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GCL Tie and Treating Superfund Site Supplemental Site Characterization

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Background/Objectives. The GCL site occupies approximately 30 acres in an industrial area where creosote non-aqueous phase liquid (NAPL) and related chemical constituents (volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs] and polycyclic aromatic hydrocarbons [PAHs]) are the primary contaminants of concern. Since 2004 a groundwater extraction treatment system (GWETS) has operated at the site; however, effective removal of the contaminants of concern appears to be approaching an asymptotic level and the persistence of source material (NAPL) is preventing groundwater in localized areas from reaching clean up goals within the expected timeframe of the remedy. Battelle performed a detailed review and evaluation of relevant site information including past investigation and optimization efforts and recommended a path forward for additional high resolution site characterization (HRSC) focusing around a localized area where NAPL has been historically observed on site. The objectives of the HRSC study were to further refine subsurface lithology, characterize groundwater hydraulics (i.e., transmissive zones, confining units, and preferential pathways), evaluate the horizontal and vertical extent and nature of NAPL in soil and groundwater in the study area, and determine the vertical distribution of dissolved phase constituents and correlate the concentrations with the presence of NAPL.

Approach/Activities. Groundwater, soil and subsurface lithology were characterized at four new borehole locations to a target depth of approximately 150 feet below ground surface. Overburden lithology was characterized using the Unified Soil Classification System (USCS). Bedrock lithology encountered at depth was visually characterized through inspection of continuous 5-ft-long extracted cores and further evaluated utilizing advanced downhole geophysical methods. Groundwater and soil in the unconsolidated overburden were characterized by collecting soil and groundwater samples approximately every 20 and 10 feet, respectively, and analyzed for VOCs, SVOCs and PAHs. Groundwater flow direction and rate within open bedrock boreholes was characterized utilizing a heat-pulse flow meter (HPFM). Groundwater samples were collected from open bedrock boreholes at depths where detectable groundwater flow was measured during HPFM testing

Results/Lessons Learned. Subsurface lithology was delineated into three units consisting of shallow glacial lacustrine deposits of moderate permeability dominated by vertical groundwater flow, mid to lower glacial till deposits of low permeability dominated by horizontal groundwater flow, and deep, blocky, fractured siltstone/sandstone bedrock dominated by subparallel fractures of moderate width occurring parallel to existing bedding planes exhibiting moderate permeability dominated by vertical groundwater flow. The investigation confirmed that after more than 15 years of operating the GWETS, NAPL remains in low permeability units in discrete locations at the site. A portion of this NAPL is located in the shallow glacial till zone, which currently is not treated by the GWETS system. Multiple lines of evidence indicated that NAPL may not be a significant source of benzene, but likely is a continuing source of PAHs. Based on the results of the recent investigation and historical data, it is not likely that the GWETS will achieve site action levels (remedial action objectives, or RAOs) in a reasonable timeframe.