Biosparging successfully limited fugitive VOCs while remediating residual weathered gasoline in a shallow sand aquifer

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Abstract A field trial of biosparging examined if an air injection scheme could be implemented that stimulated biodegradation and avoided the emission of fugitive volatile organic compounds (VOCs) from a weathered gasoline while maintaining effective remedial performance. The objective was to avoid costly off-gas collection and treatment usually required when treating highly volatile light non-aqueous phase liquid (LNAPL) in shallow aquifer systems. The trial was conducted in a sand aquifer where residual gasoline LNAPL contaminated the water table zone at a depth of only 2.5 m. The evolution and fate of the generated VOCs was intensively monitored by multi-level sampling from the vadose zone and flux hoods at the ground surface. A judicious air injection strategy was able to maintain VOC mass flux within the biodegradative capacity of the vadose zone. This was despite VOC concentrations up to 160 000 g L⁻¹ being generated from the LNAPL.

Key words biosparging; air sparging; LNAPL; petroleum hydrocarbon; gasoline; volatile organic compounds; remediation; biodegradation; vadose zone