Using Vapor Pins® for Source Characterization

The Vapor Pin® is ideally suited for locating Volatile Organic Compound (VOC) contamination sources beneath pavement. Our experience is that most sites have sources of contamination that in addition to those associated with underground tanks and degreasing areas. Unsuspected source areas often correspond to former exterior doors that were obscured by later building expansion. Cox-Colvin has located such sources equipped with little more than some Vapor Pins®, a hammer drill, and a multi-gas meter.

Cox-Colvin's approach to VOC source investigation consists of installing Vapor Pins® along a grid, allowing the points to equilibrate, and collecting readings with a multi-gas meter. With a team of two people, we've installed as many as 90 Vapor Pins® in one day, and sampled, removed the Vapor Pins®, and plugged the holes on the following day.

For source characterization, we normally install brass Vapor Pins® in the stick-up configuration on a grid spacing of 20 to 30 feet. We cover the Vapor Pins® with traffic cones and allow them to equilibrate for at least an hour. We then collect field readings with a hand-held multi-gas meter capable of measuring VOCs via Photo-Ionization Detector (PID), oxygen (O_2), and Lower Explosive Limits (LEL). The PID indicates VOC sources. O_2 in soil gas is normally lower than in air, but unusually low levels (<5%), especially with high LEL readings, are characteristic of methane generation (methanogenesis). Methanogenesis occurs when non-chlorinated solvents or other organic matter degrades at too high a rate for O_2 replenishment.

After collecting field readings at all of the sample points, samples are collected from locations with elevated PID readings, and submitted to a laboratory for confirmation. Samples can be collected into evacuated glass vials, Bottle Vacs, Tedlar bags, Summa canisters, sorbent tubes, and potentially other devices. Some containers do not offer low enough reporting levels for vapor intrusion sampling, but low levels are probably not needed for locating contaminant sources.

At the conclusion of sampling, remove the Vapor Pins® and fill the holes with hydraulic cement or caulk. Urethane and polyurethane caulks are recommended by radon mitigation guidance for filling holes and cracks, but they contain VOCs that could interfere with subsequent sampling. Hydraulic cement does not contain VOCs, but it sets up quickly, making it potentially difficult to fill borings to total depth.

After removing the silicone sleeve and other plastic parts from the Vapor Pins®, decontaminated them for reuse. Cox-Colvin has a number of Vapor Pins® that they have used an average of seven or eight times with no breakage or damage.