

# Vapor Intrusion Studies



## Areas of Expertise

- Regulatory Analysis
- Measurements
- Modeling
- Risk Assessment
- Risk Communication
- Mitigation
- Litigation Support

## More Information

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## Key AECOM Attributes

As the #1 Environmental Firm in the world, our size and service diversity is an advantage in VI studies, offering a cost-effective mix of national experts and local staff to meet our clients' needs. Our interdisciplinary teams include expertise in geology, hydrology, risk assessment, air measurements, data validation & laboratory audits, building design, ventilation, industrial hygiene, ambient air quality, etc. This expertise is utilized as appropriate for a given site.

## Overview

Vapor intrusion (VI) is a growing environmental concern for anyone who owns, leases, operates, or occupies a building. Vapor intrusion occurs when chemicals present in soil or groundwater volatilize, migrate through the soil and enter an overlying building or structure. This process can pose health risks to people living or working in the building. The issue generally needs to be addressed for buildings at the point of the original release and for any nearby or downgradient buildings. Therefore, it can be a concern for both current and future buildings, and can involve industrial, commercial, and/or residential buildings. Vapor intrusion presents a substantial challenge for site managers and can be a high-profile issue with implications for a company's reputation.

AECOM has 20+ years of experience assisting our clients at hundreds of sites to solve their vapor intrusion challenges, in a technically-sound, cost-effective manner.

## Our Approach

AECOM first determines the overriding goal of our client, whether it is to:

- Reach a determination as quickly as possible; or
- Proceed in a logical, stepwise manner to determine which buildings, if any, may be impacted; or
- Minimize disruptions to occupants of residential buildings.

In some cases, the goals may vary depending on the building type and usage. For example, a day care center may be addressed differently than adjacent industrial buildings.

Our next step typically is to review the available information and develop a conceptual site model (CSM) that summarizes what is known and not known about the site to guide any future work. As new data become available, they are compared with predictions based on the CSM. Either the CSM is confirmed or it is revised or updated, as necessary. In this way, we move towards an “off ramp” to complete VI studies at a given site and avoid endless rounds of data collection that fail to serve any useful purpose. The CSM serves as a roadmap for regulators and other interested parties.

## Areas of Expertise

**Regulatory Analysis.** VI guidance in the US is a patchwork of Federal and State documents. AECOM has been a leader in summarizing and interpreting the various guidance and standards related to VI. We offer our clients approaches that help them balance the need to meet both the applicable local guidance and their portfolio-wide risk management objectives.

**Measurements.** AECOM provides a full range of services for environmental sampling, including groundwater, soil, geophysical, soil gas, sub-slab vapor, indoor and outdoor air, and building ventilation measurements. This work ranges from tests at a single building to extensive measurements at about 250 single-family houses in a subdivision.

Our in-house expertise in air measurements, indoor air studies, and volatile organic compound (VOC) analysis, helps us select the best sampling and analytical options for a given site, develop data quality objectives, ensure that the detection limits meet the project needs, and limit target compound lists to avoid false positive or otherwise misleading results.

Our experience includes various innovative approaches, such as routinely using radon as a tracer to develop site-specific attenuation factors, performing high-volume sub-slab vapor sampling to minimize the number of monitoring locations, and using compound-specific isotope analysis to differentiate among potential sources.

**Modeling.** Regulators have moved away from relying upon modeling as the primary line of evidence for evaluating VI at existing buildings. Nonetheless, it continues to be a useful tool. AECOM uses the Johnson & Ettinger (J&E) Model, BioVapor, attenuation factors, etc. to predict soil gas concentrations and indoor air impacts, as well as to evaluate various “what if” scenarios. For undeveloped land

or future use scenarios, modeling continues to be the primary approach to evaluate VI. AECOM’s expertise in fate & transport modeling helps ensure that we generate defensible output with an appropriate level of conservatism.

**Risk Assessment.** Data evaluations are performed to determine what portion of the detected indoor air concentrations may be attributed to the VI pathway. Once this important step is complete, we can determine the potential risk associated with the incremental increase in concentration due to VI for chemicals present in indoor air. Evaluations range from a simple screening to a site-specific risk evaluation.

**Risk Communication.** No single test result can determine whether or not VI is occurring. Instead, various lines of evidence must be reviewed and appropriately weighted in the evaluation process. This presents challenges for presenting and explaining the results to regulators, building occupants, and other stakeholders. AECOM uses data formats and other tools that have proved successful in conveying test results to the public, whether in written form or at public meetings.

**Mitigation and Remediation.** If vapor intrusion proves to be a concern, AECOM’s remediation experts design, install, operate and maintain mitigation measures. These may be a passive or active sub-slab depressurization system (SSDS) for a given building or a larger-scale site remediation approach such as air sparge/soil vapor extraction (AS/SVE). For existing large industrial buildings, we typically evaluate whether mitigation is needed across the entire building slab or whether a localized approach may be more cost effective. For new construction, AECOM’s expertise in design & build ensures that the proposed environmental solution will interface seamlessly with the building design to avoid project delays or impacts to site operations.

**Litigation Support.** AECOM’s scientists and engineers have been leaders for many years in researching VI issues and sharing results at technical conferences and in leading journals. In addition, AECOM staff has worked through organizations such as the Interstate Technology & Regulatory Council (ITRC) and ASTM to develop consensus tools and approaches to address VI. We use expertise gained in these activities to support our clients in toxic torts, contract disputes, or other litigation matters involving vapor intrusion. These services include testifying at jury trials and at Daubert hearings for cases where >\$5 million per plaintiff was sought at trial.