

Confirming Laser-Induced Fluorescence NAPL Delineation in Newtown Creek Superfund Site

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Background/Objectives Newtown Creek is a 3.5-mile-long Creek located in New York City and creates the border between the boroughs of Brooklyn and Queens. Newtown Creek is a non-aqueous phase liquid (NAPL)-impacted site. Current and historical potential sources of NAPLs adjacent to Newtown Creek include former manufactured gas plants (MGPs), petroleum-handling facilities, including refineries, pipelines, and bulk terminals, aluminum plants (Alcoa), and other industrial facilities. The second largest oil spill in the country, known as the Greenpoint Oil spill, occurred at this Site. Illegal dumping of oil also has been documented. Observations of sheens show active NAPL transport occurs daily throughout the Creek. Sediment data collected by several parties for Superfund and NYSDEC found NAPL is present throughout the creek sediments. NAPL has been observed to extend from surface sediments to subsurface sediments, and in some areas into the underlying native material. While these data show the presence of NAPL, delineation of the extent and nature of NAPL is incomplete. Because NAPL is a significant source of COPCs, it is of paramount importance to fully delineate the nature and extent of NAPL in the surface and subsurface sediments. NAPL delineation will help identify areas where a body of NAPL exists and the potential for the NAPL to continue contaminating sediments and any future remedy.

Approach/Activities: In an effort to answer the question of where NAPL sources occur at quantities that could re-contaminate potential remedies, New York City Department of Environmental Protection (the City) conducted a NAPL delineation study of the Newtown Creek sediment bed and underlying native material using laser-induced fluorescence (LIF) technology developed by Dakota Technologies, Inc. The City's study used the Tar-specific Green Optical Screening Tool (TarGOST®) and Ultra-Violet Optical Screening Tool (UVOST®) LIF screening tools. The TarGOST tool responds preferentially to PAH-dense LNAPL/DNAPL found at former manufactured gas plants (MGPs) and wood treating sites. In contrast, UVOST responds preferentially to NAPL from lighter refined petroleum products. Crude/partially refined oil responds well on both instruments. After conducting a 200-location, creek-wide LIF survey, 43 cores were collected and processed to assess the sources of different LIF signals found during the creek-wide survey. Core processing included visual/geologic logging, ex situ LIF logging, PID logging, shake testing of sediment from horizons selected using LIF response and chemical analyses of sediment horizons identified by the LIF and other logging.

Results/Lessons Learned The survey and coring program provide a robust data set that confirms the LIF responses in the creek-wide survey correspond to NAPL in the sediment bed and underlying native material and that these NAPLs are high-concentration sources of COPCs. These results show that the City's process can be used to delineate the NAPL and to further refine areas where NAPL exists. The LIF survey, supported by the coring program, confirms that NAPL is present in the majority of sediment in the Creek. The type of NAPL varies in different areas resulting in a variety of LIF responses. For example, in the turning basin and English Kills, tar-like NAPL was found in the surface and native sediments. Elsewhere, oil-like NAPL is present in the sediment bed. This presentation will integrate the data collected by the

City for delineating NAPL and confirming the LIF responses to show the nature and extent of NAPL in the sediments of the Creek.