FIELD APPLICATION OF A REAGENT FOR IN SITU CHEMICAL REDUCTION AND ENHANCED REDUCTIVE DICHLORINATION TREATMENT OF AN AQUIFER CONTAMINATED WITH TETRACHLOROETHYLENE (PCE), TRICHLOROETHYLENE, 1,1-DICHLOROETHYLENE, DICHLOROPROPANE AND 1,1,2,2-TETRACHLOROETHANE (R-130)

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Abstract

Groundwater at an abandoned industrial area near Bergamo, Italy, was historically contaminated by tetrachloroethylene (PCE) (>100 µg/L) and, to a lesser extent, by trichloroethylene (TCE), dichloropropane (DP) and 1,1,2,2-tetrachloroethane (R-130). A liquid reagent (EHC® Liquid) was selected for remediation of groundwater at the site. The reagent is provided in two parts: EHC® Liquid Mix (a soluble organo-iron salt), and ELS® Microemulsion (a lecithin-based carbon substrate), and is designed to promote both in situ chemical reduction (ISCR) and enhanced reductive dechlorination (ERD) to destroy chlorinated organic compounds. The two components are mixed with water and injected into the subsurface. Once in groundwater, EHC® Liquid rapidly generates highly reduced conditions, favouring both biotic and abiotic dechlorination reactions. Less than 6 months after the injection of EHC® Liquid in the main source area, concentrations of the target contaminants had reached the site-specific remediation target values (CSC Legislative Decree 152/06) in the main monitoring piezometers present in the area, thus demonstrating the effective establishment of enhanced biotic and abiotic reducing conditions and degradation of the target compounds.

Keywords: aquifer, chlorinated solvents, enhanced reductive dichlorination, lecithin microemulsion, treatment

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