Must See TV: A Post-Treatment Study Like None Other

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Background/Objectives. Questions exist regarding the distributional characteristics of carbon slurry injectates in the subsurface when installed by high-pressure injection. Limited excavation and sampling studies have been conducted to characterize slurry injectate distribution. To date no studies have comprehensively characterized the distribution of such materials using extensive soil core logging.

The subject site is a former petrol retail station in southeastern Kentucky. The UST system was removed. The soil profile consists of silty and sandy clays with chert. Chert layers, where present and laterally extensive can be the most transmissive features in the saturated formation. The soils are soft to wet beginning approximately 6-8 feet below ground surface (bgs).

Approach/Activities. Roughly 11,818 kgs of BOS 200® (manufactured by Remediation Products Inc.) injectate was installed throughout an (760 m^2) area over a depth range from 1.8 to 4.8 meters. One month after injection work was completed, 12 continuous soil borings were advanced next to existing site monitoring wells and an additional 28 borings were advanced throughout the treated area. A pair of 2.54-cm PVC wells were installed at each of the additional 28 locations: one shallow screen (1.5 meter screen length) to test the upper portion of the aquifer and a deeper well screen (1.5 meter screen length) for testing of the lower portion of the aquifer. The continuous soil cores were carefully inspected macroscopically and microscopically for presence of carbon and logged for lithology. Close to 1,000 pictures were taken to document the distribution of injected carbon slurry in various soil types and along bedding interfaces. Finally, a survey was performed to accurately define locations for all soil borings, monitor wells and their respective elevations to support modeling.

Injections were completed with a positive displacement pump at a volumetric flow rate of approximately 130 LPM. Injections were completed at specific depths rather than across intervals. Injections occurred in top-down manner and were spaced about every 0.61 meters vertically. Individual injection points were spaced 1.5 meters apart horizontally.

Results/Lessons Learned. Animated modeling of lithology, distribution of soil contamination, injectate distribution, and groundwater were combined into a video presentation with some explanatory narration. Over 70 percent of the monitor wells were installed post-injection to circumvent any bias due to injectate in the well-pack. Core log descriptions and photographs document the presence of various structural geometry associated with seams or zones of BOS 200 identified within each of the forty soil borings. A vocabulary was developed to better describe the topological features of the observed distribution. Seams or zones of carbon were correlated with nearby injection points and that data was modeled using RockWorks17. Both visual examination and modeling offer corroborating depictions of carbon distribution. The use of a microscope to distinguish between carbon and dark minerals was hugely advantageous.

Performance monitoring via groundwater sampling is ongoing. At this point, roughly one year of monitoring has been performed and these data were also modeled.