Sub-Slab Depressurization (SSD) Systems for Dry Cleaners

Dry cleaners have long been an environmental concern due to their use of chlorinated solvents and the nature of these chemicals to penetrate beneath concrete slabs, into the subsurface, and spread through groundwater. While many modern dry cleaning businesses use a less harmful petroleum-based cleaning chemical, or other non-toxic compounds, there are still many sites out there that have residual solvent issues from long ago. When assessing subsurface conditions, there are 3 distinct "phases" in which contaminants can reside or be transported: soil, soil vapor and groundwater. Traditionally, the soil and groundwater phases are the ones that consultants have always focused on in Phase 2 subsurface testing. Until more recent times, the soil vapor phase was often not considered. Regulatory agencies have always had standards and set allowable maximum levels for the soil and groundwater phases. Only recently have these standards been implemented for soil vapor.

Contaminated soil vapor has become a highlighted concern due to notable cases where only the soil and groundwater pathways were checked. The soil vapor was never considered and, later, a big problem was detected that originally had been overlooked by interested parties. This then resulted in finger-pointing and, of course, lawsuits, eventually prompting the ASTM committee to revise the E1527 standard for conducting Phase 1 ESA's. Now, the current standard requires consultants to address Vapor Encroachment Concerns (VECs) in a Phase 1 ESA report. So, for those in the business of commercial real estate acquisition or financing, it is likely you are going to hear about soil vapor concerns during environmental due diligence. And, when the soil vapor is contaminated, something needs to be done to clean it up or, at a minimum, ensure that the vapors do not get through the concrete foundations and breathing space of nearby buildings and structures. Just the mention of an "environmental remediation" project can bring concern to the minds of many real estate professionals who fear the high price tag that cleanup projects are often associated with.

With respect to the management of elevated concentrations of soil vapor, EBI recommends one of two potential approaches to address the VOC residue in soil vapor below the site: 1) soil vapor extraction (SVE); and 2) installation of a sub-slab depressurization (SSD) system.

SVE is a more aggressive approach that attacks the plume to reduce concentrations. The SVE system would involve the installation of several 5' to 15' deep SVE wells and a treatment compound, including a 10 HP blower and carbon filtration system. Should the client desire to remediate the site through SVE, EBI would recommend requesting oversight of the project through the county or state Voluntary Remediation Program (VRP). In addition, permitting from the local air quality management district would most likely be required for an SVE system; this would include monthly testing and quarterly reporting to the local Air Quality Monitoring District (AQMD) during the remediation process.

An SSD system is designed to create a negative pressure below the building slab to prevent vapors from entering the building. The SSD system would include installing shallow wells into the aggregate or sand base immediately below the concrete building slab and create a vacuum below the slab using small scale blowers/fans. While there will be some contaminant reduction via SSD, it will be much slower than SVE as the SSD system is primarily designed to create a negative pressure below the slab and prevent vapor intrusion. For cases where the release has not caused any impacts to groundwater, and the only sensitive receptor of the contamination would be through vapor intrusion, an SSD system would be an effective and less costly alternative compared to SVE.

The sub-slab system is a relatively simple system that employs existing technology used by Radon mitigation contractors for years. The system includes removing contaminated soil vapor at flow rates high enough to create a vacuum below the slab, yet low enough to not require permitting through the local air quality management district. With either the SVE or sub-slab methods, a pilot test is performed to confirm that the technology will effectively remove the contaminant, or in the case of the sub-slab system, to confirm that the system will provide a level of protection to protect tenants. The goal of the pilot test is to identify site specific parameters, including vapor concentration, flow rate and radius of influence.

The range of costs for the SSD and SVE systems can be highly dependent on site conditions, but for a typical 25' x 80' dry cleaner, an SSD system can be installed for about $30K to $60K. These systems can typically be installed and operated without permitting with regulatory agencies. On the other hand, the cost for an SVE system can range from $250 to $500K, depending on site conditions. In addition, the installation and operation of an SVE system typically would require regulatory oversight and permitting from the local air quality management district.

In either case, follow up testing, operations and maintenance (O&M) will be required for both the SSD and SVE systems. For the SSD system, O&M typically includes monthly site visits, inspections and monthly laboratory testing to confirm that vapor removal does not exceed requirements of the local AQMD. For the SVE system, monthly O&M and testing is also required, as well as reporting to regulatory agencies and the AQMD. Depending on the site conditions, cleanup via either SSD or SVE can take anywhere from 6 to 18 months.

EBI has successfully installed both types of systems and have successfully cleaned up former dry cleaner sites via SVE. With SSD, we are excited to offer our clients a low-cost alternative to the more costly SVE system.

To contact an expert or to request a quote on the remediation services described here, or any other environmental due diligence needs, please email us at info@ebiconsulting.com.