Emulsified Zero-Valent Iron (EZVI)

IN-SITU DNAPL REMEDIATION

EZVI is an emulsion of powdered zero-valent iron, surfactant, oil, and water that reductively dechlorinates halogenated hydrocarbons (e.g. PCE, TCE, CFC, VC). Because EZVI uses an emulsion to deliver reactive iron, it has the ability to mix with DNAPLs present in the subsurface environment. Thus, EZVI is a "source area remediation" technology.

- Field-tested by the U.S. EPA under the SITE Program
- Primarily used for in-situ DNAPL source area destruction
- Typical source concentration decrease ~90+% within 3 months
- Surfactant-stabilized water-in-oil emulsion with zero-valent iron particles
- Hydrophobic, dense emulsion absorbs DNAPL, delivering contaminant to iron
- In-situ chemical reduction of chlorinated solvent to ethene and water
- Injection or soil mixing using conventional technologies
- Does not promote mobilization of DNAPL
- Developed/patented by NASA
- Available in both bulk quantities (delivery via tanker truck ~5000 gallons) or in smaller volumes (250 gallon totes)
- TEA is the largest custom manufacturer/ supplier of EZVI, providing reactive, stabile emulsions since 2005

EZVI Awards:

- **2007 NASA Induction into the Technology Hall of Fame**
- **2006 Federal Laboratory Consortium (FLC) Excellence in Technology Transfer**
- **2005 NASA Government Invention of the Year**
- **2005 NASA Commercialization Invention of the Year**

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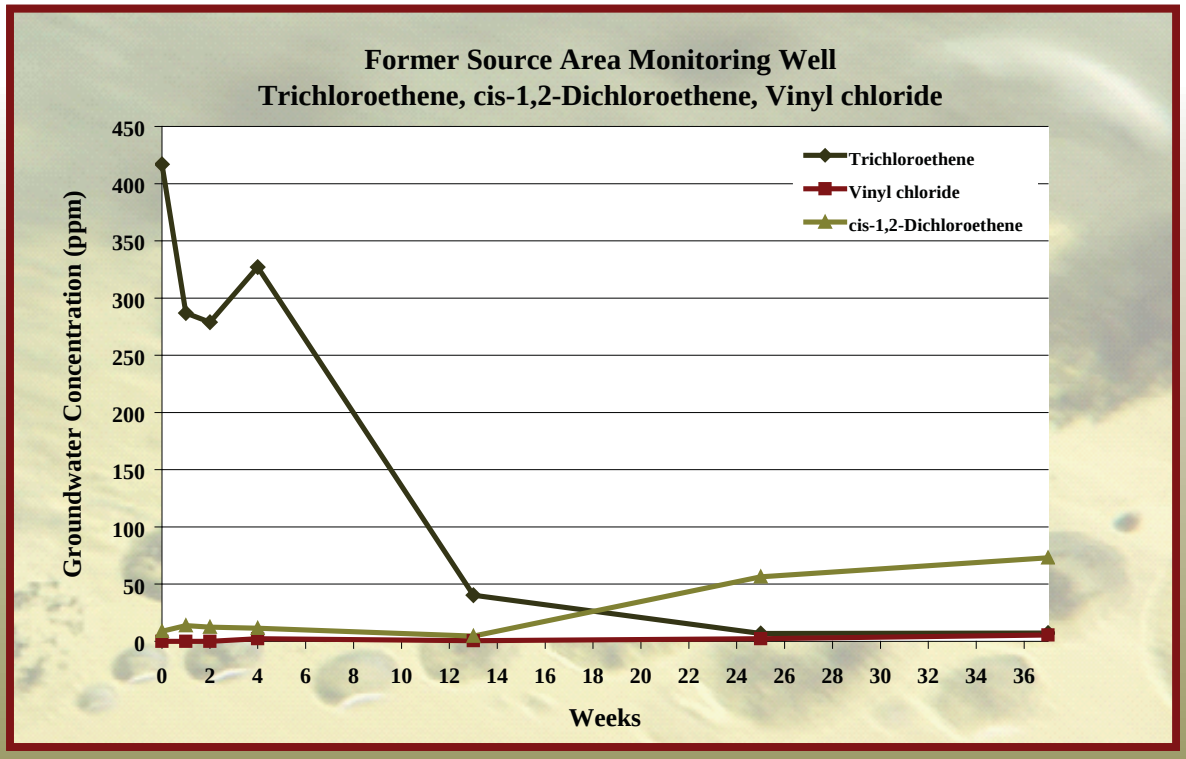
EZVI Post Injection Results

Private Client - Central Florida

- Twelve month results show reductions in TCE groundwater concentrations from 417 mg/L (baseline results) to non-detect.
- Cis-1,2-dichloroethene and vinyl chloride are increasing, indicating biodegradation of TCE in conjunction with abiotic reduction via ZVI in the interior of the emulsion.
- DNAPL mobilization due to the injections does not appear to be a concern as COC concentrations in the adjacent monitoring wells have remained stable.
- Dissolved TCE concentrations have decreased (from 3.25 mg/L (baseline results) to 0.0472 mg/L) in groundwater located adjacent to and above the 10-foot EZVI injection zone.
- Subsurface delivery/distribution utilized the **Badger Injection Solution's** Kinetically Adjustable Porespace Dilation System provided by **Renegade Environmental Services**.



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