

In Situ Enhanced Bioremediation Using Biobarriers and Biological Grid to Treat a Large, Dilute Trichloroethene Plume

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Background/Objectives. Building 1533 is located at Kelly Air Force Base adjacent to the base boundary. Shallow groundwater in the vicinity of Building 1533 is contaminated with chlorinated solvents, primarily TCE and the plume extends into the adjacent residential area. The source of groundwater contamination may be a site which is a former waste oil storage facility that was used from 1960s to 1973 in the former Defense Property Disposal Office building. Materials reportedly released to an unlined sump at this site include spent solvents, transformer oils, and metal shavings. To prevent off base migration of the TCE plume and to assist in reducing groundwater concentrations to the cleanup levels, a zero valent iron (ZVI) permeable reactive barrier (PRB) was installed in 2002. Additionally, in situ enhanced bioremediation (ISEB) injections were conducted in 2008 in an attempt to reduce concentrations to below the cleanup levels.

In 2011, TCE concentrations continued to be well above the cleanup levels. The highest concentration of TCE was 29 µg/L. Though the concentrations were low, the TCE plume was large and dilute, and covered an area of 80 acres. When APTIM took over the contract in 2011, ISEB was selected as the corrective measure to reduce concentrations of TCE to below the cleanup levels and attain unrestricted site closure.

Approach/Activities. The corrective measure in 2013 included injection of amendments (emulsified vegetable oil, bioaugmentation culture SDC-9™, and microbial nutrients) through 51 Direct Push Technology (DPT) points and the installation of five biobarriers upgradient of the PRB. This ISEB work was performed in an effort to optimize groundwater remedies initiated in the past which included ISEB/PRB. ISEB was chosen based on the ease of implementation, concentration of contaminants, depth of the treatment area, size of the plume, the aggressive schedule to attain unrestricted site closure and cost. Additionally the ISEB injections would complement the already existing ZVI PRB, a technology that utilizes biogeochemical processes to create reducing conditions that aid in both biological and abiotic reactions.

As of 2018, four rounds of injections have been conducted. Amendments were injected using a mixture of biological grid pattern and biobarriers. Injections were conducted using injection points, temporary injection wells and open boreholes with packers. Approximately 80,000 gallons of amendments including Emulsified Vegetable Oil, bioaugmentation culture SDC-9™ and microbial nutrients were injected using 80 injection locations. Two injection rigs were used to inject amendments.

Results/Lessons Learned. TCE and daughter product concentrations have reduced to below the GWPS as of 2017. Annual sampling is being conducted to ensure contaminant concentrations remain below cleanup levels. The presentation will discuss the implementation of the project, field challenges and results of the monitoring events in detail.