

Case Study: Fracture Emplacement of Iron and Cellulose into Bedrock for Bioremediation and Chemical Reduction of TCE

OVERVIEW

Site: A former Air Force Missile Site in Colorado

Contaminant(s): Trichloroethylene (TCE), upwards to 4,000 ppb

Subsurface Material: Sandstone

Contaminant Location: Sandstone Aquifer

Remediation Criteria (TCE): Current 5µg/L; Original 100µg/L



OBJECTIVES & CHALLENGES

- Emplace a micro-iron and soluble cellulose amendment into bedrock to promote bioremediation and chemical reduction of TCE
- Contamination present under the missile facility infrastructure

FIELD PROGRAM

- Field program focused primarily on the TCE source area
- Fracturing was used to emplace 280,000 lbs of iron-cellulose amendment
- Fractures were emplaced between 35 and 65 ft depth
- Nine fracture borehole locations were used for the program

TECHNICAL EVALUATION

- A 94% mass reduction of TCE was achieved in the source area, 21 months after the program
- Two years after amendment emplacement, TCE concentrations in the source area decreased from 1000-4000µg/L to 0-400µg/L (see figures)
- Due to the success of the program The Army Corps decided to remediate to a stricter guideline (5µg/L from the original 100µg/L)

