Innovative Environmental Technologies, Inc.

Manufacturing Facility, Fairlawn, NJ

Project Summary

The subject site is in Fairlawn, NJ. Two oxidation events were implemented by IET, the first occurred in August 2007 and the second in February 2008. The site is impacted by xylenes, ethyl benzene and naphthalene. The in-situ injection program targeted these compounds in two impacted areas; the first area was primarily impacted by xylenes and to a lesser extent ethyl benzene and naphthalene; the second area's primary compound of concern was naphthalene and to a lesser extent xylenes and ethyl benzene. Injections occurred between 6 and 20 feet below ground surface (bgs).

Remediation Plan

The remedial approach taken at the site utilized both free radical chemistry, oxidation chemistry and facultative biological oxidation in such a way as to extend the oxidant and free radical residuals while enhancing the in-situ environment such that it was suitable for biologically based attenuation. IET applied three remedial materials to the subsurface via a patented injection process and apparatus (United States Patent # 7,044,152) such that the oxidation reactions occurred in a controlled manner. In a unique application of zero-valent iron metal, IET activated both the persulfate and the peroxide species in-situ, allowing for both the oxidation and biological remedial processes to occur via a single injection event. Subsequent oxidation events did not require the reapplication of the iron, rather the reduced ferrous ions were oxidized back to ferric species. The premise of the approach is based on the utilization of oxidizing species and their by-products. The first phase, the oxidation event, chemically oxidizes the majority of dissolved and sorbed targeted compounds. Once the oxidants are exhausted the ferric iron and sulfate species allow for the biological attenuation phase, which polishes and obtains the targeted treatment goals.

Results

A direct review of the data from the four monitoring wells located in and around the injection area indicates that the removal rates and efficacy of the treatment regime has been very successful. Further, the conversion and utilization of the Fe+2 and Fe+3 species is supported by the analyses through the course of the project. The monitoring well in the source area, as seen in the graphs below, has had significant decreases in the concentration of contaminants. Ethylbenzene has decreased 88%, m- and p-xylenes have decreased 94.6%, o-xylene has decreased 97.6%, and naphthalene has been reduced 86%. In the second area's monitoring wells, ethylbenzene has decreased 53%, m- and p-xylenes have decreased 60.5%, o-xylene has decreased 64%, and naphthalene has decreased 74% since September 2005. The variation in the efficacy between the two areas is primarily a function of the proximity of the wells to the injection location. The first area had significant masses of materials delivered close to the monitoring point; the second's monitoring location is slightly down gradient of that areas injection grid.