

Hydrophobic Contaminants in the Subsurface

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Abstract. Remediation of subsurface soils and groundwater impacted by hydrophobic organic contaminants (HOCs) continues to present a significant challenge. Factors contributing to persistence of hydrophobic compounds include low contaminant solubility and heterogeneity of subsurface soils. Due to their hydrophobic nature, considerable contaminant mass can be stored as Non-Aqueous Phase Liquids (NAPLs) or sorbed to solids. Interbedded zones of low-permeability soils can also store contaminant mass via matrix diffusion. As such, remediation approaches must address contaminants in all of these compartments. Intermediate hydrophobic compounds (e.g., chlorinated solvents) may have aqueous solubilities of 10^2 to 10^4 mg/L. For these compounds, significant contaminant mass may be removed by treating the aqueous phase. Nevertheless, vast quantities can remain as NAPL, sorbed to solids, or stored in low permeability zones. Many traditional remediation approaches have focused on the aqueous phase in transmissive zones only. More recently, approaches such as reactive soil mixing and thermal-based technologies have been developed to address contaminants in all phases. Some strongly hydrophobic contaminants have solubilities well below 1 mg/L. These include polychlorinated biphenyls (PCBs) and polyaromatic hydrocarbons (PAHs). For these compounds, desorption alone can require several decades. To be effective, treatments must reflect this extended time frame. Promising treatment approaches involve combination of reaction and sequestration.

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