

Studies	Phase	Performing Entity	Field Activity	Date	Locations	Samples	Objective/Description	Chemical Analyses	Notes	Report	
NAPL Sediment Studies	Phase 1	NCG/Anchor QEA	Surface Sediment	April - May 2012	124	124	Initial investigation to broadly characterize the chemical and physical properties of surface sediment throughout the creek. Visual observations of sediment sample physical characteristics.	Key analyses: PAHs, VOCs, SVOCs, PCB Aroclors/PCB congeners, pesticides, metals, TOC. Full list provided in RI Report Table 2-2b.	NAPL visual observations for Phase 1 sediment samples and cores: - Sheen - Sheen on surface - Oil Stained - visible stains on sediment (fine-grained) - Oil Coated - Visible coating on sediment (coarse-grained) - Oil Wetted - Visible oil wetting on sediment - appearing as a liquid not held by sediment grains (pooled liquid).  Shake tests performed on 5 Phase 1 cores where yellow coating was observed on sampling equipment and oil-wetted or oil-coated observations were also made. NAPL layer observed in 4 of 5 shake tests. Sheen observed in 5th shake test.	Phase 1 Data Summary Report and RI Report	
				July 2012	6	6	Surface sediment samples collocated with subsurface sediment cores to address data gaps identified during the historical data review. Data collected to characterize the chemical and physical properties of surface sediment.				
			Subsurface Sediment/Native Material	May - July 2012	98	524	Subsurface sediment samples collected to broadly characterize the chemical and physical properties subsurface sediment and native material. The data were also used to understand the depth and thickness of sediments throughout the creek.				Key analyses: PAHs/Alkyl PAHs, VOCs, SVOCs, PCB Aroclors/PCB congeners, pesticides, metals, TOC. Full list provided in RI Report Table 2-2b.
			USEPA	Phase 1 - USEPA Identified Cores	January 2015	20	NA	USEPA evaluation of Phase 1 core physical and analytical data and historical data on NAPL at upland properties to identify additional cores for further NAPL evaluation.	NA	When NAPL was identified in Phase 1 sediment cores, EPA evaluated Phase 1 chemical and physical core data and considered locations proximate to upland sites where NAPL was known or reported to be present. Sediment core data considered in the evaluation included BTEX, total petroleum hydrocarbons (TPH), PAHs, and PCBs. A total of 20 additional cores (subsequently known as the EPA-identified cores) were identified for further characterization during Phase 2.	Table summarizing EPA evaluation transmitted to respondents.
	Phase 2	NCG/Anchor QEA	Surface Sediment	May 2014 - December 2015	194	194	Surface sediment grab samples were processed using approved Phase 2 visual observation methods and terminology to identify sheen and NAPL.	Key analyses: PAHs/Alkyl PAHs, SVOCs, EPH/VPH. N-alkanes, PCB congeners, pesticides, metals, TOC. Full list provided in RI Report Table 2-2b.	Based on the Phase 1 sediment results, EPA determined that presence and extent of NAPL was a data gap in the RI. EPA required that a more precise and systematic logging procedure and terminology, consistent with NYSDEC guidance, be developed to identify and evaluate the presence of NAPL in Phase 2.	Phase 1 Data Summary Report and RI Report	
				Subsurface Sediment /Native Material	May 2014 - December 2015	165 (Cores)	Approx. 360	Subsurface sediment grab samples were processed using approved Phase 2 visual observation methods and terminology and shake tests to identify sheen and NAPL.			Key analyses: VOCs, PAHs/Alkyl PAHs, SVOCs, EPH/VPH. N-alkanes, PCB congeners, pesticides, TOC. Sample analyses depended on purpose of the sampling program. Full list provided in RI Report Table 2-2b.
	NA	NYCDEP <sup>1</sup>	Laser-induced Fluorescence (LIF) Sediment NAPL Study	April to June 2016	Approx. 150	NA	NYCDEP LIF study in Newtown Creek sediment to identify potential NAPL areas. NYCDEP provided a presentation to EPA summarizing the LIF results and later provided LIF profile logs to EPA for review.	None.	EPA reviewed the summarized data and the LIF profile logs provided by NYCDEP. EPA had significant concerns regarding calibration of the LIF instrument and indicated that additional calibration was needed to validate the LIF screening data. Subsequently NYCDEP proposed additional LIF field investigation to further calibrate and field-verify LIF results. Such data was not provided to EPA. However, even with the LIF data limitations, the LIF data was consistent with the significant NAPL areas identified in the RI NAPL delineation.	NYCDEP Presentation to EPA in December 2016. LIF Logs transmitted to EPA.	
				Verification LIF of Data Memo	May 2017	NA	NA	NYCDEP proposed collection of sediment cores adjacent to a subset of LIF screening locations conducted in 2016. Visual observations, shake tests (per NYSDEC method), and chemical analysis of selected core intervals would be performed. These data were to be collected to correlate NAPL presence and chemical concentrations with the 2016 LIF profile data.			Proposed - VOCs, PAHs/Alkyl PAHs, TPH, TOC, PCBs, metals, dioxins, pesticides.

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NAPL Sediment Studies	FS Field Investigation Program	NCG/Anchor QEA	NAPL Distribution Refinement	November/December 2017 and April/May 2018	26	68 (core segments evaluated)	Additional cores collected to further define the lateral and vertical extent (in sediment and native material) of NAPL in Category 2/3 areas to support development of remedial alternatives in the FS. This included step-out cores based on field evaluation of the additional cores. The data was also used to support selection of appropriate locations for FS NAPL mobility testing. Core segments were evaluated using Phase 2 visual and shake test methods.	None	In an October 26, 2016 memo to Anchor QEA, EPA indicated that gaps existed in the Phase 2 sediment NAPL distribution data. EPA determined that additional vertical and lateral delineation of NAPL distribution in the Study Area was required to provide sufficient data to support the FS. EPA directed that the extent of Category 2/3 Areas be further delineated during FS field investigation.	RI Report - Details in Appendix C
	FS Field Investigation Program	NCG/Anchor QEA	NAPL Mobility Testing	Part 1 - December 2017 - May 2018 Part 2 - April 2018 - October 2019	18 cores in Category 2/3 NAPL areas (CM 1.7, Tuning Basin, Lower English Kills).19 cores in Category 1B areas.	Initial Test - 436 Stage 1 - 81 Stage 2 - 10 Stage 3 - 2	The FS NAPL mobility field program was performed to evaluate whether NAPL may flow through pore spaces of Newtown Creek sediment and native material and to collect physical parameters to evaluate the effectiveness and technical implementability of potential remedial technologies and alternatives in the FS.	Various physical property, NAPL fluid property, and mobility tests (e.g., bulk density, dry density, total porosity, pore volume, water pore fluid saturation, NAPL pore fluid saturation	NAPL Mobility Data Evaluation Report (DER) is currently under review by EPA.	FS Data Summary Reports (Parts 1 and 2) and NAPL Mobility Data Evaluation Report (DER)
Ebullition Studies	Phase 2	NCG/Anchor QEA	Ebullition Survey	August 18 - 19, 2015	Selected creek areas	None	Initial visual observations of ebullition, sheen blossoms, and sheen in sections of the main stem, Dutch Kills, Turning Basin, Maspeth Creek, East Branch, and accessible portions of English Kills.	None	Limited areas of sheen blossoms identified in the Turning Basin and near the head of English Kills - only during low tide portion of survey.	RI Report - Details in Appendix D - Gas Ebullition.
	NA	NYCDEP <sup>1</sup>	Ebullition Survey	August 28 - September 2, 2015	Selected creek areas	None	Visual observations of ebullition in areas of the turning basin, first bend of English Kills, middle reach of main stem, head end of Dutch Kills, and Maspeth Creek.	None	Based on review and evaluation of NYCDEP's ebullition data, EPA identified a number of differences between the results of NYCDEP's ebullition survey and the Anchor QEA survey. The NYCDEP survey results showed greater frequency of both ebullition and sheen blossoms. The NYCDEP's survey was conducted during lower low tides (Spring tides) than the Anchor QEA survey. Based on the NYCDEP survey data, EPA required that Anchor QEA conduct an additional and more extensive ebullition survey during a Spring tide event with lower tide elevations. The second survey was conducted in September 2016.	Results provided in presentation to EPA on July 21, 2016.
	Phase 2	NCG/Anchor QEA	Ebullition Survey	September 16 -19, 2016	Selected creek areas	None	Visual observations of ebullition, sheen blossoms, and sheen in all areas of the creek and its tributaries except near the mouth (CM 0 - 0.60) and a small section of the upper main stem (CM 2-2.15).	None.	The survey results indicated more frequent ebullition and more instances of ebullition facilitated transport of NAPL in more areas of the creek than in the 2015 survey that was conducted under higher spring tide elevation conditions. The survey data was more similar to the results of the NYCDEP 2015 survey and was sufficient to support development of the quantitative ebullition pilot study.	RI Report including Appendix D - Gas Ebullition.
	NA	NYCDEP <sup>1</sup>	Ebullition Survey	September 16 -19, 2016	Limited areas of the Creek	None	Visual observations of ebullition, sheen blossoms, and sheen in limited areas of the Creek. Areas were limited due to ongoing EPA ebullition survey of the Creek.	None	Results were generally consistent with the Anchor QEA 2016 Ebullition survey.	Result provided in presentation to EPA on December 1, 2016.
	NA	NYCDEP <sup>1</sup>	Ebullition Survey	Mid-October and Mid-November 2016	Limited areas where ebullition-facilitated migration of NAPL was previously observed.	None	Visual observations of ebullition in limited areas of the Creek where ebullition-facilitated migration of NAPL was previously observed - upstream of the Kosciusko Bridge - including the Turning Basin, English Kills, and the north fork of East Branch.	None	Results were generally consistent with the Anchor QEA 2016 Ebullition survey.	Result provided in presentation to EPA on December 1, 2016.
	FS Field Investigation Program	NCG/Anchor QEA	Quantitative Ebullition Pilot Study/Ebullition Survey	September 18 - 21, 2017	Dutch Kills and Turning Basin	Sediment/ porewater (20 each), surface water (4), gas (8), flux chamber NAPL (8)	Quantitative gas ebullition pilot study conducted to test methodologies to quantify NAPL and contaminant and gas flux for a subsequent full-scale ebullition sampling program to be conducted as part of the Part 2 FS field investigation. Included sampling of NAPL and gas derived from ebullition, sediment in study area and visual observations of ebullition in the pilot study areas.	NAPL captured in flux chambers analyzed for PAHs, TPH, oil and grease, and DRO. Gas analyzed for gas composition.	Floating sampling frames and submerged flux chamber methods were evaluated in the pilot test. Based on the results of the study, submerged flux chambers were selected for the full-scale quantitative ebullition study.	FS DSR Part 1 and RI Report - Details in Appendix D

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<b>Ebullition Studies</b>	FS Field Investigation Program	NCG/Anchor QEA	Quantitative Ebullition Study	July and October 2018 January 2019 (survey only)	31 flux chambers - East Branch, Lower English Kills, Turning Basin Brooklyn, Turning Basin Queens, and Dutch Kills	7 flux chambers in each area except Dutch Kills where there were 3 locations.	Estimate the annual fluxes of NAPL, contaminants, and gasses from the sediment surface to the overlying surface water in the Study Area. The study was conducted during period of the year when ebullition activity was expected to be near maximum.	Key analyses: NAPL, PAHs/Alkyl PAHs, PCB congeners, TPH, gas composition	Currently under EPA review.	FS DSR Part 1 and Gas Ebullition Data Evaluation Report (DER)
<b>Shoreline Sediment and Seep Studies</b>	NA	NYCDEP <sup>1</sup>	Shoreline Seep Sampling	July 1017 - November 2017	11	42	Collect data to characterize the nature of contamination from seeps from selected upland properties.	PAH/Alkyl PAH, PCBs, dioxin/furans, TPH, aliphatic hydrocarbons, DRO, TOC.	EPA agrees that the shoreline NAPL seeps will require further evaluation in the FS and that the seep represent a source of contaminants to the Study Area. The need for further evaluation of NAPL seep in the FS is highlighted by the concentrations of contaminants in NAPL in seep samples reported by NYCDEP. EPA will also consider the shoreline seep data collected recently by the NYSDEC in the FS. As stated in the RI, the contribution of contaminants due to seeps will be considered during the FS.	NYCDEP presented summarized data to EPA in 2017 and provided a formal NAPL seep report in September 2020.
	Part 1 FS Field Investigation	NCG/Anchor QEA	Shoreline Seep Sampling	November - December 2017	9	9	Seep samples collected to along the shoreline to further characterize contaminant distribution near potentially erodible shorelines to identify potentially significant sources of contaminants to the creek and to support development and screening of remedial alternatives in the FS.	Key analyses: PAHs/Alky PAHs, SVOCs, PCB congeners, pesticides, metals, TOC. Full list provided in RI Report Table 2-2b.	Locations at 8 Rewe Street (TPAH) and near Cipico Construction (TPCBs) had elevated levels of contaminants.	RI Report and FS Part 1 DSR

notes:

1 - Work performed by NYCDEP was not reviewed and approved by EPA.

DRO - Diesel range organics

EHP - Extractable petroleum hydrocarbons

PAHs - Polycyclic aromatic hydrocarbons

PCBs - Polychlorinated biphenyls

SVOCs - Semivolatile organic compounds

TOC - Total organic carbon

TPH - Total petroleum hydrocarbons

VOCs - Volatile organic compounds

VPH - Volatile petroleum hydrocarbons