

Rapidly Reducing Chlorinated Solvents in Multiple Media without Upsetting the Neighbors

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Background/Objectives. Haley & Aldrich was retained to assist in the redevelopment of a brownfields site located across the street from a public school in a densely populated Boston neighborhood. The Site had experienced generations of industrial and commercial use since the 1800s resulting in overlapping and interconnected foundations and utilities throughout the subsurface. Initial response actions identified and mitigated releases of free-phase petroleum, polychlorinated biphenyls (PCBs) and asbestos-containing material (ACM). Trichloroethene (TCE) and its degradation products were identified in soil, groundwater and saturating former structures at concentrations indicative of the presence of dense non-aqueous phase liquid (DNAPL). The project objective was to reach 50 mg/L TCE concentrations in groundwater across the Site and limit potential vapor exposure to the neighboring school and residences.

Approach/Activities. A Site Characterization program consisting of membrane interface probe explorations, geologic characterization and multi-level groundwater sampling was employed to delineate the vertical and horizontal extent of chlorinated solvent impacts. Remediation at the Site was approached as a step-wise program starting with excavation and off-site disposition of impacted construction material, PCB-impacted soil, ACM, and petroleum-saturated soil. Chlorinated solvents were then addressed through in-situ soil mixing utilizing an electron donor and zero valent iron (ZVI) in the shallow soils and groundwater, followed by in situ injection of electron donor and ZVI in the deeper groundwater. A second in situ injection during construction of a building at the Site to further polish groundwater concentrations was also conducted. No bioaugmentation was needed at the Site as native DHC populations were in the range of 10^6 to 10^{10} gene copies per liter following the in situ remedial activities.

Results/Lessons Learned. Judicious use of Rusmar foam, work zone vapor monitoring, perimeter air monitoring and rapid turn analytical sampling of indoor and outdoor air on neighboring properties all contributed to a sound understanding of exposure and risk to sensitive populations. Vadose Zone soil is no longer considered to be an impacted media. Groundwater concentrations have decreased over 90% recorded across most of the Site due to the sequenced groundwater treatments. Plume contraction has been observed in perimeter monitoring wells. From peak concentrations of 710 mg/L of TCE in the fall of 2016, the Site is currently on track to reach the 50 mg/L cleanup goal during 2018 or early 2019. Through the use of a sequenced activity schedule, limited impact to neighboring properties was able to occur while achieving a truncated remedial timeline.