

Vapor Intrusion to Indoor Air—Update

Vapor Intrusion

Several years ago, vapors from a gasoline groundwater plume were found in houses in Colorado. A provocative article appeared in the Denver Post, which touched off a firestorm of concern, fear, and controversy. Today the controversy of how to assess the potential impact of vapors from subsurface contamination, persists. The issue affects infill and Brownfield property development, remediation clean-up goals for soil and groundwater, and engineering building design.

Vapor intrusion is defined as the “migration of volatile chemicals from the subsurface into overlying buildings” (USEPA 2002). Volatile organic compounds such as methane, benzene or trichloroethene (TCE) emit vapors that may migrate through soil and into the indoor air of overlying buildings in ways similar to that of radon gas seeping into homes.

This *InfoLite* provides an update of the ongoing discussion.

EPA

The USEPA is in the process of revising vapor intrusion guidelines. Two groups, the Office of Solid Waste (OSW) and the Office of Underground Storage Tanks (OUST), plan to have revisions for internal review late 2006. In our recent conference call with Henry Schuver of OSW, the revision status was characterized as, “being a bit complicated right now primarily due to some fairly recent observations, as presented in our recent workshop at AEHS in San Diego.” The full presentations are available at their Indoor Air Vapor Intrusion database website <http://iavi.rti.org>.

California

California is in process of updating their February 7, 2005 *Interim Final, Vapor Intrusion Guideline*. According to Dan Gallagher of the DTSC, they are currently generating responses to the public comments on the February 2005 *Interim Final Vapor Intrusion Guidance*. DTSC plans to await the revision of the USEPA guidance document before revising their document due to new information concerning the future building scenario, recommended soil gas sampling depths, Johnson & Ettinger Indoor Air Model EXCEL spreadsheet changes, inclusion of biodegradation of petroleum vapors, and engineering controls. http://www.dtsc.ca.gov/ScienceTechnology/HERD_POL_Eval_Subsurface_Vapor_Intrusion_interim_final.pdf

American Petroleum Institute

The American Petroleum Institute (API) has recently issued their approach regarding vapor intrusion, *A Practical Strategy for Assessing the Subsurface Vapor-to-Indoor Air Migration Pathway at Petroleum Hydrocarbon Sites*, API Publication 4741, November 2005. <http://groundwater.api.org/soilgas>.

The API focus is on collection of soil gas samples for assessing the significance of the subsurface-vapor-to-indoor-air exposure pathway and complements API and USEPA guidance (API 1998 and USEPA 2002). It provides more in-depth information on issues associated with soil gas sampling and data interpretation as applied to transport pathway assessment. This document is focused on petroleum hydrocarbon sites, however, the information is applicable to all soil gas sampling. It allows for flexibility in the selection and refinement of practicable and defensible sampling

methods. The focus here is on identifying key issues associated with soil gas sampling and data interpretation.

References

American Petroleum Institute (API). 1998. Publication No. 4674. Health and Environmental Sciences Department. Washington D.C.

United States Environmental Protection Agency (USEPA). 2002. OSWER Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). November 29.

<http://www.epa.gov/epaoswer/hazwaste/ca/eis/vapor.htm> Draft.

Common Ground

Though there are areas of disagreement regarding *vapor intrusion*, the following are generally agreed upon by scientists and regulators in the practice:

- The knowledge and science related to human health exposure from vapor intrusion to indoor air is rapidly evolving,
- The risk of exposure from vapor intrusion is relevant for both volatile and some semi-volatile chemicals (e.g. naphthalene),
- The preferred data for evaluation of vapor intrusion is good quality and representative soil gas samples,
- Indoor air sampling often leads to erroneous and misleading information and analysis, and
- Obtaining and understanding a valid *attenuation factor* α (= ratio of indoor air concentration to soil gas, subslab, concentrations) is key to predicting potential indoor impacts.