



ISCO Treatment Program: VOCs

Site

- Former Distribution Terminal, New Jersey.

Contaminants of Concern

- Methylene Chloride
- BTEX
- TCE
- MTBE
- TCA

Geology/ Hydrology

- Fractured bedrock.

ISCO Pilot Program

- Modified Fenton's Reagent (MFR).
- Two six (6) day injection events.
- Inflatable straddle packers utilized.

Results

- Substantial GW VOC reduction of 90% to 99% achieved in injection area monitoring wells.
- Estimated 851 lbs of COC mass including trapped DNAPL mass treated.

ISOTEC Case Study No. 63

ISCO TREATMENT PROGRAM: VOCs

Former Distribution Terminal
New Jersey

INTRODUCTION

The subject site is a former distribution terminal located in New Jersey. Past business activities at the site resulted in groundwater (GW) and bedrock contamination with related volatile organic compounds (VOCs). The target contaminants of concern (COC) included **Methylene Chloride, BTEX, TCE, MTBE, TCA and VC**. Permitting for the injection activities was governed by the New Jersey Department of Environmental Protection (NJDEP) regulations. The primary area of concern (AOC) is a former vapor recovery unit (VRU) that used commercial grade methylene chloride and the former underground storage tank (UST) area. Methylene chloride concentrations exceeded 700,000 ug/l in the site monitoring wells. The area of concern extends vertically from approximately 17 to 50 feet (ft) below ground surface (bgs) over three bedrock fractures.



PROJECT OBJECTIVES

The specific objective of the pilot program was to evaluate safe application of modified Fenton's reagent (MFR) and collect design data for a full-scale treatment program including radius of influence, injection flow rates, pressures, and process parameters including iron, peroxide, TDS, conductivity, water levels, temperature, dissolved oxygen and oxidation-reduction potential (ORP). The ultimate objective of the treatment program is to treat individual

COCs to below their applicable NJDEP groundwater quality criteria.

ISCO PILOT TREATMENT PROGRAM AND IMPLEMENTATION

The injection activities consisted of two 6-day injection events spaced 5 months apart. A total of 3 dual zone (10-30 ft bgs and 30-50 ft bgs) bedrock injection wells were used to distribute MFR into the subsurface during the pilot program. The injections typically occurred under a low-pressure condition between 0-20 psi. A total of 7,000 gallons of MFR was injected during the pilot program. The shallow bedrock fractures were isolated from the deep bedrock fractures using straddle inflatable packers.

RESULTS

Results of the pilot program demonstrated effective groundwater contaminant treatment throughout the treatment area after only two pilot study injection events. Summary results showed that following 2 rounds of injections, majority of monitoring locations showed COC reductions ranging from 27% to >99% with extensive methylene chloride reduction achieved at most locations. The injection area monitoring wells showed COC reductions ranging from 90% to >99%. Although site wide COCs decreased significantly compared to baseline values, a few wells showed increases compared to baseline probably due to breakdown/ dissolution of trapped DNAPL present in fractured bedrock. Conservative mass calculations using groundwater results estimated approximately 851 lbs of COC mass removal (i.e. 88% mass destruction) from site groundwater following the pilot study.

CURRENT PROJECT STATUS

The pilot program report is currently under review by the NJDEP with recommendations made for a full-scale treatment program.

HEALTH AND SAFETY

The project met or exceeded the highest safety standards set by a major oil corporation client. The standards exceeded the client’s retail gas station criteria and were on par with active refinery safety standards.

Site Map Showing Injection and Monitoring Well Locations

