

Combined Remedies Treatment Results in a \$650,000 Cost Savings for End User

PCE Contamination Remediation at Indiana Manufacturing Facility

Project Highlights

- By implementing this strategy with a clear path to closure, KERAMIDA saved their client approximately \$650,000 versus the alternative containment plan. KERAMIDA's sophisticated and aggressive remedial approach matched the technologies (ISCO, ISCR, ERD) to the technical challenges at the site.
- PCE was virtually eliminated in most other impacted wells, and continued evidence of reductive dechlorination is ongoing.
- Project currently in the monitoring phase to establish plume stability for closure.

Site Type: Manufacturing

Contaminant of Concern: PCE, TCE

Concentration:

PCE – 100- 1,000 ppb (one well as high as 70,000 ppb)
TCE – 50-100 ppb (one well as high as 3,500 ppb)

Remediation Approach:

In Situ Chemical Oxidation,
Enhanced Aerobic
Biodegradation

Soil Type: Sand Lenses in Clay Matrix

Technology Used: PersulfOx, 3-D Microemulsion, BDI Plus, CRS

Project Summary

A PCE spill from a 55 gallon drum in the late 1980s contaminated a manufacturing site in Indiana. Contaminated soil was excavated in the spill area and a pump and treat interceptor system was installed downgradient of the plume. The system continued to operate intermittently throughout the 1990s. A previous consultant had submitted a remediation work plan proposing the use of a permeable reactive barrier. However, the plan was rejected because the intended goal was remedial closure, not containment. KERAMIDA proposed a combined in-situ chemical oxidation (ISCO)/enhanced reductive dechlorination (ERD) approach focusing on the spill area (source) and the downgradient, on-site plume, with a small injection off-site. The remediation plan was approved and the injection was completed in November 2013. KERAMIDA's cost to closure is likely to be achieved for less than \$500,000 - saving \$650,000-800,000 over the life of the project. (The rejected remediation plan from the previous consultant had an estimated cost of \$1.3 million with no plan for closure.)

Remediation Approach

The combined remedies treatment included an initial application of PersulfOx® Catalyzed Persulfate in the source area with subsequent applications of 3D Microemulsion® (3DME), BioDechlor INNOCULUM® Plus (BDI-Plus) and Chemical Reducing Solution (CRS®). In addition, 3DME and BDI-Plus were applied in two downgradient areas of the plume. Groundwater monitoring performed in the eight months since injection indicates dramatic reductions in PCE concentrations. Within the source area, an initial PCE concentration of approximately 70,000 ppb was reduced to 278 ppb (with a corresponding increase in cis-1,2-DCE, which is currently being degraded). PCE was virtually eliminated in most other impacted wells and evidence of reductive dechlorination is ongoing.

Technology Description

PersulfOx is a sodium persulfate-based chemical oxidation technology which destroys both hydrocarbon and chlorinated solvent-type contaminants in the subsurface. PersulfOx contains a built-in catalyst which activates the persulfate component and generates contaminant-destroying free radicals without the need for the addition of a separate activator.

CRS is an iron-based amendment for in situ chemical reduction (ISCR) of halogenated hydrocarbon contaminants such as chlorinated ethenes and ethanes.

3-D Microemulsion is an engineered electron donor material that offers a novel 3-stage electron donor release profile, pH neutral chemistry and is delivered on-site as a factory-emulsified product.

Bio-Dechlor INNOCULUM Plus is an enriched natural microbial consortium containing species of Dehalococcoides sp. (DHC). This microbial consortium has since been enriched to increase its ability to rapidly dechlorinate contaminants during in situ bioremediation processes.