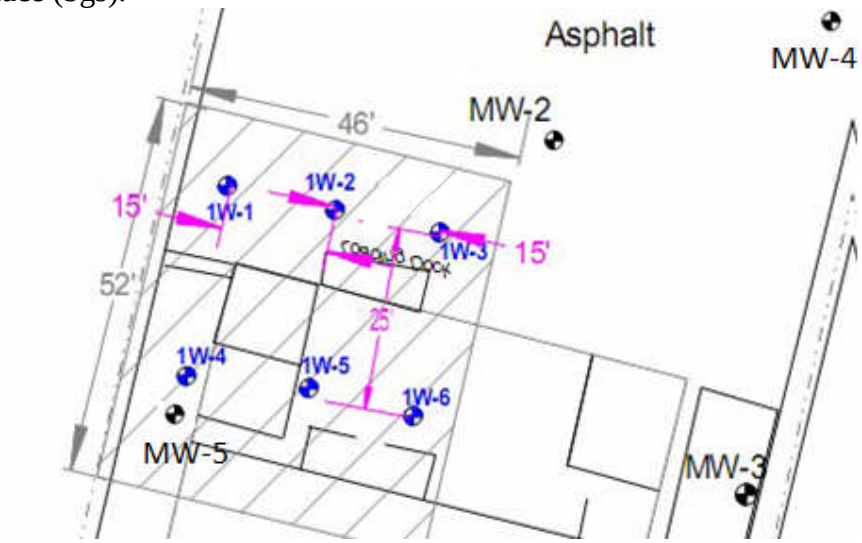
Project Summary

The subject site is located in a suburb of Durham, North Carolina. The site has historically had soil and groundwater impacted by the use of the dry cleaning agent, tetrachloroethene (PCE). The in-situ injection program targeted this compound and its anaerobic daughter products which include trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC). A total of 5 injections were completed on May 27th, 2010 via permanent injection wells that were screened from 15-25 feet below ground surface (bgs).



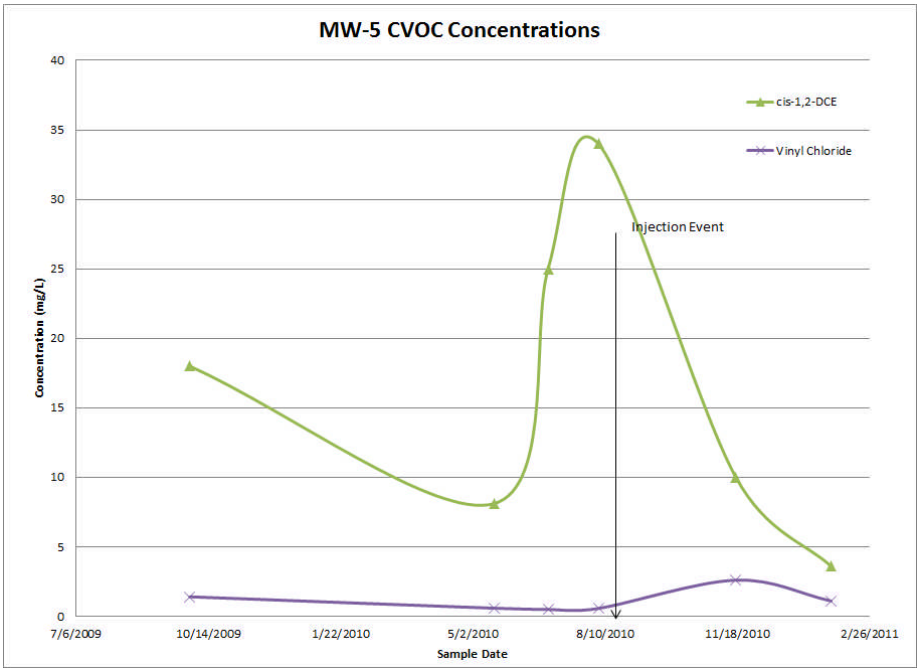
Remediation Plan

The injection program utilized permanent well injections to apply a mixture of vitamins, nutrients, sodium sulfite (an oxygen scavenger), calcium propionate, zero valent iron, HRC®, and EHC®. The designs purpose was to reduce source area concentrations and limit plume migration, as well as promote anaerobic conditions in the groundwater favorable to anaerobic bacteria that degrade CVOCs while minimizing surfacing and disposal issues. The stimulus of these indigenous bacteria in the subsurface, in conjunction with the ZVI component, is utilized to effect the rapid and measurable removal of the targeted compounds in the groundwater and saturated soils.

Results

The three monitoring wells sampled indicate that the injection event was successful in affecting the subsurface geochemistry and reducing concentrations of CVOCs in the targeted locations. MW-5 is the only well that is located in the treatment area and from the January 2011 sampling events, the PCE concentrations decreased by 99.7%. In the three months after the injection event, PCE concentrations dropped from 26 mg/L to 0.083 mg/L. The concentration of TCE similarly decreased from pre-injection

concentrations of 1.7 mg/L to 0.84 mg/L three months later, a reduction of 50.5%. As reductive dechlorination of the parent products continues, cis-1,2 DCE and vinyl chloride concentrations are expected to initially rise but then decrease in a similar manner as the PCE and TCE concentrations.



The analytical data for the natural attenuation parameters sampled also indicate that the injection event was successful in altering the geochemistry at the site. The redox potential has become more reducing from a baseline result of +80.2 mV in May 2010 to -220.6 mV, six months after the remedial event. The pH has decreased since the baseline sampling event from 6.84 to 5.71. The pH drop can be attributed to the low concentration of iron injected in the injection wells. ZVI produces hydroxide ions when oxidized which increases the pH slightly. The lack of hydroxide ions from ZVI allows the biological processes which produce hydronium ions to continue unchecked. The subsurface appears to be buffered, so the acidification of the groundwater should not drop below 5.5 pH units. The concentration of total organic carbon (TOC) increased after the injection event and has begun to decrease. The initial increase was indicative of the emplacement of organic hydrogen donors and the subsequent decrease in TOC concentrations indicate that the organic hydrogen donors are being utilized in reductive dechlorination.

MW-4 is down gradient of the remediation area and it has also been affected by the injection event. Analytical data shows that the concentration of PCE has decreased from 2.8 µg/L in May 2010 to <0.5 µg/L in January 2011, which is below the method detection limit. This well showed no compound concentrations measured above the North Carolina 2L standards. Overall, the remedial event appears to have positively affected the subsurface and caused dramatic decreases in PCE and TCE concentrations in MW-5, the only sampling point within the treatment area.