



# REMEDIATIONS VAPOR INTRUSION MITIGATION ...Assuring Breathable Air

## OBJECTIVE

While it is often possible to avoid exposure to contaminated soil and groundwater at a release site, it is not possible for building occupants to avoid breathing the air in a building impacted by the migration of volatile contaminants from such a nearby site. To protect the health of building occupants, volatile contaminants must be controlled and prevented from entry into buildings and/or treated to eliminate accumulation of unacceptable levels of exposure.

## CLEAN PROPERTIES' ARSENAL OF WEAPONS

Effective abatement of vapor intrusion potential requires a comprehensive understanding of the specific contaminants' fate and transport characteristics in the site's environmental setting, building structural elements and mechanical systems that provide avenues for vapor entry or accumulation, and occupant behavior and susceptibility to exposure. **Clean Properties'** diverse staff of geochemists, scientists, and engineers averages more than 20 years of experience in the evaluation and mitigation of indoor air quality, radon, and contaminant vapor concerns.

Abatement measures available to **Clean Properties** include control or cleanup of the contaminant at its soil/groundwater source to prevent migration to a building; installation of vapor barriers and sealants to eliminate principal avenues for vapor entry into the building, particularly via foundation cracks, sumps, utility conduits, etc.; implementation of indoor-air treatment systems such as filtration through carbon or zeolite adsorbents, ozonation or photocatalytic oxidation, or reactive precipitators to remove contaminants from building air; modification of operational parameters of existing heating, cooling, and ventilation systems to adjust pressure differentials between the building's interior and sub-building vapors or to increase fresh-air dilution to indoor air; and installation of passive venting or active sub-slab depressurization systems (SSDS). **Clean Properties** has implemented each of these abatement measures with success at appropriate building sites. Although source control and use of sealants should be part of any vapor intrusion abatement strategy, experience indicates that vapor barriers, indoor treatments, and building system modifications on their own seldom provide more than temporary solutions.

Long-term control of unacceptable vapor intrusion is best provided by installation of an appropriate SSDS, equipment that has long been demonstrated also to be effective in the control of radon entry and accumulation in buildings. SSDS systems can be integrated into new building design or can be retrofitted into most existing structures. Simplistically, SSDSs work by using blowers to create a negative pressure in sub-slab soils, with evacuated vapors discharged to the atmosphere above a location of potential exposure by building occupants. If contaminant concentrations in SSDS discharges exceed specified thresholds, treatment of the exhausted air must also be implemented using one or more of the techniques previously discussed for indoor air treatment. The principal limitation on the installation of a SSDS is the requirement that some unsaturated soil must underlie the building foundation, with groundwater not in direct contact with the foundation slab. SSDSs must be designed to reflect building size and geometry and the permeability of sub-foundation soils to vapors such that depressurization is achieved across the entire building footprint as a barrier to vapor intrusion.

Recent changes to the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000, allow for sites that demonstrate a Condition of No Significant Risk for contaminant exposure in soil and groundwater but that require continued operation of a SSDS or similar engineered system to control potential vapor intrusion exposures to meet the criteria for a Permanent Solution with Conditions. If SSDS operation is the only condition required, an Activity and Use Limitation (AUL) need not be implemented as part of the Permanent Solution. SSDS systems operated as part of a site cleanup must be fitted with telemetry systems to notify building owners, system operators/consultants, and MassDEP regulators of any system shutdowns or failures — thereby assuring that the systems are promptly repaired and maintained operating appropriately. **Clean Properties** was one of the first consulting firms to install telemetry systems at its SSDS sites in compliance with MassDEP monitoring requirements.

## EXPERIENCE

**Clean Properties** President, P.E., and LSP Marcia Berger and her staff have many decades of experience designing, installing, and operating radon mitigation, vapor-intrusion mitigation, and other sub-slab depressurization systems in a variety of complex environmental and building settings. **Clean Properties** is fully equipped to install sub-building SSDS recovery points, test soil gases and permeability, monitor SSDS pressure differentials and exhaust chemistry, and evaluate SSDS effectiveness on indoor air quality and exposure risks. Phil Anthes, former consultant to the Massachusetts Department of Public Health and Chair of ASTM Task Group E06.41.03 on Radon Mitigation, said of **Clean Properties'** vapor-mitigation activities,

“Over the years of my knowing Ms Berger, she consistently takes the time to fully understand each vapor remediation project we have worked on together. Her company has excellent workmanship.”

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