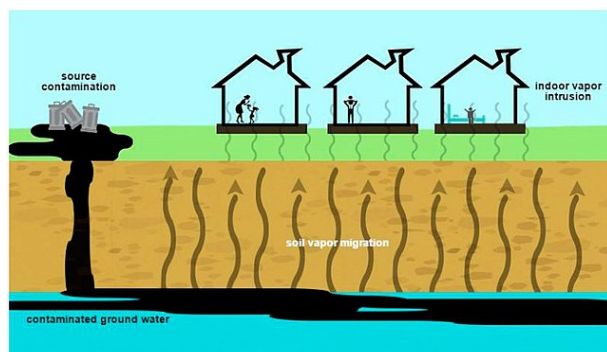




THE CUBICAL

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Evaluating Vapor Intrusion Risks: Common Threads in Federal & State Guidance



Vapor intrusion ("VI") occurs when harmful chemicals or substances in the soil or groundwater migrate into a building and contaminate the indoor air. It has been a significant concern for both EPA and state agencies for a number of years, as it poses potentially significant risks to occupants of impacted buildings. To address this

issue, EPA and many states have developed and issued guidance for the assessment and mitigation of VI risks. These guidance documents vary significantly in terms of style and content. Despite this variation though, a survey of a sampling of these guidance documents reveals several common threads of interest, which are as follows:

1. *Development of a Conceptual Site Model*

One of the key tasks when evaluating VI is the task of developing and refining a *conceptual site model* ("CSM") for VI risks and exposures. The purpose of a CSM is to identify the potential sources of contamination that might find their way into buildings, as well as the VI pathways by which the contaminants might get there. A CSM allows one to get an initial sense of whether, and to what extent, VI might be a risk. For example, a CSM may reveal that there is no completed pathway for contaminated vapors to reach human receptors inside a building. If this is the case,

then VI does not really present a risk for that particular building. In addition, federal and state guidance documents call for a CSM to be continually updated as a VI evaluation progresses. It's possible that as such an evaluation progresses, impediments to what was initially believed to be a completed exposure pathway may be identified.

2. Reliance on Multiple Lines of Evidence

Applicable federal and state guidance documents favor a *multiple lines of evidence* approach to assessing VI risks. Under this approach, data and evidence from multiple sources are collected and analyzed to provide a more comprehensive understanding of VI risks. These sources typically include: (i) concentrations of contaminants in groundwater, soil, sub-slab, or exterior soil gas; (ii) concentrations of contaminants in indoor air; (iii) confounding sources of contaminants in indoor air (i.e., indoor use or storage of hazardous or toxic materials); (iv) concentrations of contaminants in outdoor ambient air; and (v) the presence of preferential pathways for vapor migration. Combining the results from these, and other, lines of evidence can help identify areas of concern. It can also guide the design and implementation of appropriate remediation strategies.

3. Preference for Remediation Over Mitigation

Federal and state VI guidance documents recognize that mitigation strategies are an integral part of addressing VI exposure risks. They describe mitigation measures such as sub-slab venting systems, sub-slab depressurization systems, and ventilation systems in varying degrees of detail. They also describe the conditions under which such mitigation measures should be implemented.

However, while these guidance documents recognize the need for effective mitigation strategies, they clearly express a preference for permanent remediation measures. As the Massachusetts Department of Environmental Protection ("MASSDEP") states in its *Vapor Intrusion Guidance: Site Assessment, Mitigation and Closure*, "Removal or treatment of contaminated soil and/or groundwater contributing to vapors in the indoor air is the most effective long-term approach for eliminating or mitigating the vapor intrusion pathway." In short, mitigation is considered to be an interim, short-term measure, while controlling the contamination at the source is considered to be a permanent, long-term measure.

Worst First: Prioritizing the Most Impacted Buildings Under California's New VI Guidance

The final draft of California's *Supplemental Guidance: Screening and Evaluating Vapor Intrusion* (the "Supplemental VI Guidance") was released in February 2023. The Supplemental VI Guidance is the product of a joint effort by the California Environmental Protection Agency, the Department of Toxic Substances Control, the State Water Resources Board, the Office of Environmental Health Hazard Assessment, and several regional water quality control boards. It supplements existing guidance, and is intended to promote statewide consistency in site investigations and cleanups.

One of the key features of the Supplemental VI Guidance is its approach to prioritizing buildings for vapor intrusion evaluation. It establishes a "worst first" approach in situations where multiple buildings must be evaluated. The factors to be considered in prioritizing buildings for such evaluation are: (i) proximity to the source, release area, and groundwater plumes; (ii) the existence of vapor conduits; and (iii) occupancy status.

The Supplemental VI Guidance prioritizes buildings that are within 100 feet of the source of contamination. Buildings overlying groundwater plumes are high priorities as well. Buildings overlying shallow groundwater plumes are higher priorities than buildings overlying deep groundwater plumes.

Buildings potentially connected to vapor conduits have a high priority for VI migration evaluation. Conduits may include sanitary sewer pipes, drains, or electrical pipes. Potential connections to conduits are a concern because more conventional methods of evaluating VI migration risks may not detect the migration of contamination through such conduits.

Not surprisingly, occupied buildings have higher priority than non-occupied buildings for evaluating VI migration risks. In terms of occupied buildings, residences, schools, and day-centers have the highest priority.

Of course, the Supplemental VI Guidance only applies to the evaluation of VI migration risks in California. However, the focus of the Supplemental VI Guidance on the need to prioritize buildings in particular situations is an implicit recognition of the unique challenges associated with evaluating VI risks in high-density, urban settings. In this respect, the Supplemental VI Guidance provides a potentially useful set of heuristics for environmental professionals who face some of the same building prioritization challenges when evaluating VI risks in densely populated, urban areas of other states.

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