

TECHNOLOGIES FOR *IN SITU* CLEANUP OF CONTAMINATED SITES

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SUMMARY

Groundwater contamination by non-aqueous phase liquids (NAPLs) and denser than water non-aqueous phase liquids (DNAPLs) poses one of the greatest remedial challenges in the field of environmental engineering. Due to low water solubilities and aqueous diffusivities, conventional pump-and-treat technologies have a poor record of success in remediation of DNAPL contaminated aquifers. Better success has been found with the removal of volatile LNAPLs due to higher gaseous diffusivities, propensity for aerobic biodegradation, and ease of pumping and handling large quantities of gas. An evaluation of *in situ* cleanup technologies on the basis of their applicability to *in situ* treatment of NAPL contaminated aquifers is presented. Emphasis is placed on treatment of the separate phase occurring in the saturated zone. Soil washing, air sparging, biodegradation, electro-osmosis, enhanced steam extraction, stabilization/solidification, treatment walls, radio frequency heating, and containment systems and barriers are among the *in situ* technologies reviewed. In the context of the governing contaminant fate and transport processes, the relative merits of each technology are assessed on the basis of its theoretical background, field implementability, level of demonstration and performance, waste, technical and site applicability/limitations, commercial availability, and cost and residuals management.

Key words: groundwater, soil, *in situ* remediation

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