DEALING WITH THE VARIABILITY OF VAPOR INTRUSION DATA

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The vapor intrusion impacts associated with the presence of chlorinated volatile organic contaminant plumes in the groundwater beneath residential areas in New York State have been the subject of extensive site investigations and structure sampling efforts. Although there is reasonably good qualitative correlation between the areal extent of chlorinated volatile organic compounds (VOCs) in the groundwater and the areal extent of impacted structures above, subslab sampling results from neighboring structures above a groundwater contaminant plume often differ by one to three orders of magnitude. It is also common to see an order of magnitude difference in VOC concentrations obtained from same-house sub-slab samples that are only 20 to 30 feet apart. Temporal variability in the concentration of VOCs beneath a structure further complicates the situation. Thus, the heterogeneous nature of the distribution of VOCs in the soil gas beneath the structures not only represents a challenge to previous views that a relatively uniform vapor blanket exists beneath a house, but also, to the practice of making risk management decisions based on point to point comparisons of individual subslab and indoor air sampling pairs. We now view the vapor intrusion process through a conceptual model in which geologic and anthropogenic factors result in contaminant vapor distributions that more resemble a patchy fog than a homogeneous blanket. Sampling results from any one location at any given point in time may not fully represent the range of conditions that could exist at neighboring locations or at other times. Knowledge of these relationships may be important when designing sampling plans to assess the vapor intrusion pathway, and when making decisions regarding the mitigation of structures.