



Innovative Environmental Technologies, Inc.

Project Summary

Manufacturing Facility, Southern Indiana

A synergistic integration of anaerobic enhancement and zero valent iron was applied at a manufacturing facility in Southern Indiana. Contaminants including tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-DCE, and vinyl chloride were present. The geology consisted of an extremely tight glacial till underlain with bedrock. The bulk of the contamination was dissolved phase material within the soil bedrock interface.

A pilot scale application was completed over an area of approximately 8,000 square feet to demonstrate the efficacy of the reductive dechlorination technologies employed. This injection program targeted the predominant silty clayey sand between 10-12 feet below ground surface (bgs). A total of 24 injections at depths between 10-12 feet bgs and 13-15 bgs were performed at various locations surrounding the manufacturing building while the facility was in operation.

Remediation Plan

The injection program utilized direct-push technology to apply; vitamins (B₁₂, B₂), essential nutrients (o-PO₄⁺ and NH₄⁺), sodium sulfite, calcium propionate, yeast extract, zero-valent iron (ZVI), and hydrogen release compounds (HRC[®]-X and HRC[®]). The objectives of the program were to establish and maintain a stable dissolved hydrogen level, provide micro-nutrients, maintain pH, provide for optimal competitive conditions for the desired microbial consortia while minimizing the impact to the day-to-day operations of the facility (U.S. Patent 7,129,388). The stimulus of these indigenous bacteria in the subsurface, in conjunction with the ZVI component, is utilized to effect the rapid and measurable removal of the targeted compounds in the groundwater and saturated soils.

Results

Two monitoring wells were sampled and analyzed over a period of 9 months. In the source area, total volatile organic compounds (VOCs) were reduced by 99.9%. A 96.6% decrease in PCE and an 86.5% decrease in TCE was observed in the down gradient well with only a slight increase in daughter products. The increase in concentrations of cis-1,2-DCE show that the reductive dechlorination is taking place in the subsurface. A full-scale design for the entire facility is currently underway.

