TECHNICAL BRIEFING – 2012 ANNUAL MONITORING REPORT
AREA B (PICA 205) GROUNDWATER – APRIL 2013

The document reviewed was an annual data report for Area B groundwater. The response action for groundwater in Area B is Expedited In-Situ Enhanced Bioremediation. The remedy has been in place since 2008. The remedy consists of injection of a dilute molasses solution as a carbon source to stimulate biodegradation. The sampling results contained in the annual report were completed in accordance with the Final Remedial Design for Area B. Sampling was performed in September 2012 and December 2012. Tasks included annual groundwater monitoring, semi-annual performance groundwater monitoring, total organic carbon (TOC) and pH monitoring (for the same wells as semi-annual performance monitoring), and surface water monitoring. Water-level measurements were taken from the monitoring wells prior to sampling and used to prepare a groundwater potentiometric map.

Annual Groundwater Monitoring

Wells included for the annual sampling were as follows: MW-01B, MW-02B, MW-03B, MW-08, MW-09, MW-10, and MW-18. These wells were to be sampled annually until 2011 which was the most recent Five Year Review. Annual sampling has continued based on the review. Analytes consist of the following: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), 1,1-dichloroethene (1,1-DCE), and vinyl choride (VC).

Semi-Annual Performance Groundwater Monitoring

Wells included in performance monitoring were as follows: MW-06, MW-6B, MW-08, MW-15, MW-16, MW-17, MW-18, IW-03, and IW-10. Wells MW-18 and IW-10 were added to the monitoring program in 2011 at the request of the New Jersey Department of Environmental Protection (NJDEP). Analytes consist of the following: PCE, TCE, cis-1,2-DCE, 1,1-DCE, VC, total organic carbon (TOC), pH, methane, ethane, and ethene. TOC and pH results are used for determining the effectiveness of enhanced biodegradation and figuring out the frequency of future injection events. Methane, ethane, and ethene results are similarly used to monitor the progress of biodegradation.

Surface Water Monitoring

A total of five surface water samples were collected and identified as follows: SW-1, SW-2, SW-3, SW-4, and SW-5. Samples are collected from the landfill pond and the drainage ditch. Three samples including the one from the landfill pond were collected on December 18, 2012. Due to heavy vegetation that would obscure the presence of MEC, two other samples were collected at a later date (January 2, 2013).

Groundwater Monitoring Results

1,1-DCE, PCE, cis-1,2-DCE, and TCE were detected but not in concentrations that exceeded Site Cleanup Levels (SCLs). VC was detected in concentrations (1.07 to 318 micrograms per liter [ug/L]) exceeding the SCL in three of 14 samples.

Ethene was detected at a concentration of 2.1 ug/L in Well MW-8 which is the furthest downgradient. The concentration range in the other six wells was from 0.012 to 27 ug/L. Ethane remained at similar elevated concentrations or increased in all the monitoring since the previous sampling. Methane was similarly elevated in concentration or increased from previous sampling.

The highest TOC concentration (105 milligrams per liter [mg/L]) was detected at Well MW-8 (located adjacent to Injection Line 3) and the lowest TOC concentration (25.4 mg/L) at Well IW-19 (adjacent to Injection Line 1).

Surface Water Monitoring Results

None of the COCs exceeded the SCL in the second half of 2012. In March 2012 sampling vinyl chloride was detected above the SCL at SW-3 (17.3 mg/L) and at SW-4 (15.6 mg/L).

Data Trend Analysis

Results from monitoring from September 2008 through December 2012 were analyzed to identify trends. Graphs were plotted for the following analytes: TOC, pH, ethene, ethane, and methane. Such analytes are utilized to evaluate whether subsurface conditions are favorable for reductive dechlorination. Results for each of the injection lines and surface water are briefly discussed below.

Injection Line 1:

- TOC concentrations are elevated above baseline

- pH was within optimal range
- Methane concentrations were sustained indicating methanogenic redox conditions which are favorable for reductive dechlorination

- Other indicators were also favorable.
- No parent (VOC) compounds were detected. No 1,1-DCE was detected. Concentrations of cis-1,2-DCE continued to decrease.
- Vinyl chloride concentrations have decreased. VC was not detected for four consecutive sampling rounds but was found at greater than the SCL in December 2012.

Injection Line 2:

- TOC and methane concentrations were above background and in the favorable range for reductive dechlorination.
- PCE was not detected in the monitoring period. TCE has been below the SCL with one exception in November 2009 as was the case with 1,1,1-DCE. cis-1,2-DCE was below the SCL and VC was either not detected or below the SCL.
- Ethene and ethane concentrations indicate that "ERD is resulting in complete biodegradation of CVOCs."
- The elevated TOC, methane, and ethane along with a decrease in the concentration of COCs show that reductive dechlorination is proceeding effectively.

Injection Line 3:

- TOC and methane concentrations are favorable for reductive dechlorination.
- PCE has not been detected. TCE concentrations have declined and TCE was not detected in the September 2012 sampling. 1,1-DCE was not detected in any of the wells in September 2012. Prior to that detections had decreased to below SCL in most wells since June 2009 and since September 2010 in two wells. VC is declining in concentration.
- Ethene and ethane concentrations are an indicator that complete biodegradation is occurring.

Surface Water:

- With the exception of vinyl chloride at two surface-water sampling locations in March 2012 VOCs have not been detected.

Remedy Going Forward

The Record of Decision (ROD) stipulates that COC concentrations in groundwater must attain SCLs within seven years. As of September 2012 (the fifth year of remedy implementation) SCLs had been attained in seven of nine wells. Downgradient wells are sampled on an annual basis. PCE, TCE, cis-1,2-DCE, and 1,1-DCE were less than SCLS. VC exceeded the SCL at one location. Based on these results it is inferred that the plume is stable and is attenuating at the downgradient edge. Surface water has occasional detections of VOCs above the SCL. Monitoring will continue and evaluation will continue as part of the annual reporting. The next sampling is scheduled for September 2013.