

CASE STUDY

Field Application of ChitoRem[®] chitin complex as a Slow Release Electron Donor for Dechlorination: Distler Brickyard Site, West Point, KY

Background

- Chloroethene source area (mainly TCE) is present in low permeability sediments.
- The objective is to clean up the source and prevent migration of contamination to underlying aquifer, which is a local drinking water source.
- The selected approach enhances the formation permeability while simultaneously providing an electron donor, chitin, for anaerobic reductive dechlorination (ARD).
- The technology, Bio-Fracing[™], consists of hydraulic fracturing to create high permeability sand-and chitin-filled fractures, increasing permeability and stimulating dechlorination.
- The technology is in situ, passive, and low maintenance.



Pilot Test (Oct. 01 – Jan. 02)

- Three fracture zones were created from a single borehole located in the source area.
- Chitin produced VFAs (e.g., acetate, propionate, and butyrate)
- The presence of VFAs immediately stimulated sulfate reduction and methanogenesis, creating the geochemical conditions favorable for ARD of chloroethenes.
- After 9 months, significant concentrations of VFAs persisted, indicating that chitin may be a relatively long-lived electron donor, and ethene predominated.

Full-Scale Implementation (Mar 03 – Mar 05)

- A total of 33 fractures were created at ten borehole locations for full-scale implementation.
- VFAs produced from chitin degradation were present in concentrations greater than 1,000 mg/L throughout the site.
- As in the pilot test, the presence of VFAs immediately created geochemical conditions favorable for ARD of chloroethenes. After 12 months, significant concentrations of VFAs remained, indicating that chitin may be a relatively long-lived electron donor.
- ARD is currently continuing at the site as indicated by ethene and other TCE degradation products.

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