# The Emerging Threat To Indoor Air Quality

New science and tightening guidance on vapor intrusion are forcing facility leaders to rethink indoor air quality, due diligence, and long-term asset plans.

By Alissa Barrow

Environmental risk does not always stay where you left it. Consider a formerly industrial property redeveloped into a commercial campus that cleared its environmental review with no red flags. Years later, the facility manager receives an unexpected call from state regulators who want to reopen the file. New guidance on "vapor intrusion" means the site can no longer be considered safe based solely on older groundwater and soil data.

Suddenly, a topic that once existed only in environmental reports and consultant memos is at the center of questions about indoor air quality, lease negotiations, and capital planning. For facilities teams under pressure to deliver healthy, ESG-ready buildings, the possibility that imperceptible, yet harmful vapors from legacy contamination — or even the sewer network — could find their way into occupied spaces is more than just a technical nuance. It is a risk that can reshape how they manage existing portfolios and evaluate new projects.

Vapor intrusion occurs when vapor-forming chemicals migrate from contaminated soil or groundwater into an overlying building. This process is often compared to radon seeping into basements. The Environmental Protection Agency (EPA) notes that volatile organic compounds, such as chlorinated solvents and petroleum hydrocarbons, can move through soil and cracks in foundations. These compounds can accumulate indoors, impacting air quality and posing long-term inhalation risks to occupants.

For many years, facility leaders have relied on environmental site assessments and "attenuation factors" to treat the issue as largely under control. However, new research and regulatory updates suggest that this approach is incomplete, creating important implications for how facilities approach indoor air quality and "suitable for occupancy" decisions.

*Harmful vapors created by legacy contamination can enter a building through the soil, as well as through sewer and utility networks, impacting a facility's indoor air quality and threatening occupant health.*

## More Than Just Cracks In The Slab

The traditional mental model for vapor intrusion is simple. Contaminants in groundwater or soil vapor diffuse upward and enter buildings through cracks in slabs, utility penetrations, and gaps around sumps or drains. That mechanism is real, and it underpins the EPA's 2015 Technical Guide for assessing and mitigating vapor intrusion at residential and nonresidential sites.

However, in recent years, researchers and regulators have highlighted another, less intuitive pathway — building and municipal infrastructure itself.

Studies and technical reports now describe "preferential pathways," such as sanitary sewers and utility conduits, that can act as express routes for vapors. Rather than being attenuated by soil, vapor-forming chemicals can enter leaky pipes or manholes, travel long distances, and enter buildings through floor drains, cleanouts, or utility entries. Conduit-driven vapor intrusion has been documented at sites with chlorinated solvents, where high concentrations were measured in sewer headspace and in indoor air near plumbing features, even when sub-slab measurements suggested relatively low risk.

For facility managers, this means that a site that appears acceptable based solely on sub-slab sampling could still have indoor air quality issues if the sewer or utility network is acting as a hidden transport system.

Another shift in the science is the recognition that vapor intrusion is often highly variable over time rather than a steady-state condition. The EPA and state agencies emphasize that indoor air concentrations can fluctuate with changes in barometric pressure, temperature, building ventilation, and even the operation of mechanical systems. Short-term spikes may occur during cold weather, low-pressure events, or particular HVAC operating modes, which one-time or short sampling campaigns can miss.

For facilities that rely on a few "snapshot" air samples taken under limited conditions, this raises the possibility that past testing understated the peak exposures that

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matter most for health and liability. Continuous monitoring of indoor air is a powerful tool for evaluating when peak exposures are likely to occur, typically reducing the number of sampling events required and often identifying the root cause of the vapor intrusion issue.

## Guidance Tightens As Rules And Tools Change

Regulators are beginning to incorporate this evolving science into guidance and screening tools, which directly affect how facility risks are evaluated. The EPA maintains a Vapor Intrusion Screening Level (VISL) calculator that provides risk-based concentrations for a large suite of chemicals in indoor air, soil vapor, and groundwater.

As toxicity values are updated and new information becomes available, VISL values and related assumptions can change, sometimes lowering the concentrations that trigger concern. When that happens, facilities that were previously considered low risk may rise above revised screening levels, prompting additional investigation or mitigation.

State environmental quality documents typically emphasize the use of multiple lines of evidence, such as combining sub-slab soil vapor, indoor air, and, sometimes, sewer or utility sampling, and encourage sampling across different seasons or operating conditions. Officials may also refine default attenuation factors, recognizing that one-size-fits-all assumptions can be misleading at complex sites.

For facility executives, the regulatory shift has several concrete implications. Sites that were closed under earlier, less detailed guidance may reopen if new information suggests that evaluations were incomplete. Proposed changes in use, such as converting a light industrial property to office or mixed-use space, may trigger more stringent vapor intrusion reviews than the original construction did.

Lenders, investors, and corporate environmental, social, and governance (ESG) teams are also paying closer attention, asking whether vapor intrusion risks have been evaluated under current standards rather than legacy assumptions. This shifts the focus of vapor intrusion from a narrow environmental compliance issue to a broader discussion of facilities risk management.

## What Should Facility Leaders Do Now?

The emerging picture does not mean that every facility over a groundwater or vapor plume is unsafe. However, it does argue for a more deliberate and documented approach, with significant ROI potential and reduced liability for those who act early.

A useful starting point is simply knowing your portfolio's history. Facilities located on or near historical industrial sites, dry cleaners, landfills, rail yards, or fill areas are more likely to contain subsurface vapor-forming contaminants, even if current uses are benign.

Facility executives should understand what environmental assessments have been conducted, which media were sampled (e.g., groundwater, soil vapor, indoor air, sewers), and when those investigations occurred relative to current guidance. Proactively identifying and addressing these risks can reduce costly disruptions, prevent regulatory penalties, and enhance long-term asset value.

Facilities that delay assessment face last-minute regulatory scrutiny, more intensive indoor air sampling, and costly on-site mitigation implemented during business hours, causing operational disruptions.

## A Proactive Approach Can Mitigate Risk

Both office/retail and industrial owners report that proactive engagement can yield positive ROI, as early intervention reduces future liability exposure, preserves property value, strengthens negotiating positions, and fosters trust among tenants and investors.

Where risk is identified or suspected, mitigation options exist and are well described in EPA and state guidance. Sub-slab depressurization systems, similar to radon mitigation systems, reduce the entry of vapors from beneath foundations by creating a pressure field that safely vents gases outdoors. Additional measures for traditional pathways include sealing cracks and penetrations, improving slab integrity, and installing vapor-resistant barriers.

In cases where sewers or utilities are implicated, agencies and practitioners may consider venting or lining pipes, sealing floor drains, or adjusting building plumbing configurations to reduce vapor entry points.

Facility executives should ensure that any mitigation system is designed, installed, and monitored as part of the broader building operations strategy with clearly defined roles and budgets. Investing in effective mitigation can also deliver ROI by minimizing downtime, safeguarding tenant health, and supporting higher lease rates through improved indoor air quality.

Now is the time to take practical steps: review the facility's environmental history, reassess risks under current guidance, and incorporate vapor intrusion into ongoing air quality and ESG programs.

Taking these actions positions your organization to both manage risks and demonstrate leadership regarding occupant health and compliance.

## An Evolving Understanding

As science advances and guidance becomes more stringent, vapor intrusion is becoming a more prominent factor in defining "safe, healthy, and resilient" buildings.

For those responsible for long-lived assets, the message is less about panic and more about alignment, ensuring that the assumptions built into past assessments, designs, and disclosures align with what regulators and the scientific community now know about how vapor-forming chemicals can enter buildings. This alignment, supported by verifiable sources and clear documentation, is an essential component of a facility's readiness for occupancy. ■

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