

ENVIRONMENTAL FRACTURING APPLICATIONS



MAPPING THE SUBSURFACE DISTRIBUTION OF FRACTURE – EMPLACED ZERO VALENT IRON

...mapping the subsurface placement of Zero Valent Iron was successfully accomplished using tiltmeter geophysics which helped optimize groundwater remediation of carbon tetrachloride and chloroform.

PROBLEM

Zero Valent Iron (ZVI) was emplaced into aquifer sediments using hydraulic fracturing technology to mitigate carbon tetrachloride and chloroform contamination. State regulators required verification of adequate ZVI distribution in the source area.

OBJECTIVES

- to map the configuration and areal extent of ZVI fractures placed in subsoils.

FIELD PROGRAM

A total of 18,260 lbs. of ZVI was emplaced into aquifer sediments at 15 fractures between 60 to 82 ft. depth. Subsurface distribution of ZVI placement was mapped using tiltmeter geophysics and depicted using three dimensional computer graphic software. A concentric array of 14 tiltmeter stations was set up at each fracture borehole location to collect signal data.

TECHNICAL EVALUATION

Analysis of tiltmeter geophysical data determined that ZVI was:

- distributed up to 40 ft. radially (max) from injection boreholes;
- placed as horizontal fractures not exceeding an angle of inclination of 30 degrees to the ground surface;
- optimally placed to effect treatment over the entire source area.

Three dimensional computer graphic of ZVI fractures emplaced in contaminant source area near storage silos.

