Thermal Soil Mixing and ZVI Injection Using Large Diameter Augers at a Former Dry Cleaner

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Background/Objectives. Tetrachloroethene (PCE) was released into the subsurface at the site, located in Jacksonville, Florida, during drycleaning activities over a period of approximately 20 years. The suspected source areas include a former UST, which may have contained spent solvents; a floor drain; the former drycleaning machine; and a former supply well that provided water for drycleaning operations. Site assessment activities reported chlorinated solvent contamination in soil and groundwater to a depth of approximately 65 feet below ground surface (bgs). A fine-grained sand is present from land surface to a depth of approximately 60 feet bgs. A low permeability clay layer is present below this depth and appears to have prevented further vertical migration of contamination. Solvent contamination in the vadose zone soils (approximately 0 to 8 feet bgs) appear to have been either removed during the UST closure excavations or during soil vapor extraction operations. Previous remedial methods for treating the contaminated groundwater have been largely unsuccessful due to the likely presence of DNAPL at varying depths within the saturated soils. The objective of this remedy is to remove the remaining adsorbed, soluble, and potential DNAPL contaminant mass located in the source areas. Funding for this technology is being provided by the Florida Department of Environmental Protection, Drycleaning Solvent Cleanup Program.

Approach/Activities. Golder will be using FECC Corporation's (FECC) Chlorinated Source Contamination Removal Technology with thermal treatment followed by injection of zero-valent iron (ZVI) to remove adsorbed, soluble, and potential DNAPL contaminant mass in the source area. This remedial approach uses an 8-foot large diameter auger (LDA) and thermal soil mixing to quickly remove the majority of the chlorinated solvent mass followed by injection and mixing of ZVI into the heated soil and groundwater. The ZVI continues to remove residual chlorinated solvents long after the thermal treatment. The columns would extend to a depth of approximately 65 feet bgs to make sure chlorinated solvents sitting on top of the clay are effectively treated. The treatment technology consists of the following major elements: soil mixing using the 8-foot diameter LDA; in situ thermal treatment using a combination of hot air and steam; a vapor collection system that recovers the volatilized contaminants, steam, and hot air in a surface shroud under an applied vacuum; a data acquisition and recording (DAR) system for real-time system monitoring and contaminant removal data; an off-gas conditioning system; a recovered liquid and vapor contaminant treatment system; and a ZVI mixing and injection system.

Results/Lessons Learned. Field activities are scheduled to commence in the fall of 2017. Golder will present the results of the source removal activities, including the final number and depth of the LDA locations; the treatment area; system operating parameters, such as the steam/hot air injection flow rates and temperatures, shroud temperature, and volatized vapor extraction flow rates; effluent vapor and liquid concentrations; the estimated mass of contaminants removed, as determined by the DAR system outputs; and the amount of ZVI applied per location. Golder will also present on the advantages of using this technology over other industry accepted remedial methods for chlorinated solvent contamination.