PCB Remediation Using an Innovative ISCO Approach: Bench and Pilot Study Results

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Overview. Anecdotal evidence from a proof-of-concept bench-scale study indicated that an activated carbon peroxide-based chemical oxidant exhibited the ability to significantly reduce the concentrations of soil impacted with polychlorinated biphenyls (PCBs) and volatile chlorinated organics. These results were intriguing, especially given that PCBs have generally been considered fairly recalcitrant with limited in situ remedial options. The successful demonstration of a potential in-situ remedy that can be readily implemented would provide an innovative and cost effective approach to addressing sites impacted with PCBs. As a result, a bench-scale study was developed and completed in order to provide for a proof-of-concept. Concurrently, and in anticipation of positive results, a pilot-scale study was designed such that implementation could begin immediately following the completion of the laboratory bench-scale study.

Background/Objectives. Soils in an area of a former steel manufacturing site, located in the Upper Midwest, were identified as being impacted by both volatile chlorinated organics and PCBs. The impacted soils were delineated from depths ranging from approximately 6 to 20 feet below ground surface (ft-bgs), and covering an area of approximately 20,000 ft^2. The site is currently undergoing remediation as part of brownfield efforts, and the identification of cost effective and implementable remedies is paramount in keeping the overall site development moving forward. In order to address the identified the identified soil impacts excavation and thermal treatment remedies were being contemplated. However, a preliminary test of an in situ chemical oxidant indicated that significant reductions in PCB soil concentrations were possible and could provide a means to treat the impacted soils in-place and potentially provide a significant cost savings.

Approach/Activities. In order to verify the preliminary information, a bench-scale study was implemented to demonstrate the efficacy of the chemical oxidant to effectively treat both the volatile chlorinated organics and PCB impacts. The bench-scale study involved the collection of site soils and the completion of a bench-scale treatability study using a control and two duplicate reactors. The reactors were set up to provide for multiple time point sampling to monitor soils conditions and oxidant performance over the course of a 30 day testing period. While the bench-scale study was underway, a pilot-scale study was designed such that implementation could be initiated in short order. The purpose of the pilot-scale study will be to determine the field-scale deliverability of the oxidant and to further verify the efficacy and performance of the oxidant over a larger area.

Results/Lessons Learned. The results of the bench-scale study will be available in November 2017 and the results of at least one round of performance monitoring from the pilot-scale study are anticipated to be available for presentation at the time of the conference. Additionally, lessons learned from both the bench- and pilot-scale studies will be provided in order to disseminate information for use at other similarly impacted sites.