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Modeling Contaminant Vapor Communication between the Subsurface and Indoor in Vapor Intrusion Controlled Pressure Conditions

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Background/Objectives. There has in recent years been increasing interest in understanding the transport processes of relevance in vapor intrusion of volatile organic compounds (VOCs) into buildings on contaminated sites. These studies have included fate and transport modeling. Most such models predicted the indoor air contaminant vapor concentrations based on very simple scenarios, but often results in difficulties in reconciling these results with field measurements.

Approach/Activities. This paper focuses on indoor-outdoor pressure difference as a major factor that may be subject to significant changes and control in vapor intrusion situations. A three-dimensional finite element model was employed with consideration of various real conditions, such as soil types, surface coverage, and the role of these conditions and factors were quantified.

Results/Lessons Learned. Our modeling results showed that indoor air pressure variations are seen to contribute to significant variations in indoor air contaminant vapor concentrations, though beyond a certain point the fluctuations do not influence results very much. Reported field measurements were used to compare with the modeling results, and the implications for controlled pressure method studies will be considered.