Update on Iron-Clay Soil Mixing for Remediation of Chlorinated Solvent Source Zones

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Abstract. ZVI-Clay is an *in situ* source remediation technology that uses conventional soil mixing equipment to admix reactive media (zero valent iron) and stabilizing agents (clay) with soils impacted by chlorinated compounds. Reactive media and stabilizing agents are delivered into the subsurface via a grout that is injected concurrently with soil mixing. Through this process, chlorinated compounds in treated zones are depleted and hydraulic conductivity of the targeted zone is decreased. The net benefit is a permanent reduction in contaminant discharge from the treated interval into surrounding groundwater.

DuPont pioneered this technology through research conducted between 1996 and 2002. In 2003, DuPont donated patents covering ZVI-Clay technology to CSU. CSU's current focus with the technology involves technical development and commercialization.

This presentation includes a technology overview and update. The most recent soil mixing application was completed at Site 89 in Camp Lejeune, North Carolina. This site comprised 30,000 cubic yards of soils impacted by 1,1,2,2-tetrachloroethane and trichloroethylene. Preliminary soil treatment data indicates 98 percent average removal of chlorinated VOCs within three months of treatment. Of primary soil contaminants, average PCA levels were reduced from 45,000 µg/kg to detection limits and average TCE levels were reduced from 16,000 µg/kg to 6 µg/kg, a reduction of 99.96 percent. In groundwater, CVOCs were reduced from 226 mg/L to 34 mg/L, a reduction of 85 percent. Degradation is expected to continue with time.

In addition, laboratory studies have been conducted evaluating ZVI-Clay Soil Mixing for additional site applications. Through these studies, new contaminants have been evaluated for efficacy of ZVI-mediated degradation. Positive treatment results were obtained for remediation of 1,2-dichloropropane, with a degradation half-lives ranging from 5 to 15 days depending on iron type and amount. Less positive results were obtained for remediation of bis(2-chlorethoxy)methane. A current research focus involves using this approach for remediation of soils and sediments impacted by polychlorinated biphenyls (PCBs).

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