

# VaporSafe™ Continuous Air Monitoring for a Sustainable Solution to the Vapor Intrusion Pathway at a Non-Residential Facility

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**Background/Objectives.** TRC has been assisting with site investigation and cleanup at a USEPA Region V RCRA Corrective Action Site. Corrective Action for the Site, as outlined in the Final Decision, is largely complete. However, new remediation goals were established for the Site in 2016 after USEPA published revised trichloroethene (TCE) toxicity values. As a consequence of the new remediation goals, a passive sub-slab ventilation (SSV) system was installed and short term indoor air monitoring was completed to demonstrate system effectiveness. Despite favorable indoor air sampling results, USEPA was hesitant lift the occupancy restrictions which would return the 225,000 square foot building to full industrial use, since recent risk assessment guidance raises concerns with short-term TCE exposures during pregnancy.

**Approach/Activities.** Due to tight clay soils beneath the majority of the building footprint, active mitigation throughout the 150,000 square foot restricted area would be very costly. However, the continuation of traditional 8-hr canister indoor air sampling on a quarterly basis, may not have ever addressed concerns with short-term data variability. Therefore, TRC recommended using the VaporSafe™ Automated Continuous Real-Time Vapor Intrusion Monitoring and Response System (VaporSafe™). VaporSafe™ is equipped with a gas chromatograph (GC), which is deployed on site to provide real-time indoor air results. During the initial phase of the project, air samples were collected for direct injection into the GC to provide rapid response, real-time analysis to identify preferential pathways and evaluate how changes to the system (e.g., closing a door) affect indoor air concentrations. Following this initial assessment, a multiplexed, automated system to collect continuous samples from twelve sample locations over a period of several days was set up. Differential outdoor/indoor/sub-slab pressure measurements were also collected over the same time period. Concentration and pressure data were then used as a basis for highly targeted building improvements. After building improvements were completed, the VaporSafe™ system was deployed a second time to document post-mitigation building conditions.

**Results/Lessons Learned.** TRC evaluated the data to better understand the variability of TCE in indoor air as well as the potential effect of preferential pathways and variable pressure on vapor intrusion. Data were used to identify encroachment locations and an indoor air source unrelated to historical operations (brake degreasing in an area of the plant where the current tenants are operating a garage). Additionally, TRC could document how atmospheric pressure, wind speed, and site operations (air compressor) affected indoor air concentrations. These data have allowed TRC to recommend targeted, cost-effective modifications to the existing structure/SSV system to address those areas with lingering vapor intrusion concerns. Ultimately the mitigation and two one-week continuous air monitoring events cost approximately \$150,000, followed by an anticipated annual energy use of ~3,000 kW-hr. By contrast active mitigation throughout the entire restricted area likely would have had a capital cost on the order of \$1 million with an anticipated annual energy use in excess of 50,000 kW-hr. Use of the VaporSafe™ system is expected to result in a 94% reduction in energy use while providing assurance that TCE does not pose an unacceptable risk to current or future building occupants.