



Geosyntec's recommended ERD remedy is expected to save \$2 million relative to operation of an existing pump-and-treat system.

Client: Confidential Multi-National Corporation

Services Provided:

- ✓ Source area investigation using Membrane Interface Probe
- ✓ Bioremediation design
- ✓ Bioremediation system installation, operation and maintenance
- ✓ Regulatory negotiation

Project Objective

Groundwater at this former manufacturing facility is impacted with chlorinated solvents, principally tetrachloroethene (PCE) and its dechlorination daughter products. A groundwater pump-and-treat (P&T) system operated at the facility property boundary since 1997 has successfully limited the off-site migration of impacted groundwater; however, the P&T system has not addressed remaining chlorinated solvent source areas on-site, and continued operation of the P&T system is viewed by project stakeholders as being inefficient and prohibitively expensive. Results of an enhanced in situ reductive dechlorination (ERD) pilot test performed at the site by another consultant in 2006 indicated that ERD will be an effective remedy for the chlorinated solvent source areas. Geosyntec was retained to negotiate regulatory approval for, and to design, implement, and construct, a full-scale ERD system at the site.

Geosyntec's Scope of Services

Geosyntec developed a remedial strategy that relies on ERD and long-term monitoring to address the remaining chlorinated solvent source areas and replace the P&T remedy. The goal of the strategy is to implement a phased ERD approach to treat approximately 90% of the chlorinated solvent mass remaining in the source areas, followed by long-term monitoring (monitored natural attenuation) to meet cleanup criteria. In collaboration with a European partner firm, Geosyntec met with regulators in Wiesbaden Germany on multiple occasions, successfully negotiated regulatory approval of the proposed approach, presented results of the first ERD phase (limited scale) and gained approval for second phase (full-scale) implementation.

The Geosyntec team completed a pre-design investigation (PDI) using a membrane interface probe (MIP) and direct push technology to complete delineation of the solvent source areas. The MIP investigation provided a rapid and invaluable tool for redefining the distribution of chlorinated solvent impacts, yielding data critical to the design of the ERD system. Installation of ERD monitoring points confirmed our MIP investigation results and the updated conceptual site model. Subsequently, Geosyntec developed a detailed design for an active (forced gradient) ERD system, assisted the client in evaluating fabrication contractor bids, and supervised ERD system construction and startup. The ERD system was designed to recirculate groundwater, soluble electron donors (ethanol & sodium lactate), and bioaugmentation cultures (KB-1[®]) to address source areas identified in shallow groundwater during the MIP investigation. Significant dechlorination of PCE to ethene has been observed within the nine-month operational period and results were presented to the regulatory authority (RP Darmstadt). The second phase of ERD will consist of an expanded ERD recirculatory system to replace the P&T system. This design and implementation of bioaugmentation and groundwater recirculation is one of the first permitted in Germany.

Notable Accomplishments

Geosyntec developed and won regulatory approval for a cost-effective strategy to replace an aging and inefficient P&T system with ERD. The MIP investigation conceived and directed by Geosyntec provided critical new data regarding chlorinated solvent distributions at that site, significantly improving the conceptual site model developed by predecessor consultants on the project. After nine-months of operation, the first phase of ERD recirculation implementation has resulted in significant CHC mass reduction in the treatment zone, with greater than 75% of the CHC dissolved mass converted to innocuous ethene. Over the next 30 year period, Geosyntec's recommended remedy is expected to save our client \$2 million relative to continued operation of the existing P&T system.