One-Dimensional Column Studies of Emulsified Vegetable Oil for Dense Non-Aqueous Phase Liquid Subsurface Remediation

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Abstract. A technique for subsurface remediation of DNAPL’s involves injection of vegetable oil emulsion into contaminated aquifers. Use of this emulsion serves two purposes: to act as a co-solvent to enhance contaminant mobility and to act as a substrate for biodegradation. The purpose of this research is to characterize the extent of contaminant mobilization, and to determine how the oil affects hydraulic conductivity. This study employs one-dimensional, water saturated, sand packed columns to test clean and contaminated columns. All tests apply before and after emulsion-injection tests to determine how it changes each column’s properties. Initial testing with small droplets in contaminated columns shows that mobilization of contaminant is significant for all sand types but there is no significant trend involving media sieve size. Initial testing with small droplets in clean columns shows that there is very little effect on hydraulic conductivity, suggesting that little vegetable oil is left behind. Future testing will use emulsion with larger droplets. It is expected that more emulsion will be entrained in the media, beneficial for future bioremediation, and less PCE will be recovered, not beneficial for contaminant mobilization.