ENVIRONMENTAL FRACTURING APPLICATIONS

EMPLACEMENT OF ZERO VALENT IRON FOR REMEDIATION OF CARBON TETRACHLORIDE

…zero valent iron emplaced into aquifer sediments resulted in a rapid decline in contaminant concentration levels and strongly reducing conditions in groundwater.

PROBLEM

Carbon tetrachloride and chloroform is present in an aquifer at a grain terminal. Groundwater treatment using Zero Valent Iron (ZVI) was the preferred approach by State regulators to reduce *in situ* contaminants to harmless end products.

OBJECTIVES

- to emplace ZVI into saturated silts and sands for promoting reductive dechlorination of the organic compounds.

FIELD PROGRAM

A total of 18,260 lbs. of ZVI was emplaced into aquifer sediments between 60 to 82 ft. depth. ZVI was incorporated into a guar fluid and injected at four borehole locations within the contaminant source area. Subsurface distribution of ZVI placement was mapped using tiltmeter geophysics to help in the evaluation of ZVI remedial performance.

TECHNICAL EVALUATION

Injection of ZVI at frac pressures into aquifer sediments resulted in:

- up to 40 ft. radial distribution of ZVI from injection boreholes.
- a 73 % reduction in carbon tetrachloride concentrations at perimeter wells 90 days after ZVI placement. Groundwater geochemistry indicated a total depletion of nitrates and 50% decrease in sulfate levels.

Fracture - Emplacement of Zero Valent Iron into aquifer sediments at a grain terminal in California, USA.