



Geosyntec successfully partnered with local consultants to provide specialized remedial design and technical support during pilot- and full-scale implementation of bioremediation of PCE DNAPL source areas and plume.

Client: Commercial Dry Cleaner

Services Provided:

- ✓ Treatability Testing
- ✓ Pilot Test Design
- ✓ Full-Scale Design
- ✓ Specialized Technical Support and Troubleshooting during Pilot- and Full-Scale Operations

Project Objective

An active commercial dry cleaners facility was discovered to be contaminated with tetrachloroethene (PCE) dense, non-aqueous liquid (DNAPL) and associated biological attenuation daughter products trichloroethene (TCE), cis-1,2-dichloroethene (cisDCE), and vinyl chloride (VC). Concentrations in groundwater for total volatile organic compounds (VOCs) exceeded 100 mg/L in some locations. The client's objectives were to implement a cost-effective remedy that would effectively treat both DNAPL source areas and dissolved contamination on the source site and on off-site properties with minimal business operation interruption.

Geosyntec's Scope of Services

Geosyntec was retained to support the activities of the local consultant and provide specialized technical support services. Between the period of 2004 to present day, Geosyntec has completed the following scope:

- Treatability studies to evaluate natural attenuation rates and confirm that biological attenuation could be enhanced beyond natural rates with the amendment of electron donors;
- Design, data interpretation and technical support during operation of a 3 year pilot trial assessing the effectiveness of bioremediation of one of the DNAPL source areas; and
- Design, data interpretation and technical support during operation of the full-scale system treating both DNAPL sources and the plume in on- and off-site areas.

Notable Accomplishments

Treatability testing demonstrated that the rate of natural attenuation occurring on the site is naturally high as a result of anaerobic, reducing redox conditions and the presence of peat layers that act as natural electron donors. The treatability testing also demonstrated that *Dehalococcoides* bacteria capable of fully dechlorinating PCE to innocuous end products such as ethene and ethane were naturally present on site and bioaugmentation would be unnecessary. Pilot testing confirmed the treatability testing results, and illustrated that enhanced dissolution of the DNAPL source was achieved with the bioremediation system, with maximum dissolution enhancements of up to 4.4 times. Pilot testing also demonstrated that targeted source treatment was effective at cutting off contaminant mass flux from the source, achieving non-detect concentrations in the plume immediately outside of the DNAPL extent within two years of initiation of source treatment. Full-scale treatment was initiated in 2012, and was successful at achieving interim clean up requirements within the aggressive timeline specified by the EPA. Business operations continue on all affected properties with minimal interruption.