

Bedrock Treatment Remediates NJ Manufacturing Facility

3-D Microemulsion® Application Achieves 30-Foot Radius of Influence During Pilot Study

Project Highlights

- 3-D Microemulsion injections created 30-foot ROI in fractured bedrock
- TCE concentrations reduced through reductive dechlorination and daughter products reduced to ethene within 12-month study
- Pilot study results allowed for: full-scale design, maximized product ROI, minimized bedrock injection well drilling, and resulted in reduced overall project costs

Project Summary

Previous manufacturing activities impacted a fractured bedrock aquifer with TCE. The plume migrated approximately 600 feet downgradient along fractures at 70-80 feet (shallow) and 105-115 feet (intermediate) below ground surface. Remediation at the site was planned as a phased approach including a source area pilot evaluation of enhanced reductive dechlorination, bioaugmentation, and radius of influence (ROI). A larger source area treatment and property boundary barrier was to be determined based upon the pilot study results.

The pilot study found that injection of 3-D Microemulsion was capable of initially influencing a 30-40 feet ROI based on visual (turbidity) and geochemical data. Over a 12-month period, TOC levels remained elevated at concentrations above 10 mg/L at a shallow well 20-feet away. At the two intermediate wells 40-feet away, TOC concentrations increased to >40 mg/L during this period. During this same pilot study period, TCE concentrations decreased, cis-1,2-DCE concentrations increased then attenuated, and VC and ethane concentrations increased. Bioaugmentation, occurring 6 weeks after the 3-D Microemulsion injection resulted in Dehalococcoides sp. populations that increased and sustained at elevated concentrations (104 cells/mL).

Site Type: Manufacturing

Contaminant of Concern:
Chlorinated Solvents

Concentration:
TCE - 2840 ppb
DCE - 42 ppb
VC - 1.3 ppb

Remediation Approach:
Enhanced Anaerobic
Bioremediation,
Bioaugmentation

Soil Type: Fractured Bedrock

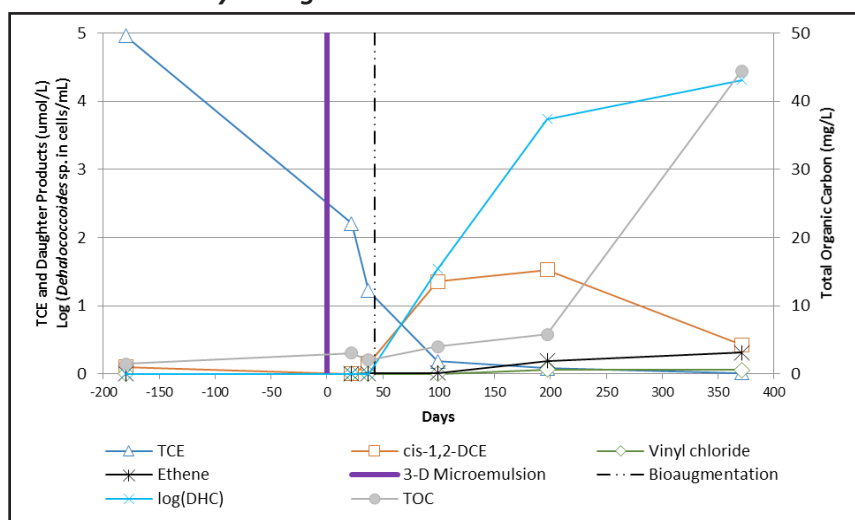
Treatment Area: 5,000 Square Feet

Technology Used:
3-D Microemulsion

Remediation Approach

Injections of 3-D Microemulsion were introduced by packer into 2 injection wells across four 10-foot fracture intervals (60-115 feet bgs). Monitoring was conducted in two shallow bedrock wells at 70-80 feet bgs and two intermediate bedrock wells at 105-115 feet bgs. ROI monitoring was conducted at these four monitoring wells that were located 20 feet, 40 feet, and 55 feet away from the injection wells. Bioaugmentation was performed 6 weeks after 3-D Microemulsion injections. Full-scale treatment is planned, which will include a larger treatment in the source area and a downgradient barrier at the property boundary.

Pilot Study Changes in Molar Concentrations Over Time



Technology Description

3-D Microemulsion is an engineered electron donor technology that offers a novel 3-stage electron donor release profile pH-neutral chemistry, and unique subsurface distribution properties.