

Combined Remedy Treatment of Multi-Chemical Solvent Plume in Fine-Grained, Low-Permeability Sediments

Bill Brab (bbrab@astenv.com) (AST Environmental, Midway, KY, USA)

Karen Thompson (karent@smithmanage.com) (Smith Management Group, Lexington, KY, USA)

Background/Objectives. A former chemical plant started operations at this site in 1957. The facility stored, repackaged and distributed chemicals, including but not limited to: hydrogen peroxide, methylisobutyl carbinol (MIBC), tetrachloroethene (PCE), acetone, ethanol and diesel fuel. In the early 1980s a release of approximately 29,000-pounds of MIBC was released into the environment, response to the release was to cover the area with black plastic and then sand. Reportedly, as a follow-up, neither free product nor soils were removed. Numerous investigations were completed between 1991 through 1999 identified approximately ten (10) halogenated solvents were present in soil vapor, groundwater, and soil. Dual-phase extraction was utilized from 2000 to 2010 with limited results. Alternative remedial technology was evaluated in 2011, the selected technologies involved a combination of ex situ and in situ methods to achieve the site clean-up goals in a multi-phased approach.

Approach/Activities. High-density qualitative soil and groundwater sampling was conducted in 2011 and 2012 to refine the existing conceptual site model (CSM). High density soil and groundwater sampling verified vertical and horizontal distribution of contaminant mass on and off-site, significant unsaturated mass confirmed a sustained NAPL source for potential vapor intrusion issues in adjacent residential properties and a dissolved solute plume downgradient further off site. A Phased approach utilizing combined remedies was selected as the remedial option for the facility; interim corrective action was completed in 2013 and 2014 and included 1) an off-site in situ permeable reactive barrier utilizing Trap & Treat® BOS 100® to capture dissolved impacts leaving the facility and 2) shallow soil mixing activated persulfate to mitigate unsaturated soil impacts adjacent to source media. Full-scale Phase 1 conducted in December 2016 utilized Trap & Treat® BOS 100® + ERD to mitigate saturated source mass soil and groundwater impacts. Full-scale Phase 2 to be completed in September 2018 will include additional off-site source and dissolved-phase treatment utilizing Trap & Treat® BOS 100® + ERD.

Results/Lessons Learned. The presentation will discuss the development of the CSM over time and highlight the remedial action as a site-specific case study example. Lessons learned and relevant data to be presented will include benefits of high-density indiscriminate (regardless of field screening/field observations) soil and groundwater sampling for qualitative analysis in the laboratory. Remedial evolution will highlight the development, selection, and use of a new and cutting edge application of cometabolic synergy: granular activated carbon impregnated with metallic reactive iron coupled with an enhanced reductive chlorinating biological component. The limiting factor in the majority of abiotic remediation technologies is the finite amount of reducing material, in this case metallic iron. Improvements to the BOS 100® platform will be specifically discussed as part of this case study and remedial technology evaluation.