

Evidence for TCE Degradation in the Vadose Zone: Relevance for Vapor Intrusion (VI) Site Management

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Background/Objectives. Tetrachloroethene (PCE) and trichloroethene (TCE) are commonly expected to behave similarly due to their analogous structures, and are both generally viewed as recalcitrant under aerobic conditions. Thus, VI practitioners expect similar attenuation factors when both compounds are present. However, a number of recent studies suggest this assumption may not be correct both because of differences in solubility and other physical parameters between PCE and TCE and aerobic biodegradation of TCE. The purpose of this paper is to assess the strength of the field evidence for these effects in the vadose zone across multiple sites, and whether these differences can be reasonably expected under certain conditions and thus used for site management decisions.

Approach/Activities. To evaluate TCE partitioning and degradation in the vadose zone, a comprehensive reanalysis of a vapor intrusion databases containing groundwater, slab soil gas, and indoor air data will be conducted. Concentrations of TCE will be evaluated to determine transport through the vadose zone. Furthermore, PCE concentrations will be evaluated and compared to TCE concentrations to determine if differences in transport and degradation exist both across populations of sites and in individual “head to head” comparisons. Recent studies evaluating similar phenomena will be compared to database findings (Lawrence, 2006, Seyedabbasi et al., 2012; Newell et al., 2013; Leeson et al., 2013, Venable, 2015).

Results/Lessons Learned. The results of this review will be used to determine if TCE degradation is naturally and regularly occurring in the vadose zone and whether the differences in physical partitioning of PCE/TCE is influential enough to affect VI site interpretation.