based on current science, TCE poses greater risks than previously thought and there is a heightened concern regarding VI risks from TCE.

- Long-Term Exposure Concerns:
  - Potential effects to the immune system.
  - Potential increased risk for certain cancers: liver, kidney, and non-Hodgkin's lymphoma.
- Short-Term Exposure Concerns:
  - Short-term exposure at sufficient dose is now of immediate concern with TCE due to the potential for fetal heart malformations.

# VI Investigations



A VI investigation is typically conducted in a phased approach, with buildings closest to the known contamination being tested first.

If VI is found to be a concern, the sampling area is expanded to fully define the area of concern.

# Evaluating Results and Determining Response Actions for VI Investigations

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Sampling data is compared to levels developed to be protective for even sensitive individuals and that consider the potential for both cancer and non-cancer effects:

- For carcinogens, risks are estimated as the probability of an individual developing cancer over a lifetime as a result of the exposure.
- For non-carcinogens, a threshold level is used below which adverse health effects are not expected to occur.

# VI Mitigation



There are a variety of options with VI mitigation, the most common being installation of a sub-slab depressurization system.

VI mitigation is regarded as an interim action to provide human health protection until the remediation of subsurface contaminant sources is complete.

# For any health-related questions, contact:

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