

Biotic, Abiotic, and Adsorption Source Area Treatment Pilot Tests of Dissolved Chlorinated Ethenes

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Background/Objectives. The site is a manufacturing facility, which currently produces automotive components in southeastern Michigan. Three pilot tests were completed around performance monitoring well PMW-1, monitoring well MW-49, and observation well OW-08 located in a former degreaser area that operated from approximately 1965 to 1992. The pilot tests were implemented to reduce the constituents of concern concentrations of Trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC). The aerial extent of the impacted groundwater plume is approximately 160 feet wide and 170 feet long. The highest baseline concentrations of TCE are 21,000 micrograms per liter (µg/L), cis-1,2-DCE at 49,000 µg/L, and VC at 78,000 µg/L in the plume area. *Dehalococcoides* (DHC) was present in the aquifer at concentrations ranging from 250 to 50,600,000 cell per milliliter in the baseline groundwater sampling event.

Approach/Activities. The site geology is predominantly fill and glacial moraine deposits composed of interbedded sand silt and clay units. The impacted unit is a perched aquifer that has a static groundwater level of approximately 16 feet below the facility's floor. Slug testing completed in the area estimated the hydraulic conductivity to be 0.02 to 2.8 ft/day. The groundwater flow velocity in the area has been estimated to be 0.0005 ft/day to 0.07 ft/day.

Emulsified vegetable oil with sodium lactate (EOS® 100) was injected to promote biotic reductive dechlorination around PMW-1. A mixture of lactates, fatty acids, alcohols and a phosphate buffer with zero-valent iron (ABC® plus zero valent iron [ZVI]) was injected to promote biotic and abiotic reductive dechlorination around MW-49. Adsorbent carbon media (Bioavailable absorbent media [BAM]) was injected to adsorb dissolved chlorinated ethenes around OW-08. The amendments were mixed and injected to the target depth of 17 to 27 feet below the facility's floor through injection points. Bioaugmentation was not completed or needed because of high DHC concentrations in the baseline sampling event.

Results/Lessons Learned. PMW-1 area received approximately 426 pounds of EOS® 100, MW-49 area received approximately 900 pounds of ABC® and 108 pounds of ZVI, and the OW-08 area received 240 pounds of BAM. Visual evidence of the amendments in nearby wells suggested a radius of influence ranging from 12 to 21.5 feet. Daylighting and mounding occurred in the wells near the injection points during implementation. The concentration of amendments were increased and volumes and injection points were decreased to minimize mounding and daylighting occurrence. Comingled EOS® 100 and the BAM amendments were observed in two of the pilot test area (PMW-1 and OW-08). Tetra Tech completed three post-injection performance monitoring events and the results will be presented.