Evaluating the Vapor Intrusion Pathway:
Incorporating Science and Best Practices into Guidance

Over the past decade, vapor intrusion (VI) has gained significant attention from the regulatory, scientific, and legal communities because of concerns for potential exposure to volatile organic chemicals (VOCs) in the indoor air attributed to subsurface contamination.

The regulatory landscape for VI continues to change in response to the changing science.

Numerous guidance documents have been developed to assist site investigators in assessing whether or not the pathway poses a significant health risk to potentially-exposed individuals in both residential and commercial settings. The development of updated toxicity information for VOCs such as for trichloroethylene (TCE) and tetrachloroethylene (PCE) is among the factors in recent years that have complicated the evaluation of VI. In addition, the U.S. Environmental Protection Agency's (EPA) recent observations and experiences have indicated that there may be greater complexity in the processes and variables that affect the migration and distribution of VOCs than was originally contemplated when EPA issued the *2002 Draft Vapor Intrusion Guidance*. The regulatory landscape for VI continues to change in response to the changing science.

The unfortunate truth is that the recommended approaches to addressing VI are still fragmented into many different state and federal-led programs. While there are some underlying similarities, these tend to be overshadowed by differences in the specific requirements from one regulatory jurisdiction to another. This may be particularly confusing to potentially responsible parties who are working to address VI within multiple states and also to stakeholders who may look to the guidance of other areas when trying to gain an understanding of a complex pathway.

One area that can vary drastically among regulatory programs is the decision as to when and how to sample indoor air. Rather than follow tiered, step-wise investigation approaches, some state regulatory guidance programs drive the need to collect indoor air samples during the initial stage of the VI pathway evaluation. Some regulatory agencies reference the use of data from the past radon studies to suggest that indoor air and long-term sample collection intervals (greater than 24 hours) would be more representative to assess the VI pathway. However, one significant difference between radon and common VOCs of concern for the VI pathway is that there are generally no confounding background sources of radon; what is measured in the indoor air is coming from the subsurface. Somehow this crucial factor has been lost during discussions of lessons learned from the radon industry and how they can be applied to assessment of the VI pathway. When evaluating the VI pathway, the potential and common overlap of site contaminants from subsurface sources and personal, indoor, and ambient sources requires careful consideration. Multiple lines of evidence should be considered to be able to understand the site characteristics and to support the VI pathway evaluation.

New technical approaches for evaluating the VI pathway are still evolving and the scientific community continues to learn from shared case studies. We are making progress and the experiences have led to an improved understanding and approaches for assessing and managing VI. The articles in this issue of *EM* address some of the key regulatory and policy issues of current interest. They should serve to both educate and stimulate further debate. **em**

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