FIELD SAMPLING AND ANALYSIS PLAN
ADDENDUM 1
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
NEWTOWN CREEK

Prepared by

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April 2012

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LIST OF ACRONYMS AND ABBREVIATIONS

AR	Air
ASOS	Automated Surface Observation System
COC	chain-of-custody
CSM	Conceptual Site Model
DK	Dutch Kills
DMP	Data Management Plan
EB	East Branch
EK	English Kills
FB	Field Blank
FS	Feasibility Study
FSAP	Field Sampling and Analysis Plan
GPS	Global Positioning System
HASP	Health and Safety Plan
IDW	Investigation-derived Waste
JFK	John F. Kennedy
MC	Maspeth Creek
NC	Newtown Creek
NOAA	National Oceanic and Atmospheric Administration
NYC	New York City
NYSDEC	New York State Department of Environmental Conservation
PCB	polychlorinated biphenyl
PPE	Personal Protective Equipment
PUF	polyurethane foam
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RI	Remedial Investigation
SOP	Standard Operating Procedure
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WC	Whale Creek
YYYYMMDD	YearMonthDay

6 AIR MONITORING

This section, which supersedes Section 6 of the Field Sampling and Analysis Plan (FSAP; Anchor QEA 2011d) that was approved by the U.S. Environmental Protection Agency (USEPA) on October 28, 2011, describes the procedures that will be followed to perform the air monitoring.

6.1 Overview

Purpose. The objectives of the air monitoring program are as follows:

- To evaluate baseline concentrations of specific airborne chemicals (volatile organic compounds [VOCs] and polychlorinated biphenyls [PCBs]) in the New York City (NYC) area
- To measure the level of ambient concentrations that would be experienced within the breathing zone on or along the Study Area
- To estimate the portion of the measured concentrations that is potentially attributable to the Study Area

Although "a release of hazardous substances to air is not observed or suspected" (Weston 2009), air sampling will also be conducted, as appropriate, during other field efforts to characterize and facilitate the control of emissions arising from Remedial Investigation (RI) activities and to ensure the protection of personnel performing field sampling and sample processing and the public.

Existing Data Review. Available background regional air quality data will be researched and considered for use with evaluating the RI data. Additionally, data from local meteorological stations was reviewed to provide additional data on temperature, precipitation, wind direction and wind speed near the Study Area. Section 6.2.1 provides more information on existing data review procedures.

Data Gap Assessment Relative to Conceptual Site Model (CSM). Data gaps exist for ambient air monitoring information outside of the Greenpoint area.

Summary of Work to be Performed to Close Data Gaps. The data gaps will be addressed by obtaining and evaluating existing air data from the New York State Department of Environmental Conservation (NYSDEC) VOC program and by performing additional ambient air monitoring in the Study Area.

The following activities are included for air monitoring:

- **Existing Data Review.** Review of available background regional air quality data, including NYSDEC data, for use with the RI data
- **Air Monitoring.** Collection of simultaneous air measurements for VOCs and PCBs at selected locations on opposite sides of the Study Area, as well as measurements at a height of about 2.5 feet above the water surface when the wind direction is generally perpendicular to Newtown Creek

Figure 6-1 shows the proposed air sampling locations. Table 6-1 provides the sampling location names, rationale for each sampling location, and planned analyses for each location.

6.2 Procedures

An overview of air data review and air monitoring procedures are described in the following sections. All of the tasks described in this section will be documented and stored in the project files as described in the Data Management Plan (DMP; Anchor QEA 2011c). During air monitoring activities, field observations will also be documented. Field notes will be maintained in a log book, on the Daily Activity Log (see Standard Operating Procedure [SOP] NC-01 – Field Records, for sample form), and on data collection forms (see SOPs NC-20 – Air Monitoring for Polychlorinated Biphenyls and NC-21 – Air Monitoring for Volatile Organic Compounds, for sample forms).

6.2.1 Existing Data Review

Available background regional air quality data will be researched and considered for use with evaluating the RI data. The NYSDEC maintains the New York State Volatile Organic Compound Ambient Monitoring Network, which monitors VOCs across the state (NYSDEC 2012). Several NYSDEC VOC monitoring stations in Manhattan, Brooklyn, and Queens, New York City have been identified and data from these stations will be collected

and reviewed. The NYSDEC VOC sampling stations are identified as Public School 274 Kosciusko School (800 Bushwick Avenue, Brooklyn, New York 11221), College Point Post Office (120-07 15th Avenue, Queens, New York 11356), Public School 219 Queens College (144-39 Gravett Road, Queens, New York 11367), Canal Sreet Post Office (350 Canal Street, New York, New York 10013), Public School 59 Beekman Hill International (228 East 57th Street, New York, New York 10022), and Queensboro Community College (56th Avenue and Springfield Boulevard, Oakland Gardens, New York 11364).

A search of local meteorological stations was conducted to provide additional data on wind direction and velocity near the Study Area. Weather data has been examined from two federally maintained stations in the area. These stations are Automated Surface Observation System (ASOS stations that are maintained by the Federal Aviation Administration and the National Weather Service). They are located at LaGuardia Airport (Ditmars Boulevard and 94th Street, Flushing, New York 11369) and JFK International Airport (JFK Expy & S Cargo Road, Jamaica, New York 11430). The data has been downloaded from Weather Underground (wunderground.com) or directly from the National Oceanic and Atmospheric Administration (NOAA) National Climate Data Center database. Monthly summaries of this data are presented in Attachment 2. Other Personal Weather Stations in close proximity to Newtown Creek were evaluated but none had historical data records of sufficient length (i.e., greater than 5 years) or wind direction data.

6.2.2 Ambient Air Monitoring

To meet the air monitoring objectives, simultaneous air measurements will be made over a 24-hour period at selected locations on opposite sides of the Study Area, as well as measurements at a height of about 2.5 feet above the water surface (see Figure 6-1). The land-side monitors are located on either bank and paired for an upwind-downwind analysis. On-water sample collection instruments will be deployed on small rafts anchored to the bottom of the Creek. The sample locations in Figure 6-1 are preliminary and may be adjusted in consideration of field conditions, the ability to obtain access, and if research completed by the time of sampling indicates the presence of a potential significant air source.

Sampling will be performed for VOCs using passivated canisters and for PCBs using polyurethane foam (PUF) samplers. The ambient air samples for VOC analysis will be collected in pre-cleaned passivated canisters in accordance with the procedures detailed in USEPA Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (1999a). Ambient air samples for PCB analysis will be collected in accordance with the procedures detailed in USEPA Method TO-10A Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD; 1999b).

The monitoring program will also include continuous meteorological measurements at two stations adjacent to Newtown Creek located several miles from each other in order to capture spatial variability. The two stations are located approximately 0.4 miles and 3 miles east of the mouth of the Creek (see Figure 6-2). Both stations are placed in unobstructed areas as close to the Creek as possible. The easternmost station is located on the National Grid facility. The weather data obtained from these stations will be compared to historical data obtained from JFK and LaGuardia to identify timeframes for optimal sampling conditions (i.e., no precipitation and non-stagnant wind speeds) and to confirm the upwind/downwind station locations. The weather data collected during the 24-hour sampling event may also be used in conjunction with the weather data from JFK and/or LaGuardia, and the analytical data to meet the third objective (estimate the portion of the measured concentrations that is potentially attributable to the Study Area). Additionally, upper atmospheric weather conditions will be obtained from the Atmospheric Sciences Department at Stony Brook University for LaGuardia, New York http://blizzard.msrc.sunysb.edu/html/alt_mm5.cgi for inclusion in the data report.

The following three sets of activities will be conducted as part of the ambient air monitoring:

- Pre-sampling activities, including site access verification and field reconnaissance of air sampling stations, establishment of two meteorological stations, testing of equipment, and notification of authorities
- Sampling activities including air sampling equipment mobilization, set up, and completion of air sampling
- Sample processing

6.2.2.1 Pre-Sampling Activities

Pre-sampling site access verification and field reconnaissance of the selected sampling stations will be conducted. These activities are summarized as follows:

- Review the Health and Safety Plan (HASP; Anchor QEA 2011a) for potential hazards, obtain appropriate Personal Protective Equipment (PPE), and conduct safety meetings prior to and during the air sampling.
- Verify that there is access to the proposed sampling stations.
- Verify weather conditions using weather forecasts, existing weather stations, and the two meteorological towers.
- Train key field team staff well in advance of the sampling event with relevant methodology, procedures, and troubleshooting of air sampling equipment.
- Test air monitoring equipment and order replacement pieces, as needed.
- Evaluate a level of security at stations for sampling equipment.
- Develop knowledge concerning building use and operations around the sampling stations.
- Identify the designated sampling locations with spray paint or other means and record the latitude and longitude via Global Positioning System (GPS). An attempt will be made to select locations in unobstructed areas; however, due to the urban environment this may not be possible.
- Ensure ability to perform air sampling at all locations contemporaneously (i.e., start time of sampling period at each station is within a two-hour timeframe).
- Obtain the final sample table from the Project Chemist that will be compiled for each sampling mobilization and organized by station. Notify USEPA 2 weeks (minimum) in advance of the estimated sampling day (weather dependent), and provide a copy of the final sample table.

Sample stations may be relocated to meet access and security requirements. Based on the travel time between stations, and ensuring contemporaneous sampling periods for all devices, the number of field team staff to conduct the monitoring, mobilization and activation of equipment is estimated to be 10 to12 staff (5 to 6 teams of two staff members).

The air monitoring task includes the establishment of two meteorological stations with consideration of the guidelines presented in Meteorological Monitoring Guidance for Regulatory Modeling Applications (USEPA 2000). These meteorological stations are solar-powered Onset HOBO U30 data loggers, equipped with sensors for wind speed and direction, temperature, precipitation, solar radiation, relative humidity, and barometric pressure. The meteorological stations will collect continuous measurements every 15 minutes for all parameters specified. Data will be collected via an electronic data logger through a cellular network and downloaded to the electronic project files.

The targeted sampling conditions are dry, moderate to high temperature, non-stagnant wind speed (greater than 5 miles per hour and non-storm), and a south/north wind direction (perpendicular to the creek). Based on review of historical weather data (provided in Attachment 2) the ideal sampling window will be June through August. Local weather forecasts and weather data from JFK, LaGuardia, and the two meteorological stations will be used to predict an adequate sampling day. Wind speed and direction may vary throughout the 24-hour sampling period; therefore, weather forecasts will be relied on for these parameters rather than the measured wind speed and direction at the time of sampling initiation. Equipment testing and a sampling station route dry run for each team will occur the day before sampling.

The air monitoring task also includes monitoring boat traffic in the Study Area during the 24-hour monitoring period. This monitoring will either be conducted by visual observation, electronic monitoring (i.e., video recording), or obtaining vessel traffic records from Vessel Traffic Security. The monitoring method will be identified as part of the pre-sampling activities and will consider factors such as whether on-water sampling will require field team staff that could monitor boat traffic and availability of a secure monitoring location for electronic equipment.

The appropriate authorities (local agencies, land owners, fire, police, and homeland security) will be notified of the sampling event at least 1 week prior to the sampling. Sample station security will consist of enclosing the equipment in locked metal cages or plastic containers to protect the pump and canister. Additional security measures include locking the equipment

enclosures to fixed structures (poles and trees) and having field teams check equipment periodically.

Prior to mobilization, a sample table will be prepared by the Project Chemist. This table will be organized by station and will include the station number, sample identification, analyses to be conducted, quality assurance/quality control (QA/QC) samples required, holding times, preservation, and laboratory information.

6.2.2.2 Sampling Activities

Equipment will arrive at the field facility pre-assembled and pre-tested by the laboratory (passivated canisters, PUF cartridges, flow manifolds, tubing, and fittings) and the equipment rental company (low-flow pumps). Six sets of extra equipment will be delivered to the field facility for substitution in the event of equipment failure. The ambient air monitoring program will be conducted by four to five field teams (each consisting of two field staff members) on each side of the Study Area (i.e., in Queens and in Brooklyn) and one in-water field team.

Based on the information obtained during the pre-sampling activities, specific routes will be established for each of the field team staff. These field team staff will meet project health and safety requirements, as specified in the HASP (Anchor QEA 2011a). The following activities and sampling procedures will be implemented for air sample collection:

- Air sampling equipment will be inspected, calibrated, and set-up at the field facility the morning of sampling.
- Following set up, field team staff will go to the first station on their designated route and activate the air sampling equipment. The field team will follow the detailed protocols provided in SOP NC-20 – Air Monitoring for Polychlorinated Biphenyls, and NC-21 – Air Monitoring for Volatile Organic Compounds. The field team staff will then go to each of the other locations in sequential order and activate the equipment at each location, noting the time of activation, functionality of equipment, and environmental conditions (e.g., smoke, fog, or odors).
- QA/QC samples will be collected as indicated on the sample table from the Project Chemist.

- The following outlines the procedures for activation of the equipment:
  - For the PUF samplers, field team staff will complete the following steps:
    - Position the sampling assembly with the intake downward or in horizontal position 1 to 2 meters above ground level (2 to 3 feet for in-water samples).
    - Carefully remove the clean sample cartridge from the aluminum foil wrapping (the foil is returned to jars for later use), and attach it to the pump with flexible tubing.
    - Record the cartridge height above ground on the PCB air sampling form.
    - Turn on the pump power switch to begin sampling.
    - Verify the flow rate via the pump rotometer or other device.
    - Field team staff will activate the elapsed time meter and record the start time on the PCB air sampling form.
  - For passivated canisters, field team staff will complete the following steps:
    - Position the sampling assembly with the intake position 1 to 2 meters above ground level (2 to 3 feet for in-water samples).
    - Confirm that the valve is closed (knob should already be tightened clockwise).
    - Remove the valve plug and attach the gauge.
    - Attach the valve plug to the side of the gauge tee fitting.
    - Open and close the valve quickly (a few seconds).
    - Read the vacuum on the gauge; if the vacuum is fewer than 28 inches Hg, replace the canister.
    - Record gauge reading and start time on the VOC air sampling form.
    - Verify that the canister valve is closed then remove the gauge and replace the valve plug.
    - Attach the flow controller assembly to the canister.
    - Open the valve allowing the sample to start flowing into the canister. Monitor the progress of the sampling during the 24-hour period, if site access is permitted. The volume of air sampled has a linear relationship to the canister vacuum. Thus, halfway through the sampling interval, half of the sample will have collected (3 liters) and the vacuum gauge should read approximately 17 inches Hg (halfway between 29 inches Hg and 5 inches Hg). The flow controller is calibrated to leave approximately 5 inches Hg residual vacuum in

the canister and because of normal fluctuations during sampling the final vacuum will be between 2 and 10 inches Hg. A residual vacuum fewer than 1 inch Hg indicates that the canister may have come to ambient conditions before the completion of the sampling interval. This will not mean that the sample should be voided; contact the Field Team Leader in this event.

- Field team staff will continue rounds of the air sampling stations, so each station is checked approximately every 4 to 6 hours. Field notes will be taken on the VOC and PCB air sampling forms to document functionality of the equipment, pressure in the passivated canister, environmental conditions, and damage.
- At the end of the 24-hour period, equipment will be deactivated in the same order in which it was activated the previous day. Field team staff will take a photograph of the sampling set up before deactivation.
  - For PUF samplers, field team staff will complete the following steps:
    - Turn off the pump, remove the PUF cartridge from the sampler, wrap the cartridge with the original aluminum foil, and placed the cartridge in a sealed, labeled container.
    - Place the sample containers in an insulated cooler containing wet ice to keep samples cold until they can be transported to the field facility sample processing area for packing and shipping to the analytical laboratory, as described in NC-14 – Sample Packaging and Shipping.
  - For passivated canisters, field team staff will complete the following steps:
    - Close the valve by hand tightening the knob clockwise.
    - Verify and record the final vacuum of canister (repeat steps used to verify initial vacuum) on the VOC and PCB air sampling forms and chain-of-custodies (COCs).
    - Remove the flow controller assembly.
    - Replace the valve plug.
    - Return the canister to the box and place accessories (e.g., gauges) in packaging provided.
    - Complete the COC.
- Field team staff will transport samples back to the field facility sample processing area

for packing and shipping to the analytical laboratory.

- All field activities will be documented, including air sampling collection activities, custody transfer of the samples, and the PCB and VOC air sampling forms will be filled out in their entirety. Field documentation procedures are detailed in Section 14 and in SOP NC-01 – Field Records.

6.2.2.3 Sample Processing

Samples will initially be packed in the field as described in Section 6.2.2.2. Once they are packed, the field team staff will conduct the following activities:

- Transfer samples to the field facility under COC per Section 14.2.2 and in accordance with SOP NC-13 – Sample Custody. Once samples are transferred to the field facility, they will be packed and shipped to the analytical laboratory as described in NC-14 – Sample Packaging and Shipping.
- Work with the Field Team Leader to ensure field records/forms and photographs are downloaded to the field facility computer at the end of the sampling period.

The Field Team Leader will review the records and forward the records to the Data Management Task Manager.

6.2.2.4 Sample Station and Frequency

One 24-hour period of air monitoring will be conducted. Air monitoring will be conducted at six on-water stations, nine paired upwind-downwind bank stations, and five stations at a distance from the Study Area to evaluate background conditions. Sample stations are shown in Figure 6-1 and may be adjusted in consideration of field conditions, the ability to obtain access, and if research completed by the time of sampling indicates the presence of a potential significant air source. The Phase 1 RI Field Program includes one round of air monitoring.

6.2.2.5 Sample Designation

Samples will be uniquely identified at the time of collection, as described in Section 14.2.1. The nomenclature that will be {station identification}{matrix code}--{date} where:

- Station identification equals a 5-character identifier for the station, identified in Figure 6-1. The identifier will begin with a 2-character identifier to indicate whether the station is located in Newtown Creek or a tributary and will be followed by a 3-digit number that indicates the position. Field duplicates will be identified by adding 1,000 to the 3-digit position number. The character codes are as follows:
  - NC = Newtown Creek
  - DK = Dutch Kills
  - WC = Whale Creek
  - MC = Maspeth Creek
  - EB = East Branch
  - EK = English Kills
- The field blanks will not require a station identifier.
- The matrix code equals a 2-character code to indicate the sample matrix. Matrix codes are as follows:
  - AR = Air
  - FB = Field Blank
- The date equals an 8-character code to indicate the date the sample was collected in the format YearMonthDay (YYYYMMDD).

The following provides examples:

- An air sample collected at the 26th station of the main Newtown Creek area collected on September 8, 2011 would have the identification: NC026AR-20110908
- The duplicate of this sample would have the identification: NC1026AR-20110908

6.2.2.6 Sample Handling and Analysis

Ambient samples will be analyzed for VOCs by USEPA Method TO-15, and PCBs will be analyzed by USEPA Method TO-10A. Worksheet number 15 (Reference Limits and Evaluation Table) in the Quality Assurance Project Plan (QAPP; Anchor QEA 2011b) lists the individual analytes, and Table 6-2 in this FSAP provides the analyses, containers, and laboratory information. Samples will be packaged and shipped to the laboratory in

accordance with NC-14 – Sample Packaging and Shipping (see Section 14.2.3). Further information on the analytical program and specific analytes are provided in the QAPP.

6.2.3 Air Monitoring During Sampling and Processing Activities

Real time air monitoring (i.e. photoionization detector) is not anticipated for this activity.

6.2.4 Equipment Decontamination

Air monitoring equipment positioned for the on-water samples may come in contact with Study Area media. Decontamination of the equipment will be performed in accordance with the procedures described in SOP NC-02 – Equipment Decontamination.

6.2.5 Investigation-Derived Waste

Investigation-derived Waste (IDW) will not be generated during the performance of the survey and assessment. However, PPE will be generated as IDW and will be temporarily stored at the field facility and disposed of following the procedures described in Section 15 of this FSAP and SOP NC-15 – Investigation-Derived Waste (IDW) Handling and Disposal.

6.2.6 Standard Operating Procedures

The following SOPs may be relevant to this activity:

- NC-01 – Field Records
- NC-04 – Navigation/Boat Positioning
- NC-13 – Sample Custody
- NC-14 – Sample Packaging and Shipping
- NC-15 – Investigation-Derived Waste (IDW) Handling and Disposal
- NC-20 – Air Monitoring for Polychlorinated Biphenyls
- NC-21 – Air Monitoring for Volatile Organic Compounds

6.2.7 Materials and Equipment

The materials and equipment that may be required to complete these procedures is provided in Table 6-3.

6.3 Data Processing, Evaluation, and Management

The data collected to support the air monitoring event will be stored in the project files. Analytical data will be validated in accordance with QAPP (Anchor QEA 2011b) Worksheets No. 12 (Measurement Performance Criteria), No. 35 (Sampling and Analysis Validation [Steps IIa and IIb] Process Table), No. 36 (Sampling and Analysis Validation [Steps IIa and IIb] Summary Table), and No. 37 (Data Usability Assessment). Analytical data will be maintained in the project database and accessible only by designated project personnel, as described in the DMP (Anchor QEA 2011c).

Air monitoring data collected during the Phase 1 RI Field Program will be used in conjunction with available regional data to evaluate baseline conditions of air quality in the Study Area and potential contributions from the Study Area. Potential contributions from the Study Area will be evaluated by statistically comparing in-water, land-side, and background station air data to each other and ambient air concentrations, such as NYSDEC regional VOC data or other relevant urban ambient air quality data.

6.4 Reporting

Following data validation and review, air monitoring data collected during the Phase 1 RI Field Program will be included in the Phase 1 RI Data Summary Report, RI Report, and other deliverables, as appropriate.

6.5 Schedule

Based on desired weather conditions, historical weather data evaluation, and staffing efficiency, this event has been scheduled for the month of June. Local weather forecasts and weather data from JFK, LaGuardia, and the two meteorological stations will be used to predict an adequate sampling day. Because the duration of sampling is 24 hours and wind direction changes throughout the day, the wind direction at the initiation of sampling would not solely determine an adequate sampling window.

The air monitoring described in this section will be conducted over a 24-hour period. It is anticipated that at minimum, 3 months will be required for mobilization to identify sample

locations and to obtain site access. Site access considerations may expand the time of this mobilization period. The schedule will also be dependent on weather and field conditions.

Table 6-1

Air Monitoring Stations, Rationale, and Analyses

Station ID	Target Coordinates NAD 83[1] (feet)		Location in Study Area[1]	Rationale	Analyses
	Easting	Northing			
Block2525 Lot1	998692.5803	205559.8659	South of Newtown Creek and Whale Creek	- Upwind of the Study Area based on prevailing wind direction - Provide Study Area background conditions - Within manufacturing-zoned area	PCBs and VOCs
Block69Lot14	999490.9273	209406	North of Newtown Creek and West of Dutch Kills	- Downwind of the Study Area based on prevailing wind direction - Provide Study Area background conditions - Within manufacturing-zoned area	PCBs and VOCs
Block2660 Lot50	1000984.856	203865.0062	South of Newtown Creek, West of English Kills	- Upwind of the Study Area based on prevailing wind direction - Provide Study Area background conditions - Within manufacturing-zoned area	PCBs and VOCs
Block303 Lot25	1002001.045	207413.6509	North of Newtown Creek, East of Dutch Kills	- Downwind of the Study Area based on prevailing wind direction - Provide Study Area background conditions - Within manufacturing-zoned area	PCBs and VOCs
Block2979 Lot24	1005793.408	198500.4879	South of East Branch and East of English Kills	- Upwind of the Study Area based on prevailing wind direction - Provide Study Area background conditions - Within manufacturing-zoned area	PCBs and VOCs
DK012	1000869.741	209293.5418	Dutch Kills, Upper Reach	- Spatially along Study Area - At headwater of tributary near area where sediment loading is occurring - Upwind of Study Area, paired with downwind sample to evaluate potential contribution from Study Area	PCBs and VOCs

Table 6-1

Air Monitoring Stations, Rationale, and Analyses

Station ID	Target Coordinates NAD 83[1] (feet)		Location in Study Area[1]	Rationale	Analyses
	Easting	Northing			
DK013	1000817.246	209587.949	Dutch Kills, Upper Reach	- Spatially along Study Area - At headwater of tributary near area where sediment loading is occurring - Downwind of Study Area, paired with upwind sample to evaluate potential contribution from Study Area	PCBs and VOCs
EB012	1005453.069	200175.0733	East Branch, Middle Reach	- Spatially along Study Area - Near headwater of tributary where sediment loading is occurring - Downwind of Study Area, paired with upwind sample to evaluate potential contribution from Study Area	PCBs and VOCs
EB013	1005371.007	199911.4577	East Branch, Middle Reach	- Spatially along Study Area - Near headwater of tributary where sediment loading is occurring - Upwind of Study Area, paired with downwind sample to evaluate contribution from Study Area	PCBs and VOCs
EK024	1003920.202	200774.9148	English Kills, Lower Reach	- Spatially along Study Area - Evaluate potential source/presence of PCBs - Downwind of Study Area, paired with upwind sample to evaluate potential contribution from Study Area	PCBs and VOCs
EK025	1004047.493	200383.9638	English Kills, Lower Reach	- Spatially along Study Area - Evaluate potential source/presence of PCBs - Upwind of Study Area, paired with downwind sample to evaluate potential contribution from Study Area	PCBs and VOCs
EK026	1003178.821	198194.4737	English Kills, Upper Reach	- Spatially along Study Area - Near headwater of tributary where sediment loading is occurring - Evaluate potential source/presence of PCBs - Upwind of Study Area, paired with downwind and within Study Area sample to evaluate potential contribution from Study Area	PCBs and VOCs

Table 6-1

Air Monitoring Stations, Rationale, and Analyses

Station ID	Target Coordinates NAD 83[1] (feet)		Location in Study Area[1]	Rationale	Analyses
	Easting	Northing			
EK027	1003297.056	198348.3896	English Kills, Upper Reach	- Spatially along Study Area - Near headwater of tributary where sediment loading is occurring - Evaluate potential source/presence of PCBs - Within Study Area, paired with upwind and downwind samples to evaluate potential contribution from Study Area	PCBs and VOCs
EK028	1003343.411	198452.2967	Near Shoreline of English Kills, Upper Reach	- Spatially along Study Area - At headwater of tributary where sediment loading is occurring - Evaluate potential source/presence of PCBs - Downwind of Study Area, paired with upwind and within Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs
MC009	1005862.502	202887.3073	Maspeth Creek, Upper Reach	- Spatially along Study Area - Near headwater of tributary where sediment loading is occurring - Upwind of Study Area, paired with downwind sample to evaluate potential contribution from Study Area	PCBs and VOCs
MC010	1005663.466	203167.8743	Maspeth Creek, Upper Reach	- Spatially along Study Area - Near headwater of tributary where sediment loading is occurring - Downwind of Study Area, paired with upwind sample to evaluate potential contribution from Study Area	PCBs and VOCs
NC003	995070.6462	207948.7442	Channel of Newtown Creek, Near Mouth	- Spatially along Study Area - At mouth Newtown Creek	PCBs and VOCs
NC083	996691.797	208593.7429	Newtown Creek, Lower Reach	- Spatially along Study Area - Near public access point at Manhattan Avenue - Upwind of Study Area, paired with downwind and within Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs

Table 6-1

Air Monitoring Stations, Rationale, and Analyses

Station ID	Target Coordinates NAD 83[1] (feet)		Location in Study Area[1]	Rationale	Analyses
	Easting	Northing			
NC084	996688.8884	208676.9532	Channel of Newtown Creek, Lower Reach	- Spatially along Study Area - Near public access point at Manhattan Avenue - Within Study Area, paired with upwind and downwind Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs
NC085	996688.9783	208753.4406	Newtown Creek, Lower Reach	- Spatially along Study Area - Near public access point at Manhattan Ave. - Downwind of Study Area, paired with upwind and within Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs
NC086	999063.4298	207717.1223	Newtown Creek at Whale Creek	- Spatially along Study Area - Within Study Area, paired with downwind Study Area sample to evaluate potential contribution from Study Area	PCBs and VOCs
NC087	999020.7536	208186.7084	Newtown Creek at Dutch Kills	- Spatially along Study Area -Downwind of Study Area, paired with upwind Study Area sample to evaluate potential contribution from Study Area	PCBs and VOCs
NC088	1002556.854	204587.9153	Newtown Creek, Middle Reach	- Spatially along Study Area - On Respondents property - Upwind of Study Area, paired with downwind and within Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs
NC089	1002531.049	204718.748	Channel of Newtown Creek, Middle Reach	- Spatially along Study Area - Adjacent to Respondents property - Within Study Area, paired with upwind and downwind Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs

Table 6-1

Air Monitoring Stations, Rationale, and Analyses

Station ID	Target Coordinates NAD 83[1] (feet)		Location in Study Area[1]	Rationale	Analyses
	Easting	Northing			
NC090	1002461.76	204954.2754	Newtown Creek, Middle Reach	- Spatially along Study Area - On Respondents property - Downwind of Study Area, paired with upwind and within Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs
NC091	1003832.506	204226.6157	Newtown Creek, Upper Reach	- Spatially along Study Area - Upwind of Study Area, paired with downwind and within Study Area samples to evaluate potential contribution from Study Area	PCBs and VOCs
NC092	1003899.311	204619.347	Newtown Creek, Upper Reach	- Spatially along Study Area - Near location of potential future public access to Study Area at new Kosciuscko Bridge - Within Study Area, paired with upwind Study Area sample to evaluate potential contribution from Study Area	PCBs and VOCs
NC093	1004708.269	203067.1087	Newtown Creek, Upper Reach, at Confluence with Maspeth Creek	- Spatially along Study Area - Adjacent to Respondents property - Evaluate potential source/presence of PCBs within Study Area	PCBs and VOCs
NC094	1005173.498	201512.3991	Newtown Creek, Upper Reach, Between Confluence with Maspeth Creek and Confluences with East Branch and English Kills	- Spatially along Study Area - Near location of potential future public access to Study Area - Evaluate potential source/presence of PCBs within Study Area	PCBs and VOCs

Notes:

1 - Sampling locations are approximate and may be modified based on field conditions, access issues, etc.

2 - See Table 6-2 for further information on analytes.

AA = Ambient Air

NAD83 = North American Datum State Plane New York, Long Island US Feet

Table 6-2
Air Monitoring Analytes, Sample Containers, and Laboratories for Analysis

Matrix	Analytical Group	Minimal Volume	Container	Preservation Requirements	Laboratory	Number of Locations
Air	Volatile Organics	5 L	Passivated canister	Protect from temperature extremes	Alpha Analytical 320 Forbes Boulevard Mansfield, MA 02048 Cindy McQueen 508.844.4120	29
Air	PCB Aroclors	5000 L	PUF Sorbent Cartridge; wrap in aluminum foil in glass jar	≤ 4 ^{o} C; protect from light	Alpha Analytical 320 Forbes Boulevard Mansfield, MA 02048 Cindy McQueen 508.844.4120	29

Table 6-3

Air Monitoring Materials and Equipment

- 32 pre-cleaned and evacuated, batch certified Passivated canisters
- Air Sampling Forms
- Approved documents including:
  - Remedial Investigation/Feasibility Study Work Plan (RI/FS Work Plan) (AECOM 2011)[1]
  - Health and Safety Plan (HASP) (Anchor QEA 2011a)
  - Field Sampling and Analysis Plan (FSAP) (see main report)
  - Quality Assurance Project Plan (QAPP) (Anchor QEA 2011b)
  - Data Management Plan (DMP) (Anchor QEA 2011c)
  - Standardized forms as needed.
- Assorted nautical equipment (e.g., anchors, lines, personal flotation devices)
- Bags for Chains of Custody (COC)
- Black, ballpoint pen or Sharpie® (or equivalent)
- Boat(s) adequately sized and equipped for the task and expected conditions in the Study Area, including ground tackle, and required U.S. Coast Guard safety gear
- Booms
- Bound, waterproof field logbooks
- Cell phone
- COC forms (hard copy or electronic)
- Clear plastic shipping tape
- Clipboard
- Continuous-Flow Sampling Pump: The pump should provide a constant air flow (<±5%), be quiet and unobtrusive, with a flow rate capable of 5 L/min
- Custody tape or seals
- Differential Global Positioning System (DGPS) External Antennas (x2)
- DGPS Receivers (x2) with an accuracy of ±1 foot
- Portable GPS
- Digital camera
- Field computer (Panasonic Toughbook handheld tablet computer, or similar)
- First aid kit and PPE (refer to the HASP [Anchor QEA 2011a])
- Flexible Tygon or Teflon tubing piece at each end to connect to pump

[1] Note that all references can be found in: Anchor QEA, LLC, 2011. *Field Sampling and Analysis Plan, Newtown Creek*. October 2011.

Table 6-3

Air Monitoring Materials and Equipment

- Flow controller (with particulate filter) for each Passivated canister
- Hand-held electronic recording device (optional)
- Inert packing material (e.g., vermiculite, cardboard, bubblewrap, etc.)
- Latex or pre-cleaned cotton gloves
- Marine VHF (high frequency) radio
- Navigation charts (electronic)
- Pre-determined sampling coordinates/waypoints and locations figure
- Printer/scanner
- Sample labels
- Sampling cartridge for Polychlorinated Biphenyls (PCBs)
- Sealing tape
- Sealable (Ziploc) plastic bags
- Shipping tape
- PUF cylinders
- Standardized field data forms (hard copy and/or electronic)
- Study Area maps
- Temperature blanks (if not provided by the laboratory)
- Time piece
- Tubing (stainless steel, Teflon, or other inert tubing) and fittings (¼ inch Swagelok)
- Vacuum gauge for each Passivate canister if not built into the valve mechanism
- Valve and inlet cap for each Passivate canister
- Wet ice and coolers
- Wrenches (fittings require 11/16 and 5/8 inch open wrenches)
- Extension rod
- Measuring tape
- Zip ties
- Air sampling in-water rafts
- Equipment containers (i.e., metal cages)

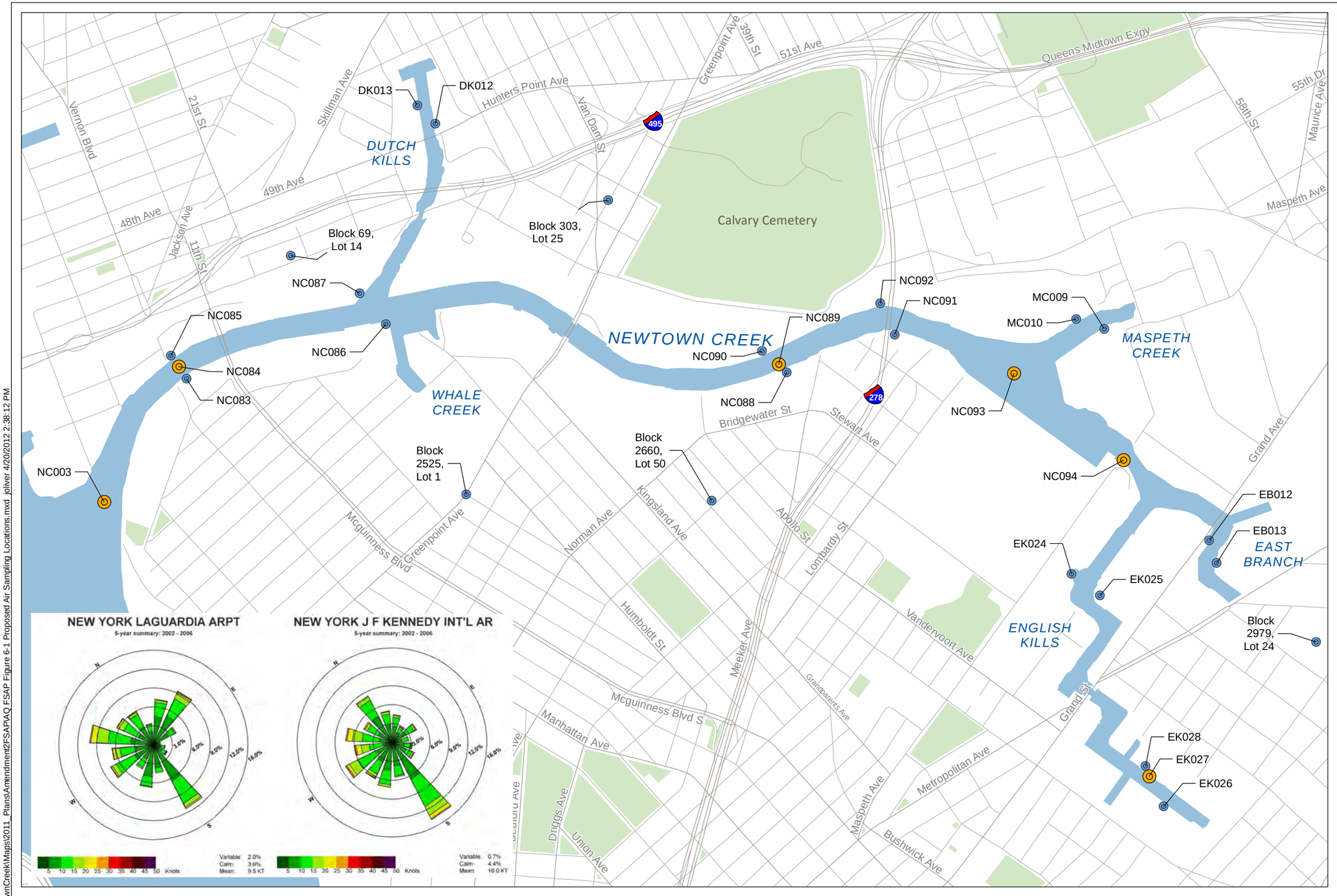
See the following SOPs for further details:

- NC-01 Field Records
- NC-04 Navigation/Boat Positioning
- NC-13 Sample Custody

Table 6-3

Air Monitoring Materials and Equipment

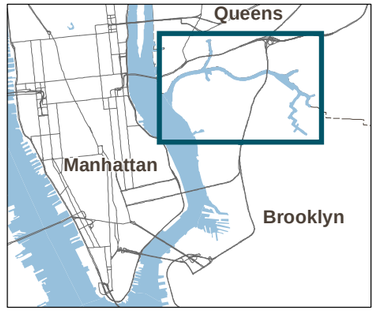
- NC-14 Sample Packaging and Shipping
- NC-20 Air Monitoring for PCBs
- NC-21 Air Monitoring for Volatile Organic Compounds (VOCs)



LEGEND

- Proposed Land-side Air Sampling Location
- Proposed On-creek Air Sampling Location
- Waterbody
- Open Space

0 500 1,000 1,500 Feet



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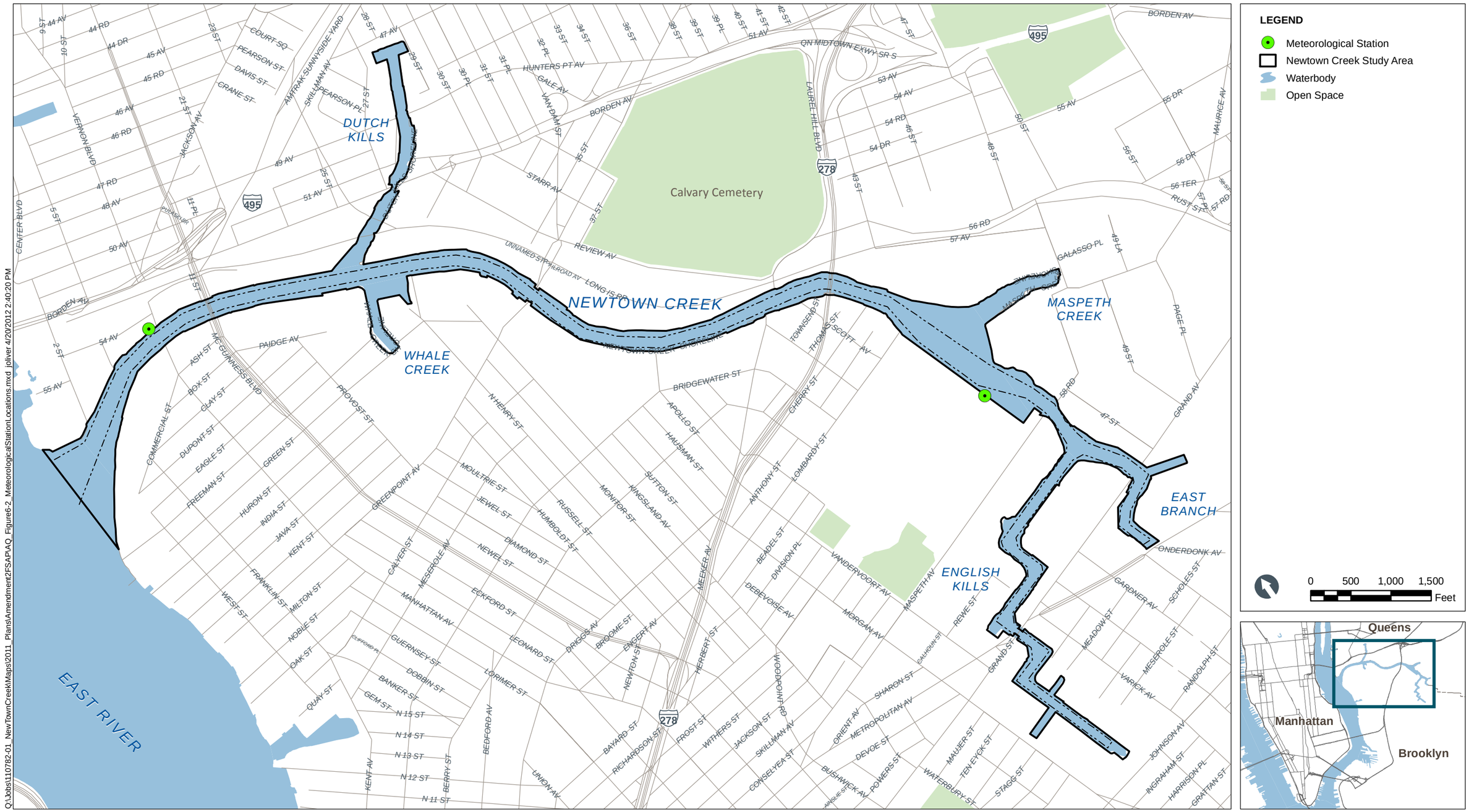
Note:
Proposed sampling stations are approximate and may be modified based on field conditions, utilities, access issues, etc.

Figure 6-1
Proposed Air Sampling Locations
Field Sampling and Analysis Plan
Newtown Creek RI/FS

Q:\Jobs\110782-01_NewTownCreek\Maps\2011_PlansAmendment2\FSAP\AQ FSAP Figure 6-1 Proposed Air Sampling Locations.mxd jolliver 4/20/2012 2:38:12 PM



ANCHOR QEA

Figure 6-2
Meteorological Station Locations
Field Sampling and Analysis Plan
Newtown Creek RI/FS

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2011a. *Health and Safety Plan*, Newtown Creek. July.

Anchor QEA, 2011b. *Quality Assurance Project Plan*, Newtown Creek. July.

Anchor QEA, 2011c. *Data Management Plan, Newtown Creek*. July.

Anchor QEA, 2011d. *Field Sampling and Analysis Plan, Newtown Creek*. October.

NYSDEC (New York State Department of Environmental Conservation), 2012. Volatile Organic Compounds Monitoring, Ambient Air Monitoring Report for Volatile Organic Compounds. Accessed: 10/31/2011 and 1/23/2012 Available from: http://www.dec.ny.gov/chemical/8538.html

USEPA (U.S. Environmental Protection Agency), 1999a. Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS). In: Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, 2nd Edition. EPA/625/R-96-010b. January.

USEPA, 1999b. Compendium Method TO-10A, Determination Of Pesticides And Polychlorinated Biphenyls In Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed By Gas Chromatographic/Multi-Detector Detection (GC/MD), 2nd Edition. EPA/625/R-96-010b. January.

USEPA, 2000. *Meteorological Monitoring Guidance for Regulatory Modeling Applications.* EPA-454/R-99-005. February.

Weston Solutions, 2009. *Expanded Site Inspection Report Newtown Creek* Brooklyn/Queens, New York, CERCLIS ID No.: NYN000206282, EPA Contract No. EP-W-06-072, W.O. No. 20405.012.013.0524.00 Document Control No. 524-2A-AEFX. Prepared by Weston Solutions, Inc. Edison, NJ. Prepared for U.S. Environmental Protection Agency. July 2009.

ATTACHMENT 1
NEWTOWN CREEK STANDARD OPERATING PROCEDURES

ATTACHMENT 1-NC-20
STANDARD OPERATING PROCEDURE
AIR MONITORING FOR POLYCHLORINATED BIPHENYLS

Prepared by
Anchor QEA, LLC
305 W Grand Avenue, Suite 300
Montvale, New Jersey 07645

Revision Date: February 27, 2012

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 120782-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

Scope and Application

The purpose of this document is to define the standard operating procedure (SOP) for the collection of ambient air samples for analysis of polychlorinated biphenyls (PCBs) to be completed as part of the Remedial Investigation/Feasibility Study (RI/FS). One 24-hour monitoring event will be conducted. Ambient air samples for PCB analysis will be collected via continuous flow sampling pumps and sorbent cartridges in accordance with the procedures detailed in USEPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air Second Edition Compendium Method TO-10A Determination Of Pesticides And Polychlorinated Biphenyls In Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed By Gas Chromatographic/Multi-Detector Detection (GC/MD) (USEPA 1999). Additional information regarding the air sampling can be found in the associated RI/FS Work Plan (AECOM 2011), Field Sampling and Analysis Plan (FSAP) (Anchor QEA 2011c), and Quality Assurance Project Plan (QAPP) (Anchor QEA 2011b).

It is fully expected that the procedures outlined in this SOP will be followed. Deviations from the procedures detailed in this SOP will be recorded in the field logbook, summarized on the Daily Activity Log, and recorded on a Field Change Report (refer to SOP NC-01 – Field Records). Procedural modifications may be warranted depending upon field conditions, equipment limitations, or limitations imposed by the procedure. Substantive modification to this SOP will be approved in advance by the Project QA Coordinator, the RI Manager, and the Respondents and communicated to the United States Environmental Protection Agency (USEPA) Remedial Project Manager. Proposed modifications to the procedures in this SOP will be documented on a Field Modification Form and submitted to USEPA (see SOP NC-01 - Field Records). The ultimate procedure employed will be documented in the report summarizing the results of the sampling event or field activity.

Health and Safety Warnings

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project Health and Safety Plan (HASP) (Anchor QEA 2011a). The HASP will be followed during all activities conducted by Anchor QEA personnel as part of the Newtown Creek RI/FS.

Personnel Qualifications

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the RI/FS Work Plan (AECOM 2011), and the corresponding documents (e.g., HASP, QAPP, and FSAP [Anchor QEA 2011a, b, and c]). Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

Equipment and Materials

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required, pending field conditions.

- Sampling vessel equipped with necessary navigation, communication, and air sampling raft deployment equipment.
- Personal protective equipment (PPE) as required by the HASP including personal floatation devices (PFDs)
- Approved documents including FSAP, QAPP, and HASP
- Bound, waterproof field logbooks
- Standardized field data forms (hard copy and/or electronic)
- Black, ballpoint pen or Sharpie® (or equivalent)
- Portable Global Positioning System (GPS)
- Cell Phone
- Digital camera
- Latex or pre-cleaned cotton gloves (for handling cartridges)
- Measuring tape
- Zip ties
- Extension rod
- Air sampling in-water rafts
- Equipment enclosures
- Continuous-Flow Sampling Pump
- Flow Meter (for calibration verification)
- Tubing with short Tygon or Teflon pieces at each end to connect to pump
- Sampling Cartridge

- Sorbent, Polyurethane Foam (PUF) with particulate filter
- Coolers and ice

Sampling Procedures

This section gives the step-by-step procedures for collection of ambient air samples for analysis of PCBs using air sampler pumps. Field conditions may necessitate minor modifications to these procedures.

Prior to Sampling

1. Notify local agencies, landowners, fire, police, and homeland security of air monitoring activities and ensure they are familiar with the appearance of air monitoring equipment.
2. Verify contents of the shipped package from the laboratory and/or equipment provider (i.e., sorbent tubes, low flow pumps).
3. Verify the pump calibration using a calibrated flow meter. Recalibrate pump or use a different pump if calibration verification is greater than ±10% accuracy. If recalibration is necessary, follow the pump manufacturer instructions for calibration. To assure accurate calibration it is important that the entire length of tubing to be used in the assembly be part of the calibration train.
4. Set the flow rate of each low flow sampling pump to 5 liters per minute before deployment.
5. Package and label equipment required for each station.
6. Package sets of redundant equipment to be used in the event of equipment malfunction.
7. Identify the exact location of each land-side station with spray paint or other means and record the latitude and longitude with a portable GPS.
8. Deploy in-water air sampling rafts the day before sampling. The boat will move to each on-water station in accordance with NC-04 – Navigation/Boat Positioning. Record the final latitude and longitude of each in-water location with a portable GPS.

Assemble Apparatus

1. Apparatus at land-side stations will be inspected and set up at the field facility prior to the field activity. The sampling equipment, designated for each station, will be enclosed in containers to fend off vandalism or theft. Each container will be clearly labeled with contact information of the Field Team Leader. The exact location of each land-side station will be selected prior to the sampling period in order to allow more contemporaneous activation of the stations. The equipment containers may be secured to lampposts or other anchored objects to further protect against theft. Containers will be placed at each station at the time of sampling.

2. Apparatus at on-water stations will be inspected and set up at the field facility prior to the field activity. Sampling equipment will be enclosed in a waterproof plastic container to protect from water splashing, etc. Containers will be placed on the deployed air sampling rafts at the time of sampling. The boat will move to each on-water station in accordance with NC-04 – Navigation/Boat Positioning. Record the final latitude and longitude of each in-water location with a portable GPS.

Sampling

1. Remove sample tag from cartridge. This tag should remain with the cartridge during sampling, by attaching to pump.
2. Wearing latex or cotton gloves, carefully remove the clean sample cartridge from the aluminum foil wrapping (the foil is returned to jars for later use) and attached to the pump with flexible tubing. Position the sampling assembly with the intake downward or in horizontal position. Locate the sampler in an unobstructed area, if possible, 30 meters from any obstacle to air flow. The PUF inlet is positioned 1 to 2 meters above ground level (or 2.5 feet above surface water for in-water stations). Record cartridge height above ground on the air sampling sheet. Figure 1 illustrates the low flow pump with PUF cartridge configuration.
3. After the PUF cartridge is correctly inserted and positioned, turn on the pump power switch to begin sampling. Verify the flow rate via the pump rotometer or other device. Activate the elapsed time meter and record the start time. Check the pumps during the sampling process and record any abnormal conditions discovered on the

PCB air sampling form. Area temperature and barometric pressure will be collected at the installed meteorological stations.

4. At the end of the sampling period, turn off the pump, remove the PUF cartridge from the sampler, wrap the cartridge with the original aluminum foil, fill out the label on the sample tag, and place the cartridge in a sealed, labeled container.
5. Place the sample containers in an insulated cooler containing ice to keep samples cold (4°C) until they can be transported to the sample processing area for packing and shipping to the analytical laboratory as described in NC-14 - Sample Packaging and Shipping.

Post Sampling

1. Verify pump calibration with flow meter.
2. Ensure PCB air sampling form (Attachment 1) and COC are completed.
3. Ensure storage and transfer of samples occurs according to the procedures described in SOPs NC-13 – Sample Custody. Samples should be shipped to the laboratory overnight.

Quality Assurance/Quality Control

Entries in the field forms will be double-checked by the field team staff to verify the information is correct. It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

References

AECOM, 2011. Remedial Investigation/Feasibility Study Work Plan, Newtown Creek, June, 2011.

Anchor QEA, 2011a. Health and Safety Plan, Remedial Investigation/Feasibility Study, Newtown Creek. July, 2011.

Anchor QEA, 2011b. Quality Assurance Project Plan, Remedial Investigation/Feasibility Study, Newtown Creek. July, 2011.

Anchor QEA, 2011c. Field Sampling and Analysis Plan, Remedial Investigation/Feasibility Study, Newtown Creek. August 2011.

U.S. Environmental Protection Agency, 1999. Compendium Method TO-10A - Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam Sampling Followed by Gas Chromatographic/Multi-Detector Detection. EPA/625/R-96/010b.

Attachments

Figure 1 – Low Volume Air Sampler

Attachment 1 – Example PCB Air Sampling Form

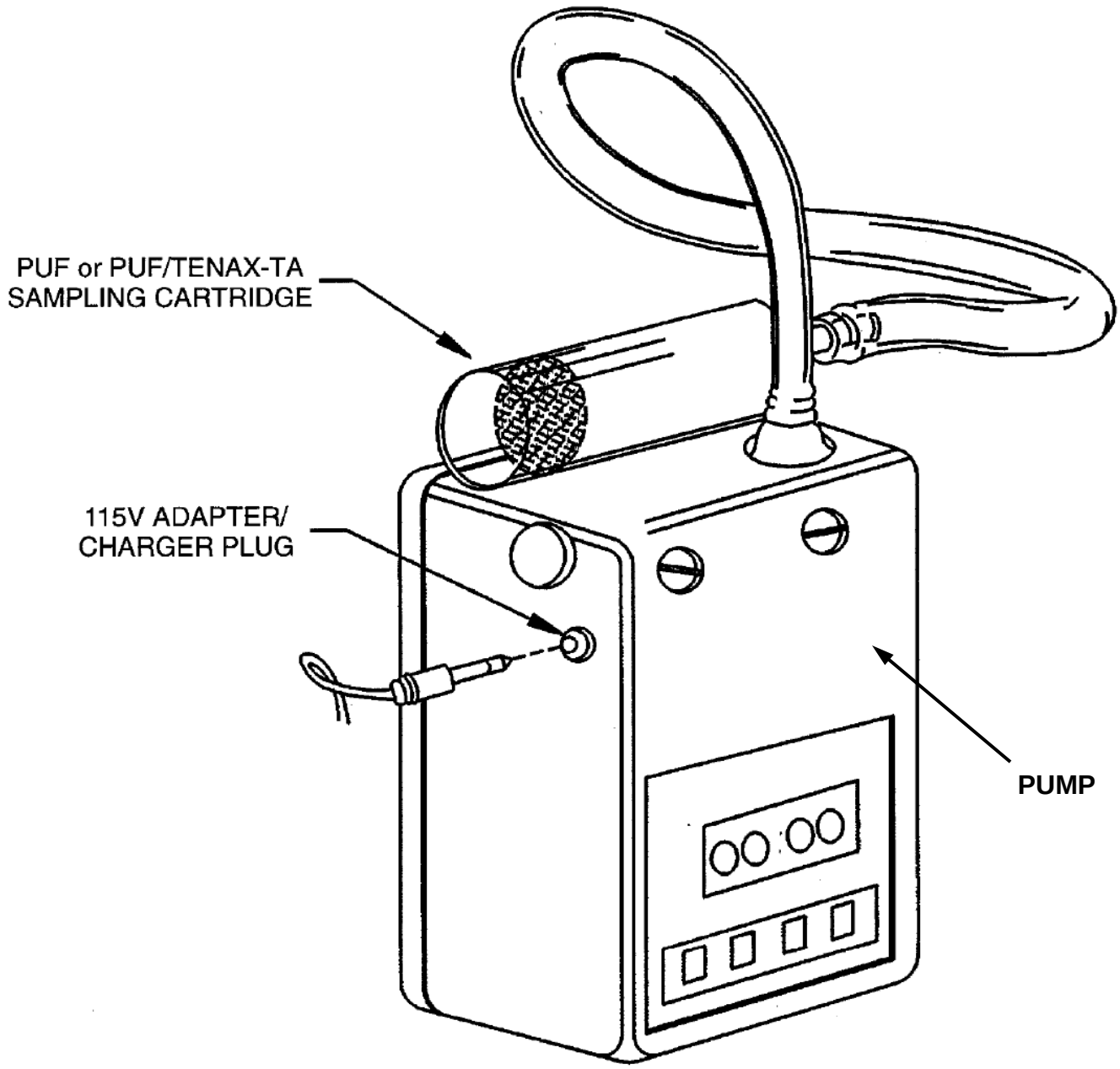


Figure 1
Low Volume Air Sampler
SOP NC-20
Newtown Creek RI/FS

ANCHOR QEA

ANCHOR QEA

Low Flow PUF Air Sampling Form

Job: Newtown Creek RI	**Station ID:**	**Station Coordinates:**	**Location Description:**	
Job No: 120782-01.01	**Temperature (°C):**	**Flow Calibration verification:** Before_____ After_____	**Field Staff:**	**Date:**
	Barometric Pressure (inHg):			
Low Flow Pump ID #	**Cartridge ID #**	**Sample Type:**	**Height of Inlet from ground level (ft)**	

Start Time	End Time	Total Time (24hr)	Flow Start (L/min)	Flow End (L/min)	Total Sample Volume (L)

Periodic Equipment QA/QC Checks

Time	Flow (L/min)	Equipment Condition (battery, etc.)

Other Observations and Comments (smoke, fog, odors, etc):

Field Team Staff Printed Name

_____

Field Team Staff Signature

_____

ATTACHMENT 1-NC-21
STANDARD OPERATING PROCEDURE
AIR MONITORING FOR VOLATILE ORGANIC COMPOUNDS

Prepared by
Anchor QEA, LLC
305 W Grand Avenue, Suite 300
Montvale, New Jersey 07645

Revision Date: February 27, 2012

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 120782-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

Scope and Application

The purpose of this document is to define the standard operating procedure (SOP) for the collection of ambient air samples for analysis of volatile organic compounds (VOCs) to be completed as part of the Remedial Investigation/Feasibility Study (RI/FS). One 24-hour monitoring event will be conducted. The ambient air samples for VOC analysis will be passively collected in pre-cleaned passivated canisters in accordance with the procedures detailed in USEPA Method TO-15, Determination of Volatile Organic Compounds in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (USEPA 1999). Additional information regarding the air sampling can be found in the associated RI/FS Work Plan (AECOM 2011), Field Sampling and Analysis Plan (FSAP) (Anchor QEA 2011c), and Quality Assurance Project Plan (QAPP) (Anchor QEA 2011b).

It is fully expected that the procedures outlined in this SOP will be followed. Deviations from the procedures detailed in this SOP will be recorded in the field logbook, summarized on the Daily Activity Log, and recorded on a Field Change Report (refer to SOP NC-01 - Field Records). Procedural modifications may be warranted depending upon field conditions, equipment limitations, or limitations imposed by the procedure. Substantive modification to this SOP will be approved in advance by the Project QA Coordinator, the RI Manager, and the Respondents and communicated to the United States Environmental Protection Agency (USEPA) Remedial Project Manager. Proposed modifications to the procedures in this SOP will be documented on a Field Modification Form and submitted to USEPA (see SOP NC-01 – Field Records). The ultimate procedure employed will be documented in the report summarizing the results of the sampling event or field activity.

Health and Safety Warnings

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project Health and Safety Plan (HASP) (Anchor QEA 2011a). The HASP will be followed during all activities conducted by Anchor QEA personnel as part of the Newtown Creek RI/FS.

Personnel Qualifications

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the RI/FS Work Plan (AECOM 2011), and the corresponding documents (e.g., HASP, QAPP, and FSAP (Anchor QEA 2011a, b, and c). Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

Equipment and Materials

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required, pending field conditions.

- Sampling vessel equipped with necessary navigation, communication, and air sampling raft deployment equipment.
- Personal protective equipment (PPE) as required by the HASP including personal floatation devices (PFDs)
- Approved documents including FSAP, QAPP, and HASP
- Bound, waterproof field logbooks
- Approved documents including FSAP, QAPP, and HASP
- Standardized field data forms (hard copy and/or electronic)
- Black, ballpoint pen or Sharpie® (or equivalent)
- Portable Global Positioning System (GPS)
- Cell Phone
- Digital camera
- Measuring tape
- Air sampling in-water rafts
- Equipment enclosures
- Pre-cleaned and evacuated, batch certified passivated canisters
- Valve and inlet cap for each passivated canister
- Vacuum gauge for each passivated canister if not built into the valve mechanism
- Flow controller with built in particulate filter (for each passivated canister; Figure 1)
- Tubing (stainless steel, Teflon, or other inert tubing) and fittings (¼ inch Swagelok)
- Wrenches (fittings require11/16 inch and 5/8 inch open wrenches)

Sampling Procedures

This section gives the step-by-step procedures for passive collection of ambient air samples for analysis of VOC samples using passivated canisters. Field conditions may necessitate minor modifications to these procedures.

Prior to Sampling

1. Notify local agencies, landowners, fire, police, and homeland security of air monitoring activities and ensure they are familiar with the appearance of air monitoring equipment.
2. Verify contents of the shipped package from the laboratory and/or equipment provider (e.g., canister, particulate filter, gauge, flow controller).
3. Verify that each gauge is working properly. If the gauge does not read "zero", it may need to be replaced. Contact the laboratory to order replacements.
4. Check the initial vacuum of each canister. Canisters for passive sampling will be under a vacuum of 30 inches ± 2 inch Hg.
    a. Confirm that valve is closed (knob should already be tightened clockwise).
    b. Remove the valve plug.
    c. Attach gauge.
    d. Attach valve plug to side of gauge tee fitting.
    e. Open and close valve quickly (a few seconds).
    f. Read vacuum on the gauge. If the vacuum is less than 28 inch Hg, contact the laboratory to send a replacement canister.
    g. Verify that canister valve is closed then remove gauge.
    h. Replace the valve plug.
5. Package and label equipment required for each station.
6. Package sets of redundant equipment to be used in the event of equipment malfunction.
7. Add a stainless steel or teflon tubing extension to the flow controller assembly inlet so the height of the inlet, after final assembly, will be 1 to 2 meters above the ground.
8. Identify the exact location of each land-side station with spray paint or other means and record the latitude and longitude with a portable GPS.

9. Deploy in-water air sampling rafts the day before sampling. The boat will move to each on-water station in accordance with NC-04 – Navigation/Boat Positioning. Record the final latitude and longitude of each in-water location with a portable GPS.

Apparatus Setup

1. Apparatus at land-side stations will be inspected and set up at the field facility prior to the field activity. The sampling equipment will be enclosed in containers to fend off vandalism or theft. Each container will be clearly labeled with the contact information of the Field Team Leader. The exact location of each land-side station will be selected prior to the sampling period in order to allow more contemporaneous activation of the stations. The equipment containers may be secured to lampposts or other anchored objects to further protect against theft. Containers will be placed at each station at the time of sampling. Just prior to sampling, the following equipment checks will be performed:
    a. Verify that each gauge is working properly. If the gauge does not read "zero", replace the gauge.
    b. Record the initial vacuum of each canister. Canisters for passive sampling will be under a vacuum of 30 inches ± 2 inch Hg.
    c. Confirm that valve is closed (knob should already be tightened clockwise).
    d. Remove the valve plug.
    e. Attach gauge.
    f. Attach brass cap to side of gauge tee fitting.
    g. Open and close valve quickly (a few seconds).
    h. Read vacuum on the gauge. If the vacuum is less than 30 ±1 inch Hg, do not use the canister. (Additional sets of "redundant" equipment will be available to address this contingency.)
    i. Record gauge reading on "Initial Vacuum" column of chain-of-custody (COC) and "Initial Pressure Reading" on the VOC air sampling form.
    j. Verify that canister valve is closed then remove gauge.
    k. Replace the valve plug.
2. Apparatus at on-water stations will be inspected and set up at the field facility prior to the field activity. Sampling equipment will be enclosed in a waterproof plastic

container to protect from water splashing, etc. Containers will be placed on the deployed air sampling rafts at the time of sampling. The same equipment checks will be performed just prior to sampling as for the land-side stations.

Sampling

1. Remove valve plug.
2. Attach the flow controller assembly to the canister.
3. Adjust the sample inlet to 1 to 2 meters above ground level (2.5 feet above surface water for in-water locations) using tubing or by elevating the entire container.
4. Open valve fully (but not all the way) allowing the sample to start flowing into the canister. Monitor the progress of the sampling every 4 to 6 hours during the 24 hour period, if access to equipment is possible. Record observations on the VOC air sampling form. The volume of air sampled has a linear relationship to the canister vacuum. Thus halfway through the sampling interval, half of the sample will have collected (3 Liters) and the vacuum gauge should read approximately 17in. Hg (halfway between 29 in. Hg and 5 in. Hg). The flow controller is calibrated to leave approximately 5 in Hg residual vacuum in the canister and because of normal fluctuations during sampling the final vacuum will be between 2-10 in. Hg. A residual vacuum less than 1 in. Hg indicates that the canister may have come to ambient conditions before the completion of the sampling interval. (This will not mean that the sample should be voided; contact the Field Team Leader in this event.)
5. Photograph sampling set-up.
6. At the conclusion of sampling, close valve by hand tightening knob clockwise.
7. Remove the flow controller assembly.
8. Replace valve plug.
9. Ensure the initial vacuum and final vacuum have be recorded on the VOC air sampling form and COC.

Post Sampling

1. Return canister to box and place accessories (e.g., gauges) in packaging provided.
2. Ensure VOC air sampling form (Attachment 1) and COC are complete.

3. Ensure storage and transfer of samples occurs according to the procedures described in SOPs NC-13 – Sample Custody. Samples should be shipped to the laboratory overnight.

Quality Assurance/Quality Control

Entries in the field forms will be double-checked by the field team staff to verify the information is correct. It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

References

AECOM, 2011. Remedial Investigation/Feasibility Study Work Plan, Newtown Creek, June, 2011.

Anchor QEA, 2011a. Health and Safety Plan, Remedial Investigation/Feasibility Study, Newtown Creek. July, 2011.

Anchor QEA, 2011b. Quality Assurance Project Plan, Remedial Investigation/Feasibility Study, Newtown Creek. July, 2011.

Anchor QEA, 2011c. Field Sampling and Analysis Plan, Remedial Investigation/Feasibility Study, Newtown Creek. August 2011.

U.S. Environmental Protection Agency, 1999. Compendium Method TO-10A - Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam Sampling Followed by Gas Chromatographic/Multi-Detector Detection. EPA/625/R-96/010b.

Attachments

Figure 1 – Flow Controller and Canister
Attachment 1 – Example VOC Air Sampling Form

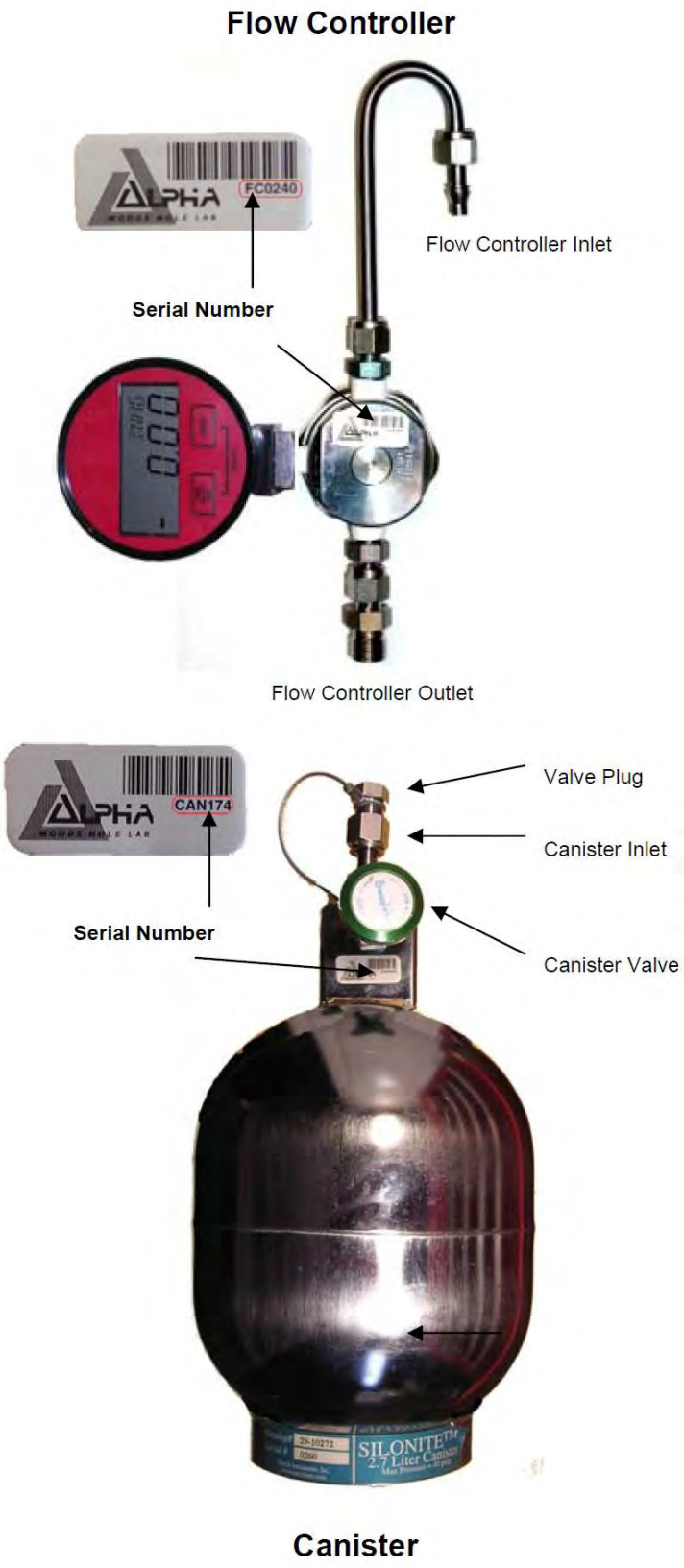


Figure 1
Flow Controller and Canister
SOP NC-21
Newtown Creek RI/FS

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Passivated Canister VOC Air Sampling Form

Job: Newtown Creek RI	**Station ID:**	**Station Coordinates:**	**Date:**
Job No: 120782-01.01	**Field Staff:**	**Location Description:**	
Canister No:	**Flow Controller No:**	**Height of Inlet from Ground Level (ft):**	**Sample Type:**
Pressure Reading (inHg)	**Time**	**Condition**	
Initial:			
Check 1:			
Check 2 :			
Check 3:			
Check 4:			
Check 5:			
Final:			

Other Observations and Comments (smoke, fog, odors, etc):

Field Team Staff Printed Name

_____

Field Team Staff Signature

_____

ATTACHMENT 2
HISTORICAL WEATHER DATA SUMMARY

Eleven years of historical data (2000 through 2010) were reviewed for John F. Kennedy (JFK) and LaGuardia (LGA) International Airports. Monthly averages were evaluated to determine sampling periods that meet the desired criteria to support the upwind/downwind sampling objective. The targeted sampling conditions are dry, moderate to high temperature, non-stagnant, non-storm wind speed (greater than 5 miles per hour), and a south/north wind direction (i.e., generally perpendicular to the creek). A summary of the historical data evaluated for precipitation, temperature, and wind speed and direction is presented below and summarized in Figures 1, 2, and 3.

Precipitation

Monthly rainfall ranged from 0.08 average inches per day to 0.16 average inches per day during 2000 through 2010 at both JFK and LGA. Precipitation varied over this time period, likely due to yearly variation in storms. For LGA, more than 64 percent of days in each month had no precipitation. For JFK, more than 53 percent of days in each month had no precipitation. Based on these data, all months have a sufficient number of dry days to conduct air sampling. See Figure 1 for JFK and LGA precipitation trends from 2000 through 2010.

Temperature

June, July, August, and September are consistently the warmest quartile of months and would be adequate to capture the targeted moderate to high temperature sampling conditions. Variation of average temperature between the years is lower in these months than in the stormier winter months. See Figure 1 for LGA and JFK temperature trends from 2000 through 2010.

Wind Speed

Wind speeds ranged from 0 to 65 miles per hour (mph) from 2000 to 2010. For the winter and early spring months of January, February, March, April, November, and December, wind speeds were generally higher than for the summer and early fall months of May through October, where the largest percent of total winds occurred in the 5 to 14 mph interval. The targeted sampling conditions for wind speed are non-stagnant, non-storm winds (greater than 5 mph). The months of May through October have the highest percentage of winds in

the 5 to 14 mph range and would be sufficient for sampling. Figures 2 and 3 show daily averaged wind speed and direction in monthly intervals for JFK and LGA.

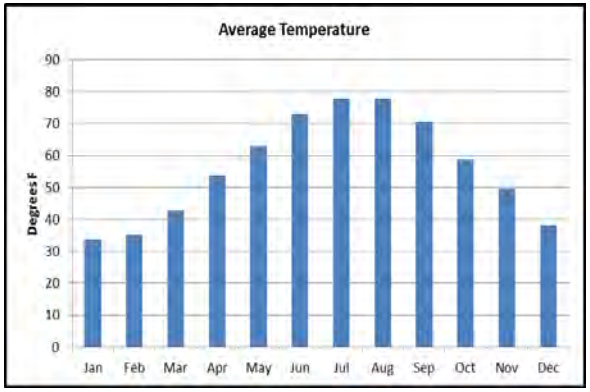
Wind Direction

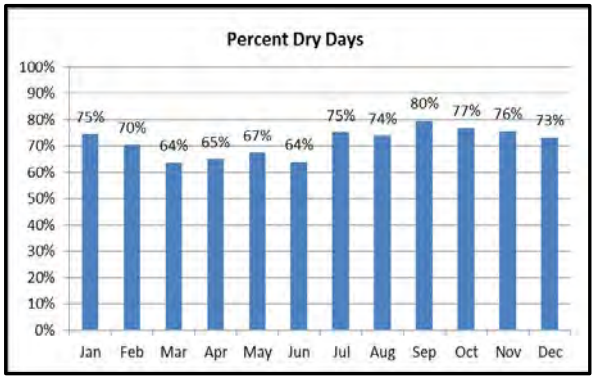
Predominant wind directions follow a winter/summer pattern. During the winter months (January, February, November, and December), the strongest winds blow from the northwest. The early spring and early fall months (March, April, and October) are transition months with winds blowing from a north-northeast and/or north-northwest direction. June, July, August, and September have the largest percentage of winds blowing perpendicular to the creek (from the south) and would be ideal months in which to conduct sampling. Figures 2 and 3 show daily averaged data of wind speeds and directions in monthly intervals for JFK and LGA. Patterns appear more strongly from the JFK airport, possibly owing to local differences in wind patterns.

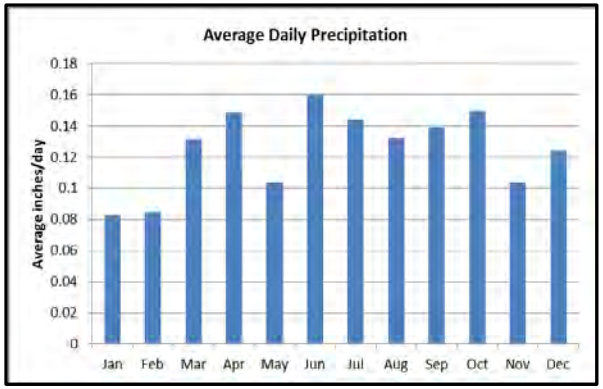
Conclusion

June, July, August, and September were identified as months that meet the targeted sampling criteria of moderate to high temperatures, predominantly dry days, non-stagnant/non-storm wind speeds, and a significant percentage of wind direction generally from the south (perpendicular to the creek). Based on staffing efficiency, June was selected as the targeted month for sampling. Local 5-day weather forecasts will be used to determine an exact sampling day.

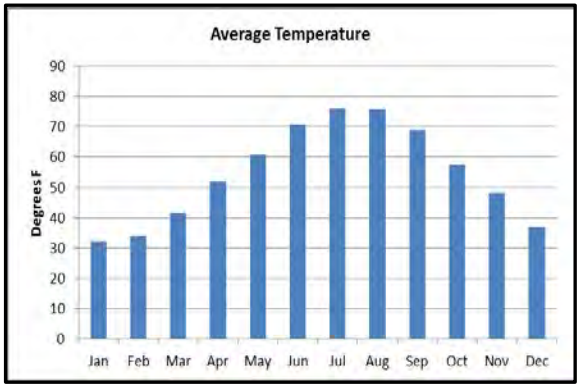
LaGuardia Airport (2000-2010)

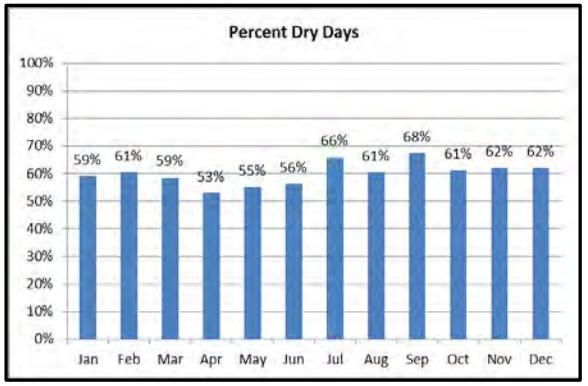






John F. Kennedy Airport (2000-2010)





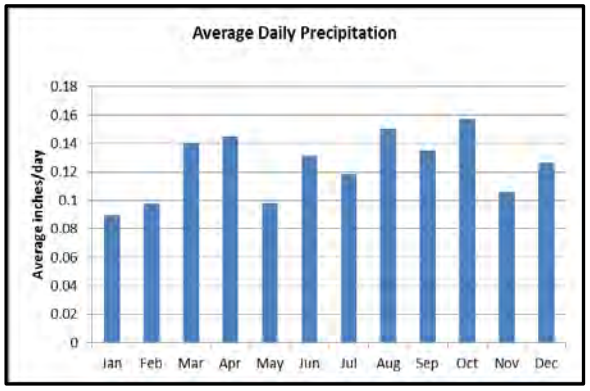


Figure 1

Temperature and Precipitation Summary for John F. Kennedy and LaGuardia Airports

Historical Data Weather Summary

Newtown Creek RI/FS

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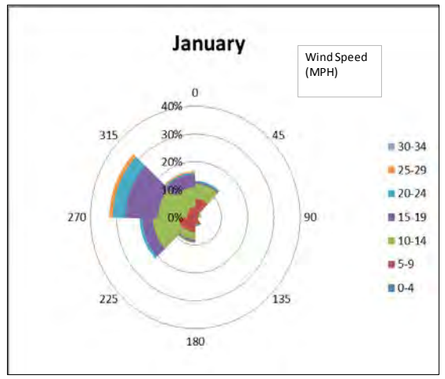

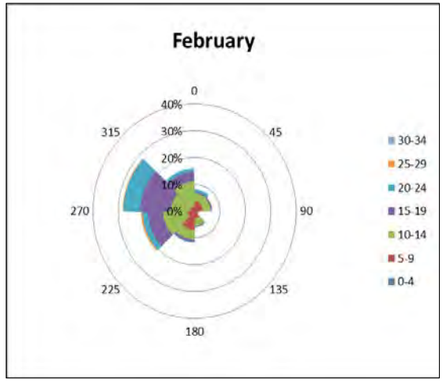

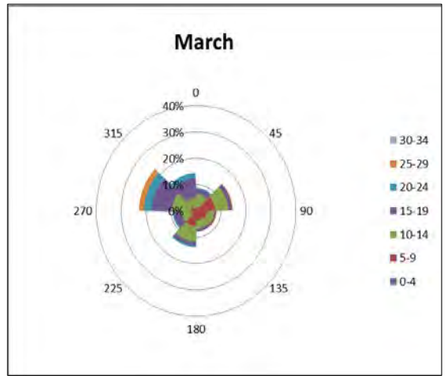

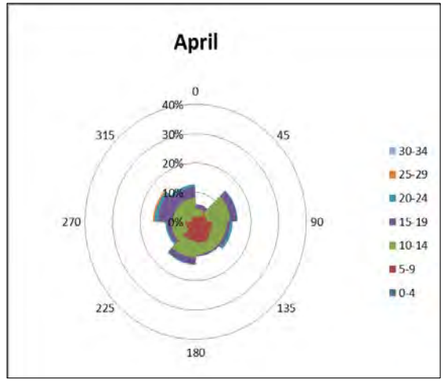

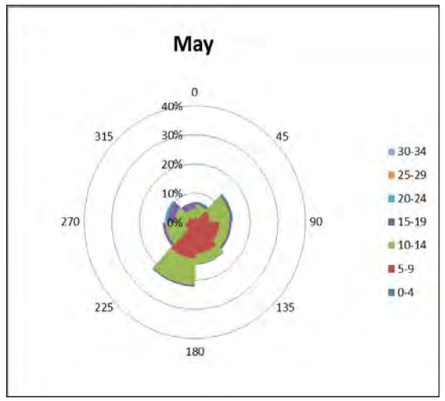

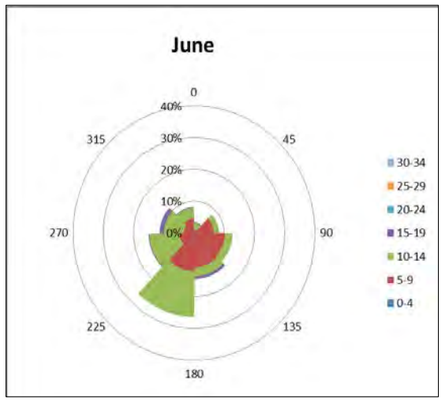

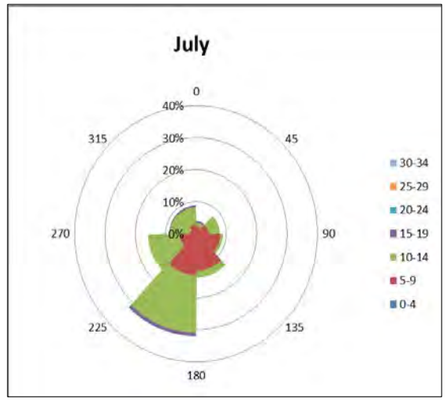

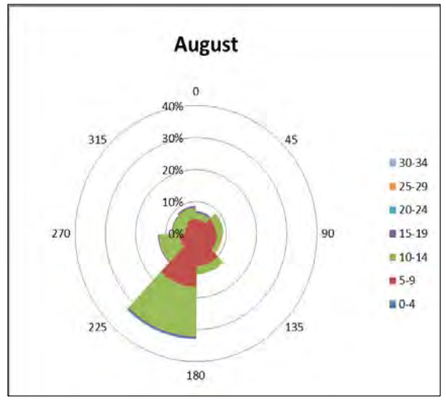

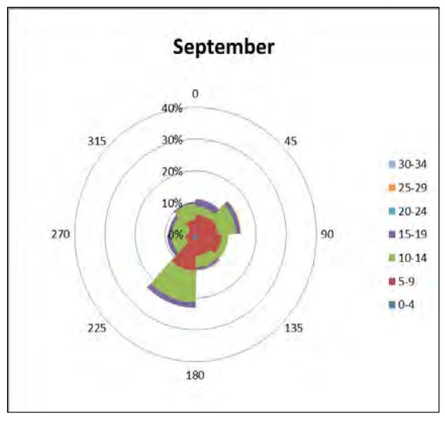

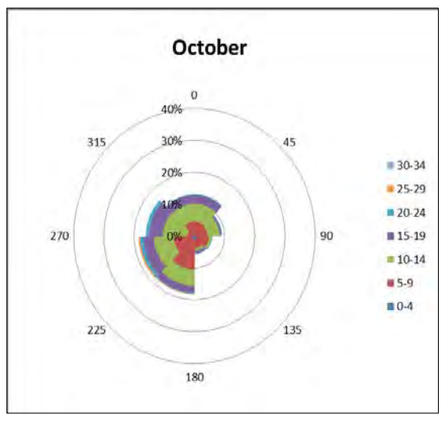

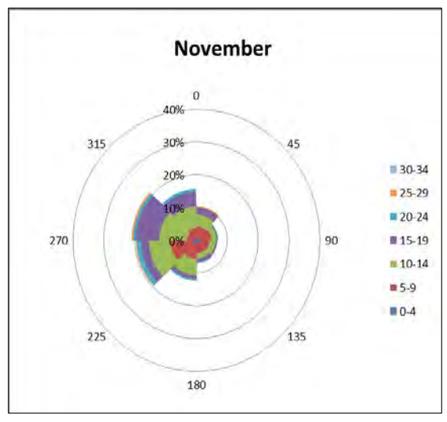

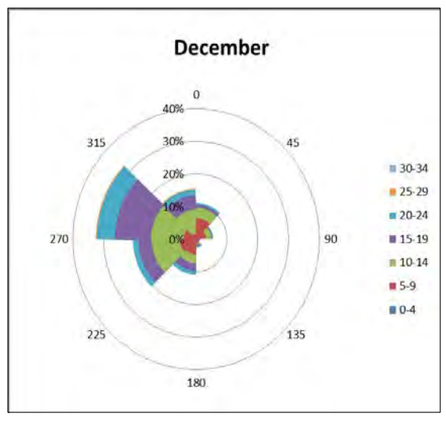

Notes:
Each figure represents monthly data (averaged on a daily basis) from 2000-2010 for LaGuardia (LGA) airport.
Wind speed is presented in miles per hour (mph) and is grouped in 5 mph intervals.
Wind directions are grouped into 45 degree intervals.
The X-axis represents percent of winds at a given speed group (ie: 0-4) coming from a given direction group (ie: 0-45).

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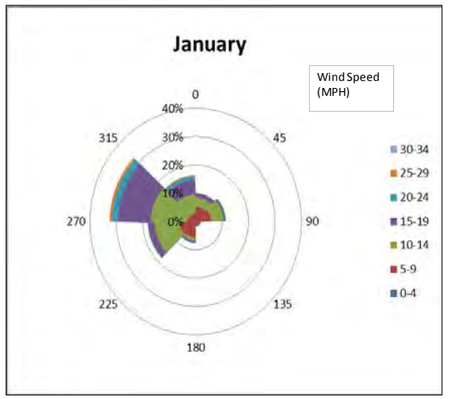
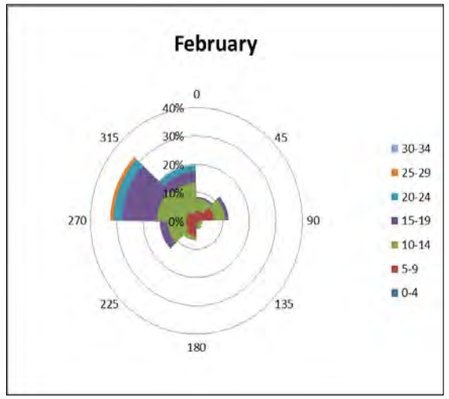
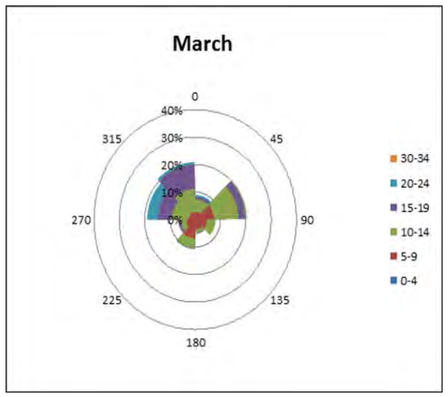
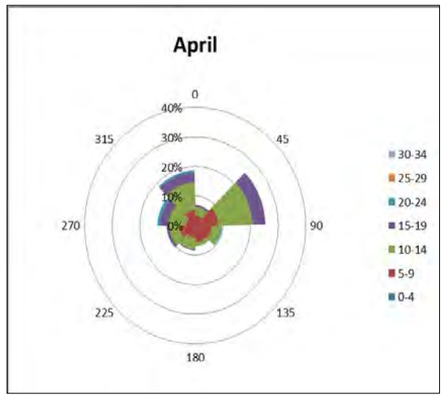
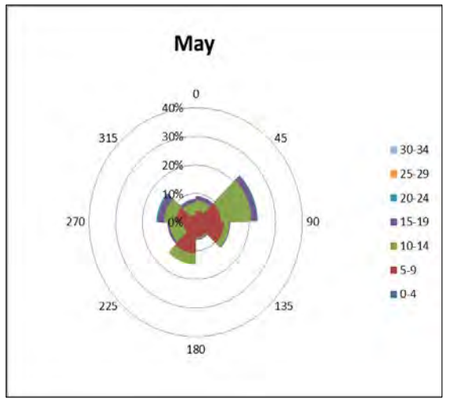
Figure 2
Wind Speed and Direction Summary for John F. Kennedy Airport
Historical Data Weather Summary
Newtown Creek RI/FS

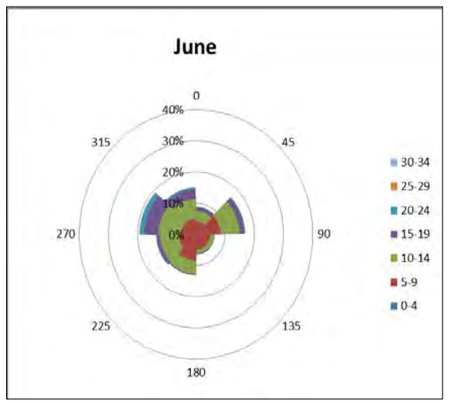


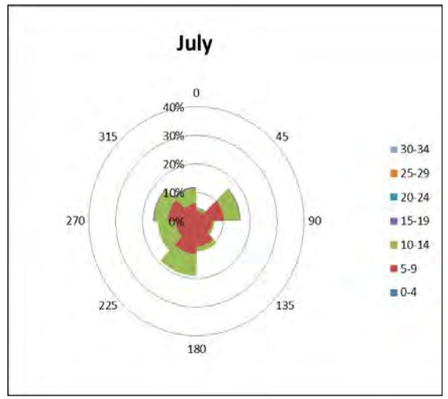


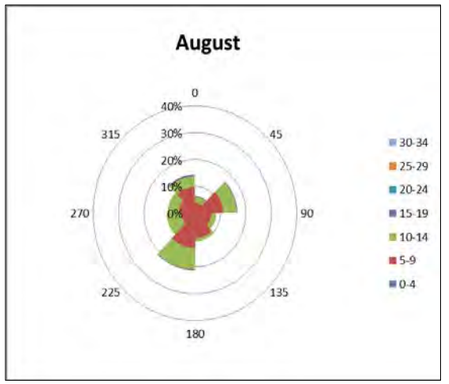


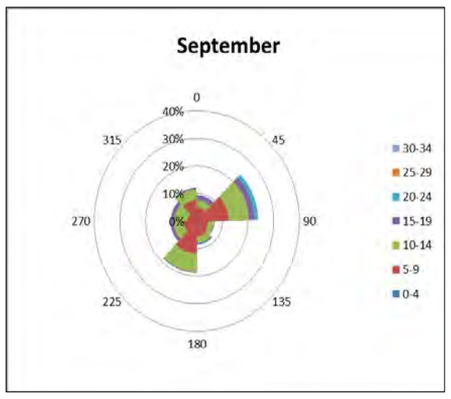


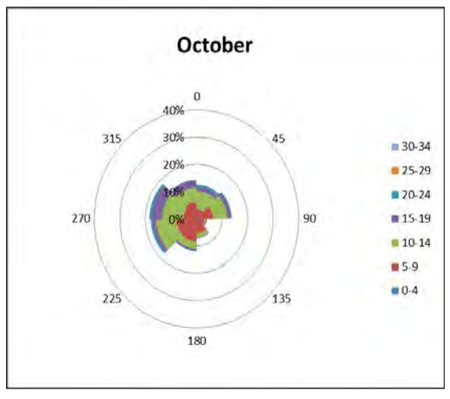


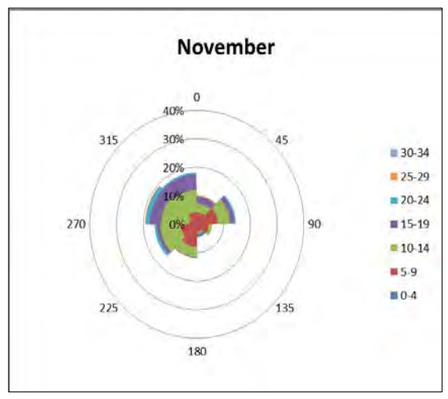












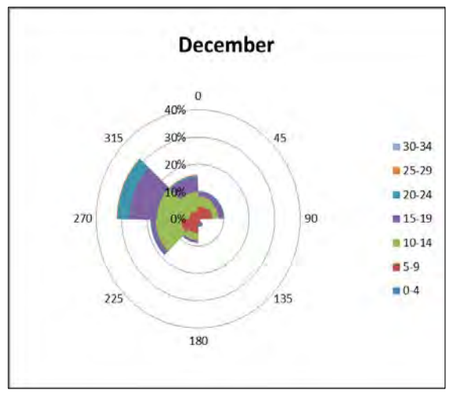


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Figure 3
Wind Speed and Direction Summary for LaGuardia Airport
Historical Data Weather Summary
Newtown Creek RI/FS