Multiple Remediation Technologies and an Updated Conceptual Site Model to Treat a Large cVOC Plume

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Background/Objectives. At the former Fort Gillem in Forest Park, Georgia, chlorinated volatile organic compounds (cVOC) have been detected above the Georgia Risk Reduction Standards (RRS) in the soil and in both the overburden and bedrock groundwater units. Historically, disposal areas were developed on the property and may be contributing to the groundwater contamination both on and off of Fort Gillem. To address the cVOC contamination, multiple technologies have been used to remove mass in the soil and groundwater.

At site FTG-09, total cVOC concentrations have been observed over 3,000 µg/L and include trichloroethene (TCE) and 1,1,2,2-tetrachloroethane (TeCA). To reduce cVOC mass and prevent contaminants from continuing to migrate downgradient, previous excavations have be completed, a duel phase extraction (DPE) system and a series of groundwater extraction wells have been installed at the Ft. Gillem property perimeter. These technologies have aided in reducing contaminant mass on site; however, the dilute downgradient plume is still present and has migrated 2,500 feet downgradient. Sampling data and potentiometric maps have been used to develop a conceptual site model (CSM) that was the basis for previous remedial designs. However, current work has significantly changed the CSM and modified the remedial design for the dilute plume.

Approach/Activities. The design phase for treatment of the downgradient dilute plume included the installation of performance monitoring wells. Several locations were dry, indicating that groundwater was not present where expected. Direct push technology (DPT) borings were then completed to determine lithology and where water is present, which clarified the flowpath for overburden groundwater. This information was then used to revise the CSM and identified areas where treatment is required. To treat the dilute plume and prevent continued migration, using in situ enhanced bioremediation (ISEB), 126 DPT injection points will be installed in the newly identified groundwater flowpaths and to create five biobarriers using emulsified vegetable oil (EVO), buffer, nutrients, and the microbial culture SDC-9™. Also, to prevent further migration of chlorinated solvents downgradient, an additional excavation is being conducted and will include the installation of a manifold at the bottom to deliver amendments to enhance the biological degradation of contaminants in the groundwater.

Results/Lessons Learned. Over 5,000 pounds of total cVOCs have been removed from the FTG-09 source area using the DPE and groundwater extraction wells; however, elevated levels of TCE and TeCA still reside in the vadose zone. An excavation is planned to remove the cVOCs in the soil and vadose zone to aid in reduce groundwater contaminant levels. Using the updated CSM, the downgradient treatments are expected to reduce the groundwater contaminants where over 3,000 µg/L of total cVOCs are present. The ISEB biobarriers will reduce total cVOC levels above 50 µg/L in the dilute plume to reduce levels below their respective RRS. This presentation will discuss how these technologies have worked together and provide data from post excavation and biobarrier injection activities.