

## New Insights into Exposure through Preferential Pathway Vapor Migration

*Megan Hamilton* ([mhamilton@enviroforensics.com](mailto:mhamilton@enviroforensics.com)), Casey McFall, CHMM, and Grace Randall (EnviroForensics, LLC, Indianapolis, IN, USA)

**Background/Objectives.** It is well understood throughout the scientific community that contaminant vapor migration can occur through preferential pathways, potentially leading to adverse human health exposures. What is not well understood, is which preferential pathways are most likely to allow contaminated vapors to reach the indoor air of a structure and create the potential to adversely affect human health, and how to best identify them. Most regulatory vapor intrusion guidance documents mandate some sort of preferential pathway investigation. The typical preferential pathways addressed in these regulatory guidance documents include, but are not limited to: sewer and utility corridors, cracks and holes in building foundations, sump pits, and naturally occurring preferential pathways, such as karst geology. A trend continues among regulators and vapor intrusion professionals of placing emphasis on the subsurface utility corridor backfill material as the main indicator of preferential pathways. The objective of this study is to further our existing study to determine if subsurface utility corridors are a reasonable preferential pathway to use as the crux for this category of vapor intrusion screening criteria. An existing database of empirical data derived from a study set of structures located at or near contaminated drycleaner sites, where a preferential pathway has been documented, will be updated and used to correlate the presence of contaminant vapors in an adjacent utility corridor, to the presence of that contaminant in the indoor air.

**Approach/Activities.** The database includes a portfolio of sites contaminated by subsurface releases of chlorinated solvents where utility corridor backfill has been documented as a vapor migration pathway. The database was originally developed in March 2017 and included evaluation of twenty-six (26) individual structures from 14 different sites located throughout Indiana. This database will be updated to include at least ten (10) additional structures that have been subject to recent preferential pathway assessment. The study set is comprised mostly of residential and small commercial buildings, along with a couple of larger commercial buildings and mixed-use structures. Sub-slab and indoor air analytical data are analyzed alongside soil gas samples collected from the identified utility corridors to determine whether a completed vapor intrusion pathway exists through the utility corridor.

**Results/Lessons Learned.** From the original database, only two of 26 structures (8%) identified as being directly connected to a vapor migration preferential pathway had indoor air detections at concentrations exceeding the health protective levels set by the regulatory agency. The utility corridor backfill around the sanitary sewer was the identified preferential pathway in each case. The conclusions thus far indicate that the relationship between the presence of elevated soil gas within the utility corridor backfill leading to a completed exposure pathway within the indoor air, at concentrations with the potential to adversely affect human health may be overstated. As regulatory requirements continue to rely heavily on the utility corridor backfill material as a vapor intrusion screening device, further empirical data are needed to determine whether this is a reliable method for vapor intrusion assessment. The expansion of this database will help make this determination.