

IS VAPOR INTRUSION A CONCERN AT YOUR SITE?

By Dan T. Stump, CHMM



Vapor intrusion (VI) is defined as vapor phase migration of volatile organic and/or inorganic compounds into buildings from underlying contaminated ground water and/or soil. Vapor intrusion requires three components: a source of contamination with sufficient mass that contains volatile chemicals, a structure with the ability to accumulate volatilized chemicals at sufficient levels to cause a threatening environment to individuals, and a pathway from the source into a qualified structure (i.e. conductive soils and cracks in the building floor). For years, subsurface contamination investigations have primarily focused on the assessment and remediation of contaminated soil and groundwater as a means of reducing or eliminating direct exposure routes, such as ingestion and dermal contact. Until recently, VI was not routinely considered in petroleum or hazardous waste investigations. So why is VI being considered now? First, there is a new regulatory awareness given several highly publicized sites in the western United States. Second, more recently employed site closure options, such as natural attenuation monitoring or engineering and institutional controls, may allow higher levels of contaminants to remain at the site than in the past. As such, there is a potential for ongoing exposure through VI at these locations.

So how is it determined if VI is a concern at your site? Initially, one would ask “why not collect and analyze air samples within the building?” This may be effective in structures with grossly contaminated atmospheric conditions utilizing portable detection devices (i.e. combustible gas meter, organic vapor analyzer, etc.) or laboratory analyses. However, in scenarios involving relatively low levels of volatilized chemicals that present a chronic long-term exposure, portable detection devices normally lack the range for positive identification. Additionally, laboratory analyses of air samples may lead to false positive results, as many of the same volatile chemicals present in contaminated soil or groundwater are also present in many commonly used commercial products (i.e., paints, glues, cleaners, construction materials). One alternative to direct sampling is to model potential VI based upon available soil and groundwater analytical results. However, this method is not recommended as the basis for determining the need for remediation or for assessing long-term exposure potential.

Currently, the Florida Department of Environmental Protection (FDEP) is conducting assessment activities on a number of petroleum- and dry cleaning-impacted sites across Florida to gauge the importance of the VI pathway in Florida, better understand which types of sites may be affected, and determine the level of background concentrations and variability that are likely to be encountered. Ultimately, a decision will have to be made as to whether incorporation of the VI pathway into default values is warranted, or continued use of site-by-site assessment is more feasible.

Vapor intrusion of contaminants into structures has also increasingly become a concern as part of property transactions. While regulatory officials continue to evaluate how VI should be addressed in Florida’s cleanup programs, *ASTM E 2600-08 Standard Practice for Assessment of Vapor Intrusion in Structures on Property Involved in Real Estate Transactions* currently provides a relatively fast and inexpensive screening process to assess potential VI within indoor environments. This procedure was developed as a voluntary supplement to *ASTM E 1527-05 Standard Practice for Environment Site Assessments: Phase I Environmental Site Assessment Process*, with a goal of identifying whether or not a VI condition (VIC) exists or is likely to exist on the property. A VIC is defined as the presence or likely presence of any chemical of concern in the indoor air environment of existing or planned structures caused by the release of vapor from contaminated soil or groundwater, either on the property or within close proximity to the property, at a concentration that presents or may present an unacceptable health risk to occupants.

ASTM E 2600-08 utilizes a relatively conservative four-tiered screening process. The first two tiers are designed to quickly and inexpensively identify whether a VIC exists onsite. If the VIC is not screened out at Tier 1 or Tier 2, the process identifies three options: (1) proceed to Tier 3, which consists of a more site-specific and comprehensive investigation; (2) proceed directly to mitigation (Tier 4); or (3) conduct an additional investigation to achieve a higher level of assurance that a VIC exists. Currently, several changes are planned for the *ASTM E 2600-08* standard that should improve its practicality, clarity, and consistency. It is anticipated that the revised standard could be available by the end of 2009.

As previously mentioned, *ASTM E 2600-08* is a stand-alone voluntary supplement to, and does not replace, expand, or otherwise change *ASTM E 1527-05*. As such, VI is generally not included within the standard scope-of-services for a Phase I ESA. However, VI can be included as a supplement to Phase I and/or Phase II Environmental Site Assessments.

Dan Stump is an Environmental Scientist in Chastain-Skillman's Lakeland Office. His work focuses on Phase I and Phase II Environmental Site Assessment (ESA) and site rehabilitation projects. Dan received a Bachelor of Science Degree in Environmental Biology from Eastern Illinois University. Dan is also a Registered Environmental Manager (REM), Certified Hazardous Materials Manager (CHMM), and a Certified Florida Environmental Assessor (CFEA). He can be reached at 863-646-1402 or dstump@chastainskillman.com.

© 2009 Chastain-Skillman, Inc. This article is taken from the 3rd quarter 2009 issue of Consultant's Update, a publication of Chastain-Skillman, Inc.