Actionable Science for Communities

SHC Task 3.61.4 – Vapor Intrusion

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Problem Summary & Decision Context

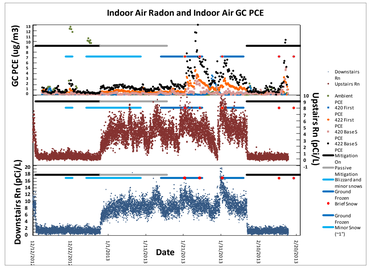
Vapor intrusion (VI) occurs when there is a migration of vapor-forming chemicals from any subsurface source into an overlying building. Recognition of soil vapor intrusion to buildings and other enclosed spaces occurred in the 1980s with concerns over radon intrusion. Subsequently, there was an increasing awareness that anthropogenic chemicals (e.g., petroleum hydrocarbons and chlorinated solvents) in soil, ground water, sewers, and drain lines could also pose threats to indoor air quality via the vapor intrusion pathway. Potential problems due to VI range from non-life-threatening odors to acute health impacts, explosions, or long-term chronic health effects.

The vapor intrusion research task is focused on filling in the knowledge gaps identified by the Office of Research and Development, Office of Land and Emergency Response and Regions. This information will, in turn, be incorporated into the next guidance issued by the Agency.

Task Overview

Vapor Intrusion is one area of emphasis that deals with the prominent issues related to contaminated sites. Focus areas for 4 Vapor Intrusion includes research on:

- Vapor pathways: distribution and movement of VOCs from groundwater through soil to the surface/subslab, and into a residence/building;
- Vapor sample collection techniques – active and passive sorbers;
- Sampling materials: influence of tubing type used to collect soil gas samples;
- Sampling probe/well installation: time required to reach dynamic concentrational gas equilibrium after installation;
- Short-duration screening to equilibration testing of the fan method to induce maximum vapor intrusion;



- Mitigation systems: effectiveness of mitigation systems to reduce or eliminate vapor intrusion;
- Timing of sampling events: using simple, inexpensive, and rapid measurement devices to predict when peak vapor concentrations will occur; and
- Use of soil vapor extraction system to prevent/reduce vapor intrusion.

Accomplishments

Over the last several years, we have produced a series of 4 EPA reports and related journal articles on research performed to look at vapor intrusion into a historical duplex in Indianapolis, Indiana. The results have provided the Program Offices and Regions with vital information that has been directly incorporated into the latest vapor intrusion guidance document released in mid-2015 entitled, “OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.”

Future Directions

In the near-term future, it is anticipated that the vapor intrusion research area will examine:

- the use of soil vapor extraction (SVE) to control vapor intrusion
- the effect of concrete impervious surfaces on the distribution and remediation of VOCs
- the effectiveness of portable adsorption systems for removing chlorinated volatile organic compounds from indoor air

In the near- to mid-term future, the evaluation and refinement of a high-purge volume approach for sampling subslab soil gas is warranted. This research would address the need for the development and demonstration of accurate, low-cost, and less intrusive sampling methods for characterizing sub-slab soil gas concentrations.

Longer-term future research will examine:

- air quality issues related to the use of multiple subslab depressurization systems to mitigate VI on the neighborhood scale
- VI in large commercial building
- identification and contribution of the preferential pathways need to be addressed as they relate to sampling variability in soils and under the subslab and the resultant their potential impact upon decisions that will be made based on the results.