USACE CONTRACT NO. DACW33-03-D-0006
TASK ORDER NO. 0001
TOTAL ENVIRONMENTAL RESTORATION CONTRACT

FIELD SAMPLING PLAN
NEW BEDFORD HARBOR SUPERFUND SITE
New Bedford, Massachusetts

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Prepared for

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts

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ACRONYMS AND ABBREVIATIONS

AIRS	Aerometric Information Retrieval System
ANSI	American National Standards Institute
AQ	air quality
ARARs	Applicable, or Relevant and Appropriate Requirements
BOD	biological oxygen demand
CDFs	confined disposal facilities
CIH	Certified Industrial Hygienist
COC	chain of custody
CQC	contractor quality control
CSO	combined sewer overflow
DDA	debris disposal area
DQCR	Daily Quality Control Reports
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
EWS	Electronic Weather Station
FB	field blank
FCN	Field Change Notice
FSP	field sampling plan
FW	Foster Wheeler Environmental Firm
HDPE	high density polyethylene
IDM	investigation derived material
Jacobs	Jacobs Engineering Group
LED	light emitting diode
MIS	Management Information System

ACRONYMS AND ABBREVIATIONS

mL	milliliters
mph	miles per hour
MS	matrix spike
MS/MSD	matrix spike/matrix spike duplicate
NAE	New England District
NAS	network analysis system
NBH	New Bedford Harbor
NE TERC	New England Total Environmental Restoration Contract
ng/m^3	nanograms per cubic meter
NIST	National Institute of Standards and Technology (formerly NBS)
NPL	Superfund National Priorities List
NPS	non-point source
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PSD	Prevention of Significant Deterioration
PUF	polyurethane foam
QA	quality assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	quality control
QCSM	quality control system manager
RCP	Regulatory Compliance Plan
RFP	Request for Proposal
ROD	Record of Decision

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RPD	relative percent difference
SAP	Sampling and Analysis Plan
SOP	standard operating procedures
SOW	statement of work
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SVOCs	semivolatile organic compounds
TAL	target analyte list (CLP inorganics)
TCLP	toxicity characteristic leaching procedure
TO	toxic organics
TSCA	Toxic Substances Control Act
TSS	total suspended solids
TTSP	Temporary Transportation and Storage Plan
USACE	U.S. Army Corps of Engineers
VOA	volatile organic analysis (analyte)
VOCs	volatile organic compounds
WWTP	Waste Water Treatment Plant

1.0 INTRODUCTION AND PURPOSE

Under Task Order No. 0001 of the New England Total Environmental Restoration Contract (NE TERC, No. DACW33-03-D-0006) for the U.S. Army Corps of Engineers (USACE) – New England District (NAE), Jacobs Engineering Group (Jacobs) will conduct remedial design and remedial action construction activities at the New Bedford Superfund Site in Bristol County, Massachusetts.

This Field Sampling Plan (FSP) provides guidance for the fieldwork by defining the sampling and field-gathering methods to be used during pre-design investigations, construction, and operation and maintenance activities in accordance with the USACE Requirements for the Preparation of Sampling and Analysis Plans (EM 200-1-3, 01 February 2001). This document was prepared to replace the project Sampling and Analysis Plan (SAP) dated February 1999 and subsequent revisions and to be complementary with the project specific Quality Assurance Project Plan (QAPP) (Jacobs 2005). In general, the QAPP is intended to be an overall guidance document covering both present and possible future data needs for the project. Some data needs or objectives may change or be added in the future, necessitating a revision to the QAPP; however, these are expected to be relatively few. This FSP is intended to be the specific project guidance for documenting planned activities to the U.S. Environmental Protection Agency (EPA) and NAE and also to be useful for field personnel in detailing sampling procedures, locations, frequencies, and analyses. Accordingly, this document is designed to be updated and revised as needed for each anticipated sampling event. For the most part, it is expected that additional subsections will be added to the relevant field sampling sections (Sections 11, 12, 13 and 14) or new sections added for new matrices or objectives. Other sections of this document may also require updates; these will be done as needed.

1.1 DOCUMENT HISTORY

Field investigations, chemical sampling and analysis work for New Bedford Harbor (NBH) performed under the previous New England TERC were initiated in 1999. The field and laboratory procedures, including Quality Assurance/Quality Control (QA/QC), were documented in a project specific SAP (Foster Wheeler, 2000) prepared in accordance with USACE guideline *Requirements for the Preparation of Sampling and Analysis Plans* EM 200-1-3, September 1994, and submitted as final in February 2000. Changes and additions to the field and/or analytical programs were documented and submitted in subsequent SAP Revisions.

The original SAP (Foster Wheeler, 2000) for this project was written to address the following data collection activities:

- Groundwater sampling and analysis program to establish baseline conditions for one year prior to construction and filling of the Confined Disposal Facilities (CDFs)
- Ambient air sampling and analysis program to establish baseline conditions for one year prior to dredging and construction activities
- Sediment sampling and analysis to further delineate the extent of polychlorinated biphenyl (PCB) contamination in and around the Harbor
- Water treatment plant sampling and analysis to provide operational information and to determine compliance with discharge criteria

In addition, the SAP (Foster Wheeler, 2000) also addressed field data collection activities, including a geotechnical boring program and geophysics investigations. Subsequent SAP Revisions included ambient air and groundwater sampling in support of construction activities, additional sampling locations for sediment contamination delineation, and combined sewer overflow (CSO) sampling, modifications to the wastewater treatment plant analytical parameters, and support to specific engineering studies, including a pre-design dredging field test and dewatering studies.

The original SAP document included field, analytical procedures, CSO sampling, and requirements including those elements required in a project specific QA plan. Following submittal and approval of the initial (February 2000) SAP and at the request of NAE and EPA, a project QAPP was prepared in accordance with Region I, EPA-New England Compendium of Quality Assurance Project Plan Requirements and Guidance (Final), October 1999. The QAPP was submitted in February 2002. The QAPP included a detailed description of analytical methods and QC criteria to be used for this project, much of which is redundant with requirements included in the SAP. In order to avoid redundancies and/or conflicting requirements between the SAP and the QAPP, this FSP was prepared in accordance with more recent USACE guidance (Requirements for the Preparation of Sampling and Analysis Plans USACE EM 200-1-3, February 2001). Jacobs updated the QAPP to reflect the anticipated scope of work for 2005. It is anticipated that future updates to the QAPP will occur on an as-needed basis to update major changes in the program.

Information contained within this updated FSP takes precedence over previous FSP documents and the earlier SAP document. The FSP will be the governing document for collecting samples in the field and the QAPP will be the governing document for laboratory analytical, data validation, and evaluation procedures. Should discrepancies between the project documents be identified, the discrepancy will be resolved between the affected discipline leads and modifications made and issued as revisions to the affected document.

Future changes and additions to the FSP for this project will be addressed in subsequent FSP Revisions. These Revisions may include changes and additions to the field procedures and sampling locations. They will reference the QAPP for laboratory and quality control (QC) procedures, as appropriate.

1.2 DOCUMENT FORMAT

This FSP was prepared in accordance with the USACE guidance document *Requirements for the Preparation of Sampling and Analysis Plans* (USACE, 2001). It generally follows the outline provided in Table 3-1 of that document. The outline has been modified to address site-specific issues on this project and to facilitate revising the document for future sampling events. Those sections that include specific sampling objectives and the details of locations, numbers of samples and QC samples were moved to the end of the document (Sections 11.0, 12.0, 13.0, and 14). These sections will be revised or new sections added as needed and only revised pages will be issued to controlled document owners. The document outline is provided in the Table of Contents included at the beginning of this document with a list of incremental revisions and acronyms. Appendices are attached to the end of this document and include references, fixed standard technical procedures, field documentation forms, and supplemental holding time and preservative information.

Planning documents for this project, including this FSP will be prepared as controlled documents issued using a sequential numbering system. After additions or changes have been through the review and approval process, the pages containing the change will be distributed to each holder of the controlled copies. Each recipient will be supplied with replacement and/or additional pages, instructions for removing/replacing specific pages, and a cumulative list of revisions for inclusion at the front of the document.

Each revision will be numbered sequentially and dated. Using this system, the possibility of outdated documents and differing versions can be avoided. This is particularly important for this project, which is expected to continue for an extended duration.

Document Control for the project will be performed in accordance with Jacobs' procedures. These procedures define the organization, responsibilities, systems and methods used to control the receipt, tracking, and issuing of all documents and data related to project development and execution.

All documents and data relating to the implementation of this project will be controlled by document procedures. To ensure that all documents that directly affect the execution of the project are effectively controlled, a master list will be used to capture both internally- and externally-generated data. The master list will include at a minimum: originator; date received; and document date, title (description), identification number, and revision status.

1.3 SITE DESCRIPTION

The NBH Superfund Site (the site), located in Bristol County, extends from the shallow northern reaches of the Acushnet River estuary south through the commercial port of NBH and adjacent areas of Buzzards Bay (Figure 1-1). The sediments in the Harbor are contaminated with high concentrations of many pollutants, notably PCBs and heavy metals from the industrial and urban development surrounding the Harbor.

The site has been divided into three areas – Upper, Lower, and Outer Harbor – based on geographical features and levels of contamination (Figure 1-1). The Upper Harbor extends from an area north of the Wood Street Bridge to the Coggeshall Street Bridge. The Lower Harbor extends from the Coggeshall Street Bridge to the hurricane barrier. The Outer Harbor is the area between the hurricane barrier and an imaginary line drawn from Rock Point southwesterly to Negro Ledge and then southwesterly to Mishaum Point.

The Upper and Lower Harbor (operable unit [OU] #1) are bordered by the City of New Bedford on the western shore and the Towns of Acushnet (north) and Fairhaven (south) on the eastern shore. In support of earlier construction activities, on-site facilities were established and are maintained at 103 Sawyer Street in New Bedford, north of the Coggeshall Street Bridge. This location includes a temporary CDF (formerly used for the Hot Spot sediments), a steam cleaning facility, a desanding facility, office and storage space (trailers) and potable water. A debris disposal area is located next to the existing CDF and is used for the storage of large solid wastes removed during dredging. Other remedial systems installed in support of the NBH remedial action include the Dewatering and Wastewater treatment facilities located on Herman-Melville Boulevard, the dredge line Booster pump station on Manomet St., and the Dredge. The five principal areas of remedial operations, Dredging, Booster Pumps Desanding, Dewatering and Wastewater treatment are identified on the Figure 1-1 site plan.

1.4 SITE HISTORY AND CONTAMINANTS

From the 1940s into approximately the 1970s, electrical capacitor manufacturing plants in the New Bedford area discharged PCB waste either directly into the Harbor or indirectly through discharges to the city's sewerage system. In the mid-1970s, as a result of EPA sampling, PCBs were identified in the sediments and the seafood in the NBH area. In 1979, the Massachusetts Department of Public Health issued regulations prohibiting fishing and lobstering throughout the site due to high levels of PCB contamination ranging to greater than 100,000 parts per million (ppm) in various parts of the Harbor. The site was included on the Superfund National Priorities List (NPL) in September 1983. EPA's site-specific investigations were initiated in 1983-1984, and included engineering feasibility studies of alternative dredging methods and disposal of contaminated sediments, pilot dredging and disposal studies to field test different dredging and disposal technologies for the contaminated sediments, and extensive physical and chemical computer modeling of the site. These studies are summarized in more detail in EPA's Administrative Record of the site.

In September 1998, after years of study, public debate, and consensus building, EPA selected a cleanup remedy for the entire Upper and Lower Harbor areas as a solution to the widespread PCB contamination in and around NBH. The remedy, as discussed in the 1998 Record of Decision (ROD), involves the dredging of about 170 acres and containment of PCB contaminated sediment on-site in shoreline CDFs. In the time since the original ROD was signed until now, the estimate of quantities of material requiring dredging and disposal has increased based on additional sampling events. This, in conjunction with engineering and funding concerns, lead EPA to reconsider off-site disposal. EPA made the decision to use off-site disposal rather than construct CDF D and documented that decision in an Explanation of Significant Difference (ESD) dated August 2002.

The ROD issued by EPA in September 1998 described three principle goals. They include:

1. The reduction of health risks due to consumption of PCB-contaminated local seafood;
2. The reduction of health risks due to contact with PCB-contaminated shoreline sediments; and
3. The improvement of water quality among the highly distressed marine ecosystem in the Harbor.

The EPA ROD defined the Project Action Limits for PCBs in sediment. It established several cleanup goals for the site that were designed to be protective of human health and the environment. The cleanup goals vary based on the geographical location and were established, in part, to reduce the amount of PCBs that accumulate in seafood potentially consumed by humans. The cleanup goals were also established to be protective of local residents living or beach combing near the Harbor. The cleanup goals in the salt marsh areas were designed to be consistent with the remediation goals for the Harbor while minimizing the disruption of beneficial and productive wetlands. Accordingly, the cleanup goals vary throughout the subtidal and intertidal areas based on the exposure scenario. These PCB cleanup goals are summarized as follows:

Areas in direct contact for residents and beach combers:

1 ppm	In shoreline areas immediately adjacent to residential properties; and
25 ppm	In shoreline areas subject to beach combing activities.

Other areas, primarily to reduce the risk to humans through the ingestion of seafood:

10 ppm	Shoreline to shoreline in the Upper Harbor with the exception of beneficial salt marsh and wetland areas; and
50 ppm	In salt marsh areas not readily accessible to beach combing and in the subtidal areas of the Lower Harbor.

In support of developing a post dredging confirmatory sampling program and delineating extent contamination in the Harbor, Foster Wheeler prepared cleanup goal maps. These maps were submitted on 02 April 2002. In order to satisfy these goals, the ROD requires sediment removal if the concentration of total PCBs exceeds the limits specified for designated areas within the Harbor. Sediments that exceed the levels specified in the EPA ROD will be removed from the Harbor.

In addition to OU #1, EPA issued a ROD amendment for OU #2, remediation of the Hot Spot sediment on April 27, 1999. These highly contaminated sediments (PCBs > 4,000 ppm) were dredged from the Harbor in 1994 and 1995 and were stored in a temporary CDF located at the Sawyer Street site, near the proposed CDF C. In 2000, the sediments were removed from the CDF for off-site disposal to a Toxic Substances Control Act (TSCA) permitted landfill.

1.5 SUMMARY OF EXISTING DATA

Existing data are available from several sources. The September 1998 ROD summarized available data for Harbor sediments, surface water, biota and air. Data from periodic air sampling at the Hot Spot CDF and groundwater data from the Hot Spot CDF, Aerovox Engineering Evaluation and Cost Analysis (EE/CA), and Cliftex reports are briefly summarized below. Where applicable, data collected by Foster Wheeler under the NE TERC are also summarized in the following subsections. Subsequent data summaries can be found in the Jacobs After Action Report (Jacobs 2005a).

Harbor Sediments

In general, sediments in the Upper Harbor sub tidal zone indicate that PCB contamination above the 10 ppm cleanup goal extends to two feet in depth throughout much of the Upper Harbor. At some locations (near Aerovox and near the Hathaway Street CSO), Harbor sediments exceed the cleanup goals at the two to three foot depth intervals. With some exceptions near the Com Electric cable crossing and others identified during recent sampling events, the majority of sediments with PCB concentrations above 4,000 ppm were dredged from the Harbor and removed during the OU #2 phase of this project.

Sediments in the intertidal zone and in the Lower Harbor were characterized during NE TERC Phase I - IV sampling efforts. Available data indicate that dredging to meet PCB cleanup goals will be required in these areas. Sediment data were reported at the end of each phase and most recently in the cumulative Sediment Data Report dated 28 June 2002. These data were used in a geostatistical modeling effort to define the extent of contamination. These results are presented in the draft *Data Interpretation Report,* (24 June 2002).

Data are available for other contaminants in the Harbor sediments, including Polynuclear Aromatic Hydrocarbons (PAHs), heavy metals and relatively low concentrations of dioxins and furans. These are discussed in more detail in the 1998 ROD and in referenced documents. Because PCBs are the primary contaminant of concern and the only contaminant with a ROD defined cleanup goal for sediment, on-going sediment investigations will focus on PCB contamination.

Air

Ambient air concentration data are summarized in the ROD and in the Annual Report Baseline Air Sampling and Analysis (23 July 2001). The ROD indicates that PCB (Aroclor) concentrations in background areas away from source areas are in the 2 to 15 nanograms per cubic meter (ng/$m^{3)}$ range. This is consistent with values typically reported for North American urban areas (EPA, 1996). Concentrations near the Aerovox facility and Marsh Island were reported in the 50 to 100 ng/m^3 range and PCB concentrations at low tide were reported as high as between 196 and 471 ng/m^3.

Air samples were also collected as part of a one-year baseline ambient air study (Foster Wheeler, 2001h). Monthly samples were collected over 24 hours at each of six stations (21, 22, 23, 24, 25, and 26 - see Section 11.0) from June 1999 to May 2000. The average values ranged from 2.7 to 92 ng/m^3 and the maximum values ranged from 9.5 to 230 ng/m^3. The maximum values were measured at station 24 and minimum values were measured at station 22. Seasonally, the maximum concentrations were measured in the summer and minimum values were measured in the winter.

Air samples were collected for PCB (Aroclors) before, during and following the dredging of the Hot Spot and placing that material in the Hot Spot CDF (OU #2). The purpose of the sampling was to demonstrate that Hot Spot activities did not cause ambient concentrations of PCBs to exceed stated action levels. Data are summarized in spreadsheet tables provided to Foster Wheeler by USACE. During the Hot Spot dredging, ambient air concentrations reported as Aroclor 1016 averaged from 10 to 174 ng/m^3 depending on distance from the Harbor. Data from stations located away from the Harbor and Hot Spot CDF are consistent with the 10 to 15 ng/m^3 range as determined from earlier sampling events. Updates to the air monitoring data can be found in the Jacobs After Action Report (Jacobs 2005a).

Groundwater

Groundwater quality is not discussed in the ROD for the site. Limited groundwater data are available from the Aerovox facility. Available data indicate concentrations of heavy metals and PCBs in groundwater at the Aerovox area.

Foster Wheeler collected samples as part of a one-year baseline study to assess contaminant concentration in the vicinity of each proposed CDF (Foster Wheeler, 2001c). Monitoring and observation wells were installed at approximately 18 locations and sampled between 1999 and 2000. Samples were analyzed for PCBs, volatile organic compounds (VOCs), semivolatile organic compound (SVOCs), Target Analyte List (TAL) metals, and cyanide. In addition, samples will be routinely collected and analyzed (by others) from wells located around Cell #1 (formerly used for the Hot Spot sediments). The available data indicate that low levels of PCBs and some heavy metals are present to varying degrees in groundwater from the different wells. Jacobs will not be collecting or analyzing groundwater samples on this project.

Surface Water and Biota

Data from surface water and biota samples indicate elevated levels of PCBs in both matrices and copper in surface water. EPA's long-term monitoring program will continue to sample and test these matrices to measure the effectiveness of cleanup. Surface water will be monitored during dredging activities to ensure that dredging is not causing an unacceptable level of re-suspension of sediments and potentially increasing the PCB concentration in surface water accordingly. Analytical sampling of the surface water is not included in the scope of work in this task order.

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3.0 PROJECT SCOPE AND OBJECTIVES

This FSP addresses the data collection activities that will be conducted to support remedial action, activities and to establish baseline conditions prior to construction and remediation. Because NAE will task more than one contractor to perform sampling activities, the bullets in Section 3.1 specify whether Jacobs or others will be tasked with the sampling activity described.

3.1 TASK DESCRIPTION

The following summarizes the scope and objectives of the data collection activities:

- By others. The collection of Harbor sediment samples (and some upland soils) to delineate the extent of PCB contamination relative to project remediation goals. Remediation action levels vary according to location and the associated risk to human health and the environment
- By others. Sediment sampling to document post dredging or post-excavation PCB concentrations to determine whether cleanup goals were met
- By others. The sampling of groundwater monitoring wells to periodically monitor for changes
- By Jacobs. An air sampling and analytical program to establish baseline conditions, and to monitor concentrations during construction (dredging and excavation) activities
- By Jacobs. Wastewater treatment plant sampling to determine whether discharge meets applicable criteria and sampling from various points in the process to monitor system performance
- By Jacobs. Dewatering facility sampling to characterize filter cake before disposal. Transportation and disposal activities will be performed by others
- By Jacobs. Oversize debris and vegetation sampling to characterize the waste before disposal
- By Jacobs. Desanding facility sampling to characterize coarse materials before disposal
- By Jacobs. Personal protective equipment to characterize the waste before disposal
- By Jacobs. Waste oil sampling to characterize before disposal
- By Jacobs. Spent oil booms, tarps, and liners to characterize for disposal

A QC program, including written plans and procedures, will be implemented to direct, monitor, and document data collection activities. The laboratory QC procedures and, where applicable, acceptance limits are discussed in more detail in the QAPP. The NAE will provide project quality assurance (QA), including a review of planning documents and data reports, field and laboratory oversight, and the analysis of QA samples for chemical analyses. Data collection activities will be conducted in accordance with NAE direction and approval.

3.2 APPLICABLE REGULATIONS AND STANDARDS

Sediment cleanup goals and surface water discharge limits are defined in the OU #1 ROD and referenced where appropriate in this document and in the QAPP. Where not specifically stated in the ROD, the project team has developed and implemented other means of monitoring site conditions and remediation progress. These include development of air action levels and an implementation plan and statistically based confirmatory sampling plan to implement ROD cleanup goals for sediment. Baseline groundwater and air data collected in 1999 and 2000 (see February 2000 SAP) may be incorporated into future development of project specific standards, where appropriate. Other Applicable or Relevant and Appropriate Requirements (ARARs) applicable to the project are also referenced in the ROD. Regulatory standards and procedures to conduct site work appropriately are addressed in the project Regulatory Compliance Plan (RCP) and in the Temporary Transportation and Storage Plan (TTSP). Health and safety procedures and requirements are detailed in the SSHP.

3.3 PROJECT SCHEDULE

A detailed project schedule is submitted with each Work Plan Modification. Where appropriate, these schedules detail those activities included in this FSP and in the QAPP. The overall project schedule is updated and discussed with EPA, NAE, and Jacobs on a regular basis.

4.0 NON MEASUREMENT DATA ACQUISITION

Non-measurement data acquisition includes information obtained from databases, literature, handbooks, local planning authorities, and other specific organizations. These data may be necessary for various project activities; e.g., risk assessment, geological data, meteorological data, engineering models, and others. The applicability and use of these data for project activities will be reviewed and authorized in the Work Plan preparation submittal process. Findings will be documented in the appropriate summary report.

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5.0 DECONTAMINATION

Where possible, dedicated and/or disposable sampling equipment will be used to reduce the possibility of cross contamination and the inadvertent migration of contaminants off-site. When disposable or dedicated equipment is not available or is impractical, decontamination procedures will be used before using the equipment or moving it off-site. Decontamination procedures are described in the following subsections.

5.1 HEAVY EQUIPMENT

Heavy equipment including dredges, excavators, loaders, backhoes, dump trucks, fork trucks, barges, boats, trailers and the sediment and wastewater processing equipment will be inspected upon arrival on-site and are expected to be free of any visible sediment or staining. If equipment is not satisfactorily cleaned it will not be allowed onsite until properly decontaminated. Heavy equipment decontamination will be performed at the decontamination pad located at the Sawyer Street site or at the decontamination station located at the dewatering/wastewater treatment building. In order to minimize the potential of spreading contaminated material offsite, at a minimum, heavy equipment will be decontaminated by high-pressure cleaning prior to leaving the site. Heavy equipment will also be decontaminated if visible contamination is encountered.

5.2 SAMPLING EQUIPMENT

In order to assure that chemical analysis results are reflective of the actual concentrations present at sampling locations, chemical sampling and field analysis equipment must be properly decontaminated prior to the field effort, during the sampling program, (i.e., between sampling points) and at the conclusion of the sampling program. This will minimize the potential for cross contamination between sampling locations and the transfer of contamination off-site. The following decontamination procedure will be utilized for the respective media.

5.2.1 Sediment, Debris, Sand and Filter Cake Sampling Equipment

Sampling equipment that will be reused will require decontamination. Samples will be collected and analyzed for PCBs. Non-dedicated sampling equipment will be decontaminated according to the following general procedure:

- Wash with a non-phosphate detergent solution
- Rinse with distilled/deionized water
- Rinse with pesticide-grade hexane
- Allow equipment to air dry
- Wrap equipment with aluminum foil, shinny side out, for transport

Decontamination fluids will be contained and transported to the Sawyer Street site for disposal in the CDF and subsequent treatment through the desanding, dewatering and wastewater treatment facilities.

6.0 FIELD OPERATIONS DOCUMENTATION

The following subsections describe field documentation records, sample handling, shipping and chain of custody (COC) requirements. These procedures and records will document that sample collection and handling was performed in a standard manner to ensure that data are representative of field conditions. Records generated during the field investigation program will be stored in the project file in accordance with Jacobs procedures.

6.1 FIELD DOCUMENTATION

Documentation of field activities will be kept in logbooks, in photographs and in daily reports. These are discussed below.

6.1.1 Field Logbook

Detailed, bound, weatherproof field logbooks with numbered pages shall be maintained by the field representative to record information related to sampling or field activities. This information will be written in ink in accordance with Jacobs' Technical Procedure-035, *Field Logbook*, and will include the following:

- Date and time of site visit
- Climatic conditions
- Key personnel on-site
- Health and safety levels of protection
- Description of field activities, including approved work changes and/or deviations from approved project plans
- Comments to/from government party representatives
- Sampling location and identification
- Sampling sequence and time of each sample collection
- Types of sample containers used and sample identification numbers
- Parameters requested for analysis

- Field observations during sampling event, including a visual description of sample (color, odor, etc.)
- Name of sample collector(s)
- QA/QC data for field instruments
- Problems encountered
- Description of sampling equipment used, including trade names, model number, diameters, material composition, etc.
- Description of instrument calibration procedures and results

6.1.2 Photographs

Photographs may be taken to document site activities. The sampling, dredging, desanding, dewatering and wastewater treatment programs will use photographs to document locations and unusual conditions. The associated field logbook entries will include the name of the photographer, dates, site location, and photograph description, including orientation of photograph. Photographs will be maintained in the project file.

6.1.3 Field Changes

The Project Manager or his designee is responsible for all site activities. In this role the Project Manager, at times, is required to adjust the site-specific programs to accommodate specific needs. When it becomes necessary to modify a site-specific program, the responsible task lead notifies the Project Manager of the anticipated change and implements the necessary changes. The Project Manager shall notify NAE. Changes in field operating procedures by the Jacobs field team may be necessary as a result of changed field conditions or unanticipated events. A summary of the sequence of events associated with field changes is as follows:

1. The task lead notifies the Project Manager of the need for the change.
2. If necessary, the Project Manager will discuss the change with the pertinent individuals (e.g., EPA, NAE) and will provide a verbal approval or denial to the task lead for the proposed change. If approved, the change will be instituted immediately upon verbal direction by the Project Manager to the task lead.

3. The task lead will document the change on a Field Change Notice (FCN) form (Appendix C) and forward the form to the Project Manager at the earliest convenient time (e.g., end of the work week).
4. The Project Manager will sign the form and distribute copies to the appropriate Jacobs project personnel, the project file, and the NAE.
5. A copy of the completed FCN form will also be attached to the file copy of the affected document (e.g., Work Plan, FSP, SSHP).

If the implemented changes are later determined to be unacceptable, the action taken during the period of deviation will be evaluated in order to determine the significance of any departure from established program practices and action taken.

6.1.4 Daily Quality Control Reports (DQCR)

Field activities will be documented in logbooks and on summary forms as discussed above. The field logbooks will include a record of each sample collected, which samples were shipped to laboratories, and those that were collected as QA/QC samples. Laboratory COC forms will be completed for samples shipped from the site. A copy of the COC will be retained with the field records. Changes from approved plans and procedures will be documented and approved on field change request forms. Copies of field sampling records will be transmitted to NAE upon request.

6.2 SAMPLE IDENTIFICATION AND NUMBERING

Samples will be uniquely identified to document their origin and purpose. Samples will be labeled with the site name, date and time collected and the analysis required. Chemical sample labels will also include the preservative (if applicable). The sample identifier will consist of an alphanumeric code, which identifies the sample type, location, depth, and quality control designation.

A unique sample identification code will be required for every sample. In general, this matrix-specific protocol follows:

Matrix	Code
Air	A- MMDDYYCC
Wastewater	WTP-AAA-MMDDYY
CSO Sample	CS-NNTE#R
IDM SAMPLE	IDM-BBB-MMDDYY

WHERE,

A	=	Air Prefix (1 digit)
MM	=	Month of sample collection (2 digit)
DD	=	Day of sample collection (2 digit)
YY	=	Year of sample collection (2 digit)
CC	=	Air Station identifier (2 digits)
V	=	CDF identifier (1 digit)
S	=	Sediment prefix (1 digit)
top depth	=	numeric top depth of sample in feet (‘) and/or inches (“)(1 or 2 digits)
bottom depth	=	numeric bottom depth of sample in feet (‘) and/or inches (“)(1 or 2 digits)
WTP	=	Wastewater Treatment Plant prefix (3 digits)
AAA	=	WTP Sample identifier (1 to 3 alphanumeric characters)
BBB	=	IDM Sample identifier (1 to 3 alphanumeric characters)
CS	=	CSO identifier (2 digit)
NN	=	CSO Number (2 digit)
T	=	Tide, (E)bb or (F)lood (1 digit)
E	=	Event, (W)et or (D)ry (1 digit)
#	=	Event number (1 digit) (1, 2, 3, etc…)
R	=	Replicate number (1 digit) (1, 2, 3, etc…)

A unique sample identification code will be assigned to QC samples. For some QC, the appropriate QC suffix will be added to the existing sample ID. For other QC samples a

QC prefix will be concatenated to the date and sequential identification number. Jacobs will identify field QC samples as outlined below.

FD	"Sample Duplicate" FD
Equipment Blank	EB-MMDDYY-EB Seq. No.
Trip Blank	TB-MMDDYY-TB Seq. No.
Field Blank	"Air Sample ID"B

WHERE,

Sample ID	=	appropriate field Sample ID described above
QA	=	QA Split suffix
FD	=	Field Duplicate suffix
EB	=	Equipment Blank prefix (all matrices excluding air)
TB	=	Trip Blank prefix
MM	=	Month of sample collection
DD	=	Day of sample collection
YY	=	Year of sample collection
EB seq. no.	=	Sequential number (01, 02, etc) assigned to each equipment blank sample during a sample collection day. Sequence number reset to 01 at start of each sample collection day.
TB seq. no.	=	Sequential number (01, 02, etc) assigned to each trip blank sample during a sample collection day. Sequence number reset to 01 at start of each sample collection day.
Air Sample ID	=	appropriate Air Sample ID described above
B	=	Air Field Blank suffix

6.3 CHAIN OF CUSTODY RECORDS

To maintain and document sample possession, COC procedures will be implemented. These procedures are necessary to insure the integrity of samples from the time of collection through data reporting. The COC protocol provides the ability to trace possession and handling of samples. A sample is considered under custody if it is/was:

- In a person's possession;

- In a person's view after being in possession;
- In a person's possession and locked up; or
- In a designated secure area.

Personnel collecting samples are responsible for the care and integrity of samples until they are properly transferred or dispatched. Therefore, the number of people handling a sample will be kept to a minimum.

COC records will be completed by the sampler and shall accompany the samples at all times. An example COC form is included in Appendix C. Additional information about the COC is presented in the QAPP.

7.0 SAMPLE PACKAGING AND SHIPPING REQUIREMENTS

This section summarizes the requirements for sample packaging and shipping. The QAPP (Jacobs 2005) contains information on sample handling that should be consulted when additional information is required.

7.1 SAMPLE CONTAINERS AND HOLDING TIMES

Containers for chemical analyses will be purchased or provided by the laboratory and certified as contaminant-free in accordance with *EPA Specifications and Guidance for Contaminant–Free Sample Containers,* EPA540/R-93/051, December 1992. Sample containers, preservation requirements, and laboratory holding times for chemical analyses are summarized in Table 7-1. Preservatives, as required by the analytical methods, will be provided to the field personnel by the laboratory.

7.2 SAMPLE PACKAGING AND SHIPPING

Samples for chemical analysis will be stored on ice from the time of sample collection. Samples for laboratory analysis will be shipped via courier or by overnight delivery service for same day or next day delivery in waterproof coolers following Jacobs' Technical Procedure-028, *Packing and Shipping of Environmental Samples*. In general, the samples taken for this project will be considered low-level or environmental samples for packaging and shipping purposes.

Table 7-1
Sample Containers, Preservation, and Laboratory Holding Times

Analysis	Matrix/ Media	Sample Container	Preservative	Holding Time[1]
PCBs	Aqueous	2 x 1 L. Glass	4°C	7 days to extraction, 40 days to analysis, 1 year if frozen
	Solid	8 oz. Glass for each laboratory if different labs are used for different methods	4°C	14 days to extraction, 40 days to analysis, 1 year if frozen
	Wipes	4 oz. Glass	4°C	14 days to extraction, 40 days to analysis, 1 year if frozen
	Air/PUF	Glass Thimble	4°C	7 days to extraction, 40 days to analysis, 1 year if frozen
Metals	Aqueous	250 ml HDPE	4°C, HNO_3 pH<2	Hg 28 days, other metals 6 months, 1 year if frozen
	Solid	8 oz. Glass	4°C	
	Wipes	4 oz. Glass	4°C	
SVOCs	Solid	4 oz. Glass	4°C	14 days to extraction, 40 days to analysis
	Aqueous	2 x 1 L. Amber Glass	4°C	7 days to extraction, 40 days to analysis
VOCs	Solid	3 x 40 mL VOAs	4°C 2 vials $NaHSO_4$ 1 vial MeOH	14 days to analysis
	Aqueous	3 x 40 mL VOAs	4°C	14 days to analysis
TCLP VOCs	Solid	1 x 8 oz. Glass with septum top	4°C	Organics - 14 days to leach VOCs - 14 days to analysis Other - 7 days to extraction, 40 days to analysis Hg - 28 days to leachate, 28 days to analysis Metals - 180 days to leach, 180 days to analysis
SVOCs PCBs/Pesticides Metals (+ Mercury)		1 x 8 oz. Glass		
Hazardous Waste Characterization Ignitability Corrosivity Reactivity	Solid	8 oz. Glass	4°C	24 hours
Cyanide	Aqueous	1 L HDPE	4°C NaOH pH>12 0.6 g ascorbic acid	14 days
Oil and Grease	Aqueous	1 L Amber	4°C HCl pH<2	28 days
Total Suspended Solids (TSS)	Aqueous	250 mL HDPE	4°C	7 days
PH	Aqueous	60 mL HDPE	None required	24 hours
Biochemical Oxygen Demand (BOD)	Aqueous	1 L HDPE	4°C	48 hours

Notes: [1] Holding times are from date of collection.
[2] Sediment samples for multiple PCB analyses (i.e., congeners and homologue groups) may be combined into a single container (i.e., one 8-oz. jar)

7.3 LABORATORY ADDRESSES AND CONTACTS

Jacobs will utilize Katahdin Analytical; as the primary laboratory and SVTC as the back-up laboratory for the analyses required during this remedial action program. Laboratory costs will be analyzed based on similar competitively bid laboratory services previously performed on to the environmental programs within New England. A project specific Statement of Work (SOW) will be issued to Katahdin and SVTC for pricing purposes. The SOW will be presented for review by NAE prior to distributing to Katahdin and SVTC in the Request for Proposal (RFP) process.

NAE will validate the laboratory, which will include a review of the laboratory documents (QA plan and SOPs), the submittal of blind performance evaluation samples to the lab and an optional laboratory inspection/audit. In addition, NAE will periodically evaluate laboratory performance with the analysis of QA samples to be collected as described in Section 8.0 of this document. Jacobs will continually evaluate laboratory data using data review checklists and EPA Region I validation procedures as described in the QAPP.

The analytical methods to be used on this project are discussed in more detail in the QAPP. Laboratory QA Plans and qualifications will be provided to NAE upon request. It is assumed that NAE will continue to use Phillip Analytical Services as the project QA laboratory for air, wastewater, sediments and investigation derived material (IDM).

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8.0 FIELD ASSESSMENT AND THREE-PHASED INSPECTION SYSTEM

This section describes the procedures that will ensure that the level of quality is known, maintained, and documented throughout the field programs.

8.1 FIELD QUALITY CONTROL SAMPLES

QC samples to be collected for the purposes of measuring precision and accuracy of the sampling and analysis process and the approximate frequency of collection are briefly summarized in this section. The actual frequency of collection will depend on the number of samples anticipated for a given sampling event with consideration given to the data quality objectives and costs for that program. The number of QC samples for a given sampling event will be agreed upon with NAE and EPA and documented in the FSP Section for that event (See Sections 11.0 and up). Specific acceptance criteria are described in the project QAPP.

8.1.1 Split Samples, Field Duplicate, and Co-Located Samples

Field duplicate samples are two samples of the same matrix, which are collected, to the extent possible, at the same time, from the same location, using the same techniques and are analyzed at the same laboratory. Field duplicates are not collected for IDM samples. Field duplicates for air samples for VOC analysis will be collected as co-located samples. Aqueous and sediment samples for analyses other than VOCs will be homogenized prior to splitting into duplicates. Field duplicates will be handled, containerized, preserved, stored and transported in the same manner as Norman field samples. Field duplicates will be collected at a frequency of approximately one per twenty samples per matrix. The laboratory will analyze the field duplicate samples independently to provide a measure of sampling variability. Field duplicate results are compared using relative percent difference (RPD) as a measure of precision. In general, RPDs of less than 30% indicate acceptable agreement for aqueous and air matrices. RPDs of less than 50% indicate acceptable agreement for soil and sediment matrices. Split samples collected for different laboratories (including government QA samples) and/or analyses will also be prepared in this manner.

8.1.2 Quality Assurance Split Samples

QA samples are collected in the same manner as field duplicates (see above) and are analyzed by different methods and/or laboratories to provide overall analytical quality assurance for the project. QA samples will be collected at a frequency of approximately one per ten or twenty samples depending on the overall size of the program. These samples will be sent to the NAE designated laboratory for analysis. When sufficient volume is available, QA samples will be preferentially selected from the same locations as field replicate samples. The NAE will use QA sample data to evaluate the acceptability of data generated during this program. Acceptable measures of agreement will vary depending on the analysis, matrix, and concentrations detected.

8.1.3 Field/Equipment Blanks

Field/equipment blanks are samples consisting of reagent (analyte-free) water collected during a sampling event from a final rinse of sampling equipment after the decontamination procedure has been performed. The purpose of equipment blanks is to determine whether the sampling equipment is causing cross contamination of samples. Equipment blanks for sediment samples will be collected at a frequency of one per twenty samples. Equipment blanks will not be collected with the Waste Water Treatment Plant (WWTP) samples because dedicated sampling equipment and/or sampling locations are used to collect these types of samples. Field blanks for air samples will be collected at a frequency of one per collection event. Where disposal equipment is used, a single equipment blank will be collected to document that the disposable equipment, sample containers and preservatives are not contaminating the field samples. Concentrations detected in the blanks will be used to determine whether contaminated sampling equipment is contributing to concentrations reported in the samples. In general, if the blank level multiplied by five (ten for common laboratory contaminants) is less than the sample concentration, cross contamination is considered insignificant.

8.1.4 Matrix Spike/Matrix Spike Duplicates for Organic Analyses and/or Matrix Spikes and Laboratory Duplicates for Inorganic Analyses

Matrix Spike/Matrix Spike Duplicate (MS/MSD) for organic analyses and matrix spike (MS) and laboratory duplicate samples for inorganic analyses are laboratory QC samples used to measure precision and accuracy in addition to identifying matrix interference difficulties with identifying or quantifying target analytes. Extra volume for MS/MSD analyses are not collected for IDM samples. A known quantity of target analyte is added (spiked) to the sample before preparation and analysis. Samples are prepared in the same manner as the other samples in the batch. Measures of percent recovery and RPD are used to assess precision and accuracy. Spike concentration levels and criteria for recovery and precision are included in the QAPP. Field personnel must collect additional sample volume for laboratory QC samples at a frequency of one pair per twenty samples and designate these as such on the COC. For aqueous samples, an additional bottle for each laboratory QC sample is required. For soil and sediment samples for a single analysis (e.g., PCBs), a single 8-ounce jar is sufficient for MS/MSD analysis.

8.1.5 Trip Blanks

Trip blanks consist of laboratory-grade distilled and/or deionized water collected in two 40-milliliter (mL) glass vials with Teflon seals. They are used to detect contamination that may be introduced during sample handling and transport. These QC samples are prepared by the laboratory, shipped to the field, and returned to the laboratory unopened. A trip blank will be included with each sample shipment cooler sent to the laboratory for VOC analyses. Trip blank results are evaluated in the same manner as equipment blanks.

8.1.6 Cooler/Temperature Blanks

Temperature blanks in each cooler will not be required. The temperature of each sample container will be checked upon receipt at the laboratory by either an infrared gun or a digital thermometer, and the temperature recorded on the cooler receipt form. Elevated (> 6°C) temperatures will be considered during the validation process to determine the effect, if any, to reported data.

8.2 FIELD INSTRUMENT QUALITY CONTROL PROCEDURES

Procedures for use and calibration of field monitoring instruments will follow manufacturer's guidelines and site-specific procedures discussed below. The following will be implemented to calibrate and document the use of field equipment:

1. A list is established to include the measuring and testing devices (field equipment) to be calibrated and the frequency of calibration of this equipment. The method and interval of calibration shall be based on the type of equipment, stability characteristics, required accuracy, and other conditions affecting measurement control.
2. The measuring and testing equipment used are of the proper range, type, and accuracy for the test being performed.
3. Calibration for the equipment will be kept in the site logbook or on field log sheets and include at least the following information:
   - Name of equipment
   - Equipment serial and/or identification number
   - Frequency of calibration
   - Date of last calibration
   - Name of individual performing last calibration
   - Due date for next calibration
4. Field equipment shall be marked with calibration due dates when possible. When this marking is not possible, alternative methods of tracing the equipment to its calibration date (such as serialization) shall be employed.
5. Field equipment shall be calibrated in accordance with the requirements of this section. Prior to field use, each instrument is calibrated and its documentation, which substantiates the calibration, is made available.
6. Systems are developed and maintained for issuance, collection, and return of measuring and field equipment. This system shall provide for the identification of personnel withdrawing equipment, methods for issuing equipment, and methods for the collection and/or return of equipment at prescribed calibration times or as otherwise required.
7. Methods are employed to assure proper handling, storage, and care of the test equipment in order to maintain its required accuracy.
8. Field equipment used to screen samples and/or monitor health and safety parameters are calibrated at a minimum of once at the beginning and once at the end of each day of use.

9. Calibration activities are performed in accordance with written manufacturer's instructions, or with EPA methods, where they exist. For example, pH calibration is performed according to EPA Method 150.1, specific conductivity with EPA Method 120.1, etc. Calibration shall be documented in the field logbook or on appropriate log sheets.
10. If field equipment is damaged and/or there are indications that the equipment may not be performing properly, the equipment will be removed from service until it is repaired or replaced.

8.3 FIELD QUALITY CONTROL REVIEW

The Field Sampling Lead is responsible for planning, scheduling, and coordinating evaluations of the internal QC checks performed during various phases of project activities in accordance with approved procedures. The Field Lead evaluates the checks performed by project personnel in accordance with applicable procedures. This evaluation is performed by verifying the following:

1. Possession and use of the approved procedure(s), standards, and/or project-specific instruction(s)
2. Conformance with appropriate procedures, standards, and instructions
3. Thoroughness of performance
4. Identification and completeness of documentation generated during performance, which may include
    - Project number and/or name
    - Task description
    - Name of performer
    - Date(s) of performance
    - Page number and total number of pages, if more than one sheet
    - All blank titles spaces of forms have been considered
    - Legible and reproducible presentation
    - Data entries, calculations, and results within scope of reason
    - Plots, charts, data summaries, graphs, etc., with parameters clearly defined
    - Input data approved for use by original department, accurately transcribed, and properly referenced

The following shall be considered if pertinent to the specific activity:

- Appropriate forms, logs, or formats have been utilized
- Equipment utilized has been referenced and calibrated as required; and/or
- Equipment utilized meets specifications

Other acceptance criteria are incorporated into the technical procedures that describe the performance and documentation of a specific activity.

9.0 NONCONFORMANCE/CORRECTIVE ACTIONS

If field procedures are determined to be inadequate for the task or were inappropriately implemented, the Field Lead will notify the QCSM and take corrective action to ensure that proper, approved procedures are implemented. For example, if samples have been collected in a manner inconsistent with the analytical objectives, these samples may be discarded and new samples taken. If samples have been sent for analysis, the laboratory may be contacted to terminate analysis. The Field Team Lead will be responsible to complete a non-conformance report in accordance with Jacobs' procedure FOSOP-407, (Appendix B).

If sample results indicate unacceptable contamination of field or trip blanks, sampling and analysis may be performed again if requested to support project analytical objectives.

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10.0 FIELD ACTIVITIES OVERVIEW

Field data collection activities are included in the following sections. These include air monitoring, water treatment plant sampling, and waste disposal sampling.

Each category of field operation (sampling of air, sediment, wastewater, etc.) is presented independently in order to facilitate and organize the phases of this project. Subsequent project subtasks will be added to the following sections in chronological order.

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11.0 AMBIENT AIR SAMPLING PROGRAM

Air sampling for PCBs at the New Bedford Harbor Superfund Site OU #1 began in June 1999 with the baseline air-sampling program. This program was conducted from June 1999 through May 2000 to establish the ambient concentrations prior to dredging and filling operations. The baseline data provided an understanding of site background and seasonal variations in ambient air concentrations of PCBs. The data for this sampling program are presented in the document *Final Annual Report Baseline Ambient Air Sampling and Analysis* (Foster Wheeler, 2001c). The procedures for this sampling effort are presented in the SAP (Foster Wheeler, 2000, Section 4.2).

Air sampling was performed during remediation of the Hot Spot Sediments. This remedial activity involved removal of highly contaminated sediments from the Sawyer Street CDF and off-site disposal in a TSCA permitted landfill after on-site dewatering and stabilization. The air sampling locations for this program were established stations previously used in association with the dredging and storage of the Hot Spot sediments. Results were compiled and reported by Foster Wheeler.

An air sampling program was also conducted during the remedial action at the Acushnet Dock Early Action Area and in association with the Commonwealth Electric cable crossing relocation project. The early action-sampling program started in February 2001 and continued to April 2001. Three air-sampling stations were used for this effort. The Commonwealth Electric cable relocation project was of longer duration and occurred from April 2001 through January 2002. Four stations were located for this effort. The sampling and analysis plan for both of these programs are presented in the Foster Wheeler SAP, Appendix L. Results were reported as a part of construction reporting requirements.

The means and methods that will be used for future air sampling programs are presented in the addendum to the *Draft Plan for the Sampling of Ambient Air PCB Concentrations to Support Decisions to Ensure the Protection of the Public During Remediation Activities, New Bedford Harbor Superfund Site, New Bedford, MA.*, revised January

2004, Rev 2 as modified by USACE, New England District, Concord MA. Use and implementation of the Public Exposure Tracking System (PETS) on the NBH project air monitoring program will be addressed in the addendum. Data are reported in the After Action Reports.

11.1 FUTURE SAMPLE COLLECTION PROCEDURE FOR POLYCHLORINATED BIPHENYLS (PCB)S

Sampling procedures to be used for ambient air PCB sampling activities at the New Bedford Harbor Superfund Site are briefly described below. The air sampling program specifics, such as sample collection procedures, monitoring locations, sampling frequencies, and turnaround times are fully detailed in the addendum to the *Draft Plan for the Sampling of Ambient Air PCB Concentrations to Support Decisions to Ensure the Protection of the Public During Remediation Activities, New Bedford Harbor Superfund Site, New Bedford, MA.*

11.1.1 Sample Collection Procedures

Ambient air samples for PCB analyses will be collected using sample methods as specified in EPA Method TO-10A (using low volume polyurethane foam). The EPA Method TO-10A field procedure is included in Appendix B. A pilot study was conducted on site in June 2004 using this sample collection method. Documentation of the Pilot Study, including details of the TO-10A sampling method and conclusions derived on the adequacy of this sampling method to meet the detection limits and site objectives, is included in Appendix D.

The placement of the polyurethane foam (PUF) samplers is flexible in that each sampler is battery operated capable of operating greater than 24 hours without loss of air flow or pump fault due to media loading. The samplers will be mounted on tripods to meet the required inlet height of approximately 6 feet approximating an adult breathing zone height. The sampler spacing will be at least two meters of separation between the low volume samplers (at co-located site). Fencing may be installed around each sampler for security purposes.

After the physical installation of the samplers, an initial calibration will be conducted using a calibration orifice that has been certified using National Institute of Standards and Technology (NIST). The details of the calibration procedure are included in the analytical method.

Samples will be collected over a 24-hour period. It is anticipated that the start time will be between 7 A.M. and 2 P.M. The sample media will be installed the day the sampling starts and a check of the samplers to insure they are operating as calibrated. The sampler will be programmed to run for 24 hours. The sample media will be retrieved within one hour after the 24 hour run. Sampling will not occur if rain is apparent in the scheduled run time.

11.1.2 Quality Control Procedures

Quality control in the field will begin with the selection of equipment for the sampling and continue through the preparation and implementation of the operating procedure, collection of samples, submittal of field blanks, spikes and duplicate (co-located samples) samples to the laboratory and conducting performance audits. QA/QC samples will be collected at the frequencies specified and will be documented in the field logbook.

Co-located stations will be used to collect field replicates, spikes and QA samples. Depending on the total number of samples, QA samples will be collected at a frequency of 10% but no less than one per sample event. Fractions will be rounded up to the next whole number in determining the number of QA samples. Samples from the stations will be shipped to the government designated QA laboratory for analysis. During alternate events, the sample from the stations will be used as field QC (field duplicates and spikes).

A field blank (FB) sample will be submitted to each laboratory during each sampling event. If an air sample is shipped to the NAE designated QA lab, a field blank will also accompany it. The field blank samples will be handled in the identical manner as an actual sample except that the field blank samples will not have air drawn through the sample. Field blanks will be labeled according to the date collection was started (for 24 hour samples), preceded by "FB". For example, FB101899-XX would indicate a field blank collected on October 18, 1999 at station location number XX.

Field replicate samples are samples of the same matrix, which are collected to the extent possible, at the same time, same location, and use the same techniques for collection and analysis at the same laboratory. Field replicate samples will be collected using co-located samplers and will be analyzed by the laboratory using the same methodology as the other samples.

11.1.2.1 <u>Air Sample Documentation</u>

Recording forms for the documentation of sample collection are included in the Air Monitoring Plan. Sample documentation procedures such as Chain of Custody Records, field and site log books, and photographs are discussed in Sections 6.0 and 7.0 of this FSP. Each sample will be legibly and fully labeled by: station location, person taking the sample, analysis requested, date and time sampling began, date and time sampling completed, flow rate and total volume collected.

11.1.2.2 <u>Collection Efficiency</u>

EPA TO-10A specifies the determination of collection efficiency. The subcontracted laboratory will supply collection efficiency samples (consisting of a known quantity of PCBs on a wool felt filter and a “clean” PUF cartridge). The wool felt filter and PUF cartridge will be used at the co-located station to determine the collection efficiency of the samplers at the site. The collection efficiency sample will have air drawn through it for a 24-hour period. Collection efficiency samples will be collected once per performance audit period (quarterly). Spike recovery criteria is 75 to 125 percent.

Performance audits consist of determining the sample flow of the TO-10 sampling system using equipment and personnel that are not involved in the route operation of the system. Audits will be conducted as needed depending on the overall length of the sampling program.

11.1.2.3 Temperature Blanks

Sample container temperatures will be measured by the laboratory upon receipt, using either an infrared gun or a digital thermometer. Temperatures will be recorded.

11.2 METEOROLOGY-RELATED FIELD ACTIVITIES

This section presents the field activities associated with the collection of meteorological data and maintenance of the on-site meteorological station. The meteorological monitoring system has been in service for several years and was installed prior to the current site remediation activities. It consists of a 10-meter (32.8-foot) tower located at the NBH site. The tower height was selected in accordance with EPA siting criteria. The meteorological parameters monitored and/or calculated include:

- Wind direction
- Wind speed
- Standard deviation of horizontal wind direction (sigma theta)
- Ambient temperature
- Vertical temperature difference
- Solar radiation
- Precipitation
- Relative humidity
- Barometric pressure

The meteorological monitoring component of the program was designed to provide Prevention of Significant Deterioration (PSD)-quality data. The siting considerations, equipment specifications and QA/QC procedures to be used are consistent with PSD requirements contained in the Ambient Monitoring Guidelines for PSD (EPA 450/4-87-007).

Sensors are connected to signal conditioners and/or to a data logging system. The data logger will record the sensor output and communication via telephone. Meteorological parameters to be measured are summarized in Table 11-1.

Table 11-1
Meteorological Parameters for the Ambient Air Monitoring Program

Parameter	Meteorological Tower Level
Wind Speed	10 meters
Wind Direction	10 meters
Sigma Theta	10 meters
Ambient Temperature	2 and 10 meters
Temperature Difference	2 and 10 meters
Solar Radiation	2 meters
Precipitation	Ground level
Relative Humidity	2 meters
Barometric Pressure	1 meter

The meteorological parameters were selected to provide the site-specific meteorological data to determine upwind/downwind ambient air monitoring locations and to execute EPA air quality dispersion/deposition models. A description of the meteorological parameters and their importance in the air quality modeling and ambient air monitoring is provided below.

Wind Direction: The wind direction indicates the direction in which contaminants will be transported. The ambient air quality models use hourly averages of wind direction to determine which receptors are influenced by contaminant emissions during each hour modeled. The observed wind directions during ambient air sampling will be used to designate samples as upwind, downwind, or crosswind relative to on-site contaminant emissions sources.

Wind Speed: The wind speed is a major determinant of the travel distance and travel time of the contaminant. In the air quality models, concentration is inversely proportional to the wind speed. Wind speed affects the volatilization of PCBs from the CDF zone and thus influences the ambient air concentrations.

Standard Deviation of Wind Direction (Sigma Theta): The standard deviation of horizontal wind direction can be related to the dispersive capabilities of the atmosphere. Atmospheric stability classifications used by the air quality models are derived primarily as a function of sigma theta. The magnitude of sigma theta is valuable in describing the consistency of the wind direction, which can be useful when interpreting ambient air sampling results.

Ambient Temperature: The ambient temperature is used in determining the rise of a buoyant plume. The plume rise calculated by an air quality model determines the final height above ground of the centerline of the pollutant plume from a point source (TIS stack). Ambient temperature can be helpful in quantifying the degree of contaminant volatilization.

Vertical Temperature Gradient: This measurement may be used to categorize atmospheric stability during the nighttime period. The temperature difference between two levels near the surface provides an alternative to sigma theta classifications at night.

Solar Radiation: Solar radiation is used to determine the stability of the atmosphere during daytime. During daytime hours, incoming solar radiation provides an alternative to sigma theta for stability classification. Solar radiation can be linked to stability since it is the source of heat energy to the surface, which in turn affects the turbulent structure of the atmosphere near the ground.

Precipitation: Precipitation data is used to determine wet deposition rates of airborne contaminants, and to determine the validity of ambient air samples. Some air quality models account for washout of particles from the atmosphere by precipitation, with washout proportional to precipitation intensity. Because rainfall provides natural dust suppression, ambient air samples of particulate-borne contaminants (such as the filter-catch portion of the PCB samples) would be biased towards lower concentrations during periods with significant precipitation.

11.2.1 Description of the Meteorological Monitoring Equipment

The meteorological monitoring system to be used is a 10-meter tower equipped with a Climatronics Electronic Weather Station (EWS) and lightning and surge protection. This system meets all EPA equipment specification requirements. The sensors on the meteorological tower meet recommended accuracy and resolution limits, as discussed in the following subsections.

This system includes wind sensors at the 10 meter level, a temperature sensor at the 10 meter level, temperature and solar radiation sensors at the 2-meter level, a precipitation gauge at ground level, signal cables, conditioning cards, and a chart recorder. The system will continually monitor and record specific meteorological parameters. A 110 Volt alternating current (Vac) transformer with 12 Volt direct current (Vdc) output will be used as the power source for the EWS station. The solid state chart recorder and the signal conditioners are contained inside a weather-tight EWS case.

Horizontal wind speed is monitored with a three-cup anemometer assembly mounted on a crossarm. A light emitting diode (LED) light source along with a 20-hole photo chopper wheel will provide a frequency output that is proportional to wind speed. The anemometer cups are aluminum and will be calibrated in a NIST wind tunnel test prior to installation. External heaters are used to prevent moisture condensation inside the sensor and to eliminate problems associated with freezing rain. The wind speed sensor measures wind speeds from 0.5 miles per hour (mph) (starting threshold) to 125 mph at an accuracy of 0.15 mph or " 1.0 percent, whichever is greater. Together with the transducer card and data logger, horizontal wind speed measurements will meet the accuracy, resolution, and specification recommendations contained in the EPA's On-site Meteorological Program Guidance for Regulatory Modeling Applications (EPA, 1987b) as shown in Table 11-2.

Ambient temperature measurements at the 2- and 10-meter level are made with expanded range, two-thermistor composite sensors encased in stainless steel. The sensors are housed within motor-aspirated shields that provide a continuous airflow at 10 feet/seconds. The motor-aspirated shields reduce errors due to solar radiation to less than 0.2EF. The manufacturer specification for the temperature sensor accuracy is ± 0.18EF over the range of -58E to 122EF. The time constant is 3.6 seconds. The sensor specifications meet the requirements contained in Table 11-2 for ambient temperature measurements.

The temperature difference is calculated based on ambient temperatures at 10- and 2-meters. The distance between the temperature measurements is approximately 8 meters. The sensor signals are continuously differentiated by the data logging system. These instantaneous differences will be averaged over 5 and 60-minute periods to report the vertical temperature difference. Temperature sensors with matching response characteristics are used.

Table 11-2
Comparison of EPA Recommended Response Characteristics, System Accuracies, and Measurement Resolutions to Meteorological Sensors

Sensor (Meteorological Variable)	Sensor Parameter	Recommended EPA Response Characteristics*	Sensor Specifications
Climatronics Wind Mark III Wind Vane (Wind Direction)	Starting Threshold	≤ 1.1 mph at 10° deflection	0.5 mph
	Delay Distance	≤ 16.4 feet	2.95 feet
	Accuracy	“ 5 degrees	“ 2 degrees
	Measurement Resolution	1 degree	1 degree
Climatronics Wind Mark III Anemometer (Horizontal Wind Speed)	Starting Threshold	≤ 1.1 mph	0.5 mph
	Distant Constant	≤ 16.4 feet	8 feet
	Accuracy	“ 0.5 mph + 5% of observed	0.15 mph or 1.5% of observed
	Measurement Resolution	0.2 mph	0.1 mph
Climatronics Temperature Sensor (Ambient Temperature)	Time Constant	≤ 1 minute	3.6 seconds
	Accuracy	“ 0.9° F	“ 0.18° F
	Measurement Resolution	0.18° F	0.1° F
Matrix Mark 1G (Solar Radiation)	Time Constant	< 5 seconds	< 1 second
	Accuracy	“ 5% of observed	“ 5%
	Measurement Resolution	10 W/m^2	1 W/m^2
Climatronics 6-diameter	Accuracy	“ 10% of observed	“ 1% of observed
Tipping Bucket Rain Gauge (Precipitation)	Measurement Resolution	0.01	0.01

Note: * On-site Meteorological Program Guidelines for Regulatory Modeling Applications, EPA-450/4-87-013,
June 1987b.

Solar radiation is measured with a dome-mounted photovoltaic cell. The sensor will respond to wavelengths between 0.35 and 1.15 microns with peak sensitivity at approximately 0.85 microns. The voltage output by the photocell is directly proportional to the incoming solar radiation. The sensor is mounted on the tower away from any structures that could cast a shadow across the sensor. The sensor output is recorded by a direct connection to the data logger.

11.2.2 Meteorological Data Logging System

The data acquisition system for the Climatronics EWS is the Campbell CR10 data logger. The data logger has inputs for 16 single-ended channels. Each data channel is sampled once every 0.8 seconds with an accuracy of 0.1% of full scale. Both five-minute and hourly averages are calculated. The hourly averages are composed of 4,430 scans during the hour. Similarly, the 5-minute averages are based on 369 samples. The 369 samples per 5-minute period meet the data sampling requirements for the sigma-theta calculations.

The standard deviation of the horizontal wind direction (sigma theta) is calculated by two separate techniques, the Climatronics Sigma Computer and the Campbell CR10 data logger. Both methods are contained in the On-site Meteorological Program Guidance (EPA, 1987b). The Climatronics sigma computer uses the method of Mardia (Mardia, 1972) to calculate the horizontal standard deviation. The Mardia method uses running five-minute averages of sigma theta that are constantly updated and continuously sent to the data logger. An hourly value is calculated from the running mean EWS Mardia value. The Campbell data logger will calculate the primary estimate of the standard deviation of wind direction based on the total population (1/N estimate) and then determines an EPA Sigma A root-mean-squared value for the hour. The calculation of two standard deviations serves as both a quality control check and as a backup should one method fail.

Wind, direction, and wind speed measurements are scalar quantities measured in degrees and mph, respectively. Temperature is measured in degrees Fahrenheit. All standard deviations are calculated to the nearest tenth of a degree. Solar radiation is measured in watts per square meter (W/m^2) by the data system. The vertical temperature difference is measured in degrees Fahrenheit and converted to degrees Centigrade per meter (EC/m) for use in nighttime stability determinations. Precipitation is measured in 0.01 inches of water.

11.2.3 Validate Meteorological Data

A significant portion of the meteorological monitoring effort will be devoted to assuring the quality of the data. Quality assurance (QA) is applied to location and equipment selection, equipment acquisition and installation, routine site operation, and data processing and reporting. Quality control (QC) procedures applied at each step provide checks for acceptable conditions with corrective procedures specified when necessary. Each of these terms are defined as follows:

- QA is the planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy a given requirement for quality (ANSI, 1987d).
- QC is the operational techniques and activities that are used to fulfill requirements for quality (ANSI, 1987).

This monitoring program is based strongly on guideline documents such as Volume IV of the EPA Quality Assurance Handbook for Air Pollution Measurement System (EPA, 1989) and On-site Meteorological Program Guidance for Regulatory Modeling Applications (EPA, 1987b). Qualified personnel not actively engaged in operations would perform system and performance audits. The following subsections describe the QC, calibration, and auditing procedures to be used during the meteorological monitoring component of the NBH ambient air-monitoring program. The purpose of QC procedures is to assess and document data quality and to define remedial corrective actions when operating conditions exceed pre-established limits. QC procedures are designed to focus on the areas most likely to have problems, based on experience and guideline documents. Table 11-3 shows the frequency of audits, calibrations, and quality control measures.

Table 11-3
Schedule of Audits, Calibrations, and Quality Control Checks

Frequency	Activity
Start of Program	Tower installation and sensor calibration/audit
Daily	Routine checks of transmitted meteorological data
Monthly	EWS electronics checks, data processing, and editing checks
Semi-Annually	Tower instruments calibration, meteorological monitoring tower performance and system audit
Semi-Annual	Meteorological monitoring tower performance and system audit

11.2.4 Quality Control: 10-Meter Tower

The meteorological sensors on the 10-meter tower will meet EPA ambient monitoring sensitivity guidelines. They will be installed and calibrated by qualified technicians. The wind direction sensor at the 10-meter level of the tower will be oriented via surveyor's transit and/or compass siting scope and topographic maps (for declination adjustments) to ensure proper orientation.

QC of meteorological data will also include comparing recorded data to ambient conditions observed by field personnel performing routine site visits. As part of this step, the field personnel assigned to the meteorological monitoring program will complete a checklist. Certain QC tasks will be performed to assure both the accuracy of the digital data conversion by the data system and the consistency of the sensor measurements. As a QC measure, a battery will be connected to the Campbell data logger.

11.2.5 Evaluating Meteorological Data

Data editing procedures will include comparing data files transmitted by wireless connection with data from on-site strip charts and field notes made in logbooks by on-site field technicians. These procedures also will include screening suspect data against a range of extreme meteorological conditions. The data screening criteria are presented below in Table 11-4.

Table 11-4
Meteorological Data Screening Criteria

Meteorological Variable	Screening Criteria
	Flag the data if the value:
Wind Speed	is less than zero or greater than 24 m/s does not vary by more than 0.1 m/s for 3 consecutive hours does not vary by more than 0.5 m/s for 12 consecutive hours
Wind Direction	is less than zero or greater than 360 degrees does not vary by more than 1 degree for more than 3 consecutive hours does not vary by more than 10 degrees for 18 consecutive hours
Ambient Temperature	is greater than the local record high is less than the local record low is greater than a 5° C change from the previous hour does not vary by more than 0.5° C for 12 consecutive hours
Temperature Difference	is greater than 0.1° C/m during the night time is less than -0.1° C/m during the night time is greater than 5.0° C or less than -3.0° C
Solar Radiation	is greater than zero at night is greater than the maximum possible for the date and site latitude
Precipitation	is greater than 25 mm in 1 hour is greater than 100 mm in 24 hours is less than 50 mm in 3 months

QA audits for the meteorological measurement system will be performed every six months in accordance with the EPA PSD requirements and will follow procedures described in Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV Meteorological Measurements (EPA, 1989).

The semiannual audits of the 10-meter meteorological tower will include a system audit and performance audit on the entire meteorological monitoring system including sensors, signal conditioners, and data logger. Wind speed, wind direction, ambient temperature, delta temperature, precipitation, and solar radiation will be audited. The system audit will include checking for proper record keeping in field logbooks and forms, documentation of scheduled audits, maintenance and calibration, operational checks, and by reviewing the suitability of the SOPs being utilized. Performance audits will provide an indication of instrument accuracy. All performance audits will be conducted using an artificial field and/or a collocated NIST traceable sensor to check the sensor operation.

A percent difference between the known and observed values will be calculated based upon the results of the audited sensors. For some parameters such as starting threshold speed for a wind speed sensor, the results of the audit will only reveal if the sensor is operating within EPA specifications.

11.2.6 Reporting Data

Data collected during the monitoring program will be reported in the standard Aerometric Information Retrieval System (AIRS) format on IBM-formatted computer diskettes. Data reports that summarize the hourly wind speed, direction and ambient temperature will be available daily. Monthly, quarterly and final data reports will be prepared and will include the hourly data summarized by month in AIRS data files. The monthly data recovery percentages and explanations for missing data will also be included in the monthly, quarterly, and final reports. The final data report will also include wind roses for each day of ambient air sampling. These reports will be submitted to the Project Coordinator.

In addition, all data collected during the monitoring program, including site logs, calibration records, audit records, etc., will be maintained and available on request for a period of three years.

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12.0 WASTEWATER TREATMENT PLANT SAMPLING

This section addresses sampling and analysis activities scheduled in support of wastewater treatment system operation.

Samples will be collected at the influent and effluent sampling ports in the wastewater treatment system to evaluate the effectiveness of treatment and to determine whether treated water is acceptable for discharge to the Harbor. Discharge criteria and laboratory reporting limits are summarized in Table 12-1. Analytical procedures and laboratory QC requirements are included in the QAPP.

Table 12-1
Wastewater Treatment Plant Reporting and Discharge Limits

Analysis	Surface Water Discharge Treatment Goal (µg/L)	Laboratory Reporting Limit (µg/L)	Analytical Method
PCB Aroclors	0.065	0.05	8082
Metals			200.7
Cd	9.3	5	
Cr	50	20	
Cu	5.6	3	
Pb	8.5	5	

Jacobs will conduct all sampling activities using direct hire personnel or Teaming Partner personnel trained in environmental sampling. Sampling procedures implemented for obtaining and shipping the samples will be either provided to Jacobs by the NAE or will be a modified version of Jacobs' existing procedures. A summary of the wastewater treatment system sampling and analytical turn around time is provided in Tables 12-2, 12-3 and 12-4 below. The sampling activities described will apply at the initial start up of the system and after a significant plant restart or movement of the dredge to a different source material (i.e., between DMUs).

Table 12-2 Wastewater Sampling During First Week (5 days) of Operation				
Analyte	**Influent**	**Midpoint**	**Effluent**	**TAT**
Total PCBs	Start up and every other day	Start up and every other day	Daily	24 hr
Cu	Start up and every other day	Start up and every other day	Daily	24 hr
Cr	Start up and every other day	None	Daily	10 day
Cd	Start up and every other day	None	Daily	10 day
Pb	Start up and every other day	None	Daily	10 day

Samples will be analyzed for PCBs by USEPA Method SW846/8082, and the selected metals by USEPA Method SW846/6010B.

Table 12-3 Wastewater Sampling During First Month (4 weeks) of Operation				
Analyte	**Influent**	**Midpoint**	**Effluent**	**TAT**
Total PCBs	None	Weekly	Weekly	10 day
Cu	None	Weekly	Weekly	10 day
Cr	None	None	Weekly	10 day
Cd	None	None	Weekly	10 day
Pb	None	None	Weekly	10 day

All weekly samples will be analyzed by using the same USEPA analytical methods as the daily samples.

Table 12-4 Wastewater Sampling After First Month of Operation				
Analyte	**Influent**	**Midpoint**	**Effluent**	**TAT**
Total PCBs	Monthly	Monthly	Monthly	10 day
Cu	Monthly	Monthly	Monthly	10 day
Cr	Monthly	None	Monthly	10 day
Cd	Monthly	None	Monthly	10 day
Pb	Monthly	None	Monthly	10 day

In addition to the sampling presented above, the wastewater sampling program will include the following:

- Water quality readings will be collected at the time samples are collected. Water quality parameters monitored will be pH, dissolved oxygen, specific conductivity, turbidity and salinity. These readings will be provided electronically to Battelle for data management records.
- Field duplicate samples will be collected at a ten percent frequency and matrix spike/matrix spike duplicate samples will be collected at a five percent frequency.
- Split samples will be collected for analysis by NAE at a five percent frequency.
- Other NAE oversight contractors may also collect samples. These sampling events would need to be coordinated with Jacobs' plant personnel.
- Subcontracted laboratories will provide all sample containers.
- Sample containers and preservatives are outlined in the table below:

Analysis	Method	Container	Preservative	Hold Time
PCBs	SW846/8082	2 1-L Amber glass, Teflon lined cap	4°C	7 days
Select Metals (Cd, Cr, Cu, Pb)	SW846/6010B	250 mL polyethylene	4°C; HNO3 to pH < 2	180 days

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13.0 INVESTIGATION DERIVED MATERIALS (IDM)

The following solid waste streams will be generated, during this remedial action portion of this project:

- Debris, organic matter (shellfish and mollusks) and vegetation
- Sand fraction from desanding operations
- Filter cake sediment from Dewatering operations
- Used PPE and disposable sampling equipment
- Spent oil booms, tarps and liners

Wastes will be disposed in accordance with the project TTSP and the RCP. An appropriately licensed waste hauler will conduct off-site transportation of regulated material. In summary, wastes will be managed in the following manner:

- Debris removed from the harbor will be placed in a lined holding cell at the designated debris stockpile area at the Sawyer Street facility debris disposal area (DDA). Debris from the large mesh (>2-inch) screen at the Desanding unit will be stored unlined at the DDA. A sampling plan for these wastes is currently being developed and will be provided as an addendum to this plan. Following receipt of the analytical results, the debris will be loaded and transported to the appropriate disposal facility. All sand material will be maintained in the DDA with adequate cover until sampled for disposal characterization. Disposal is anticipated to occur during and after the 2005 dredging field season
- Temporary storage will be provided within the Desanding building at Area C to stockpile the >200 mesh sand fraction removed. Disposal to a TSCA facility will be accomplished using 30-ton dump trucks as the material accumulates. In an effort to reduce disposal costs by sending the sand waste to a non-TSCA disposal facility, a composite sample will be collected for 24-hour TAT analysis of total PCBs, metals and oil & grease at a frequency of 1 sample per 100 tons of sand material produced. If analytical results indicate the sand material consistently meets the non-TSCA disposal criteria (<50 ppm total PCBs), the primary disposal facility for the sand will become non-TSCA. Changes in analytical data that indicate that the PCB content of the sand is greater than 50 ppm, will require disposal at a TSCA regulated disposal facility.
- Filter cake sediment removed from the Dewatering operations will be temporarily stockpiled (for logistical purposes) within the dewatering building

at Area D and then transferred to rail cars or dump trucks for disposal at a TSCA facility. Filter cake material will be sampled once per dredge area, and analyzed for TCLP and total PCBs. In order to develop a running analytical profile of the filter cake waste and to monitor performance of the dewatering process, filter cake samples will be collected for analysis of total PCBs, metals, and oil & grease at a frequency of approximately 1 sample per 550 tons of filter cake produced.

- Aqueous wastes will be containerized and returned to the Sawyer Street site for disposal in the CDF and subsequent treatment through the desander, dewatering unit and wastewater treatment system.
- Used PPE and disposable sampling equipment will be mixed with the TSCA regulated filer cake material for disposal in the same load. Separate sampling of the used PPE and disposable sampling equipment is not planned.
- Spent oil booms, tarps and liners will also be mixed with the TSCA regulated filter cake material for disposal. Separate sampling of the spent oil booms, tarps and liners is not planned.

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APPENDIX A

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APPENDIX B

Field Tech Procedures

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APPENDIX C

Example Chain of Custody Form

Jacobs Engineering Group
6 Otis Park Drive, Suite 200, Bourne, MA 02532-3870 Attn: Lonnie Fallin
Phone: (865) 220-4866 Fax: (220) 220-4848

COC # NH-A1000

CHAIN-OF-CUSTODY RECORD

Project Name:	New Bedford Harbor	**Laboratory:**	Sample Lab	
Project Number:	35BG0101	**Point of contact:**	PM	
WBS Code:	320606503	**Ship to:**	Weymouth, MA	

Comments:

#	Control Number	Matrix	Date	Time	Samp Init.	SW8260B VOLATILES	SW8081A PESTICIDES	SW8082 PCBS	SW8270C SEMIVOLATILES	SW8310 PAH	SW6010B ICP METALS	SW7470A MERCURY	SW9012A CYANIDE	SW160.1 TDS	SW160.2 TSS	E310.1 ALKALINITY	SW9056 ANIONS	E340.2 FLUORIDE	E375.4 SULFATE as (SO4)	E353.2 Nitrogen, Nitrate (as N)	E365.2 Phosphorus (as P)	SW9060 TOC		Sample Number	Location Name	Samp Type	Depth (ft bgs)* Top	Depth (ft bgs)* Bottom
						1	2				3		4	5								6						
1	NH-A100001	WW	8/14/03	8:30				X																WG-WL-1045-LF4-02	WWTP-EFF	N1	NA	NA
2	NH-A100002	WW	8/14/03	8:30							X													WG-WL-1045-LF4-02	WWTP-EFF	N1	NA	NA
3	NH-A100003	WW	8/14/03	8:30											X									WG-WL-1045-LF4-02	WWTP-EFF	N1	NA	NA
4																												
5																												
6																												
7																												
8																												
9																												
10																												

Cooler #	Turnaround Time:	Equipment:

Relinquished by: *(Signature)*	Date	Time

Received by: *(Signature)*	Date	Time

Code	Container/Preservative
1	3 - 40 mL VOA 4C HCL
2	6 - 1 L Amber Glass 4 deg C
3	1 - 1 L Plastic 4C HNO3
4	1 - 1 L Plastic 4C NAOH
5	1 - 1 L Plastic 4 deg C
6	1 - 1 L Plastic H2SO4
7	
8	
9	
10	
11	
12	
13	

Shipping Date / Carrier / Airbill Number

Received by Laboratory: *(Signature, Date, Time)* ***& condition***

* Bottom depth should not equal top depth

Jacobs Engineering Group
125 Broadway Oak Ridge, TN 37830 Attention Mike Houck
Phone: (865) 220-4866   Fax: (220) 220-4848

COC # CH-L2577

CHAIN-OF-CUSTODY RECORD

Project Name:	Example Project	**Laboratory:**	Ecology and Environment	
Project Number:	42K12345	**Point of contact:**	Alan Laffin, Analytical Services Center	
WBS Code:	320606503	**Ship to:**	4493 Walden Ave, Lancaster NY 14086	

Comments:

	Control Number	Matrix	Date	Time	Samp. Init.	SW8260B VOLATILES	SW8081A PESTICIDES	SW8082 PCBS	SW8270C SEMIVOLATILES	SW8310 PAH	SW6010B ICP METALS	SW7470A MERCURY	SW9012A CYANIDE	SW160.1 TDS	SW160.2 TSS	E310.1 ALKALINITY	SW9056 ANIONS	E340.2 FLUORIDE	E375.4 SULFATE as (SO4)	E353.2 Nitrogen, Nitrate (as N)	E365.2 Phosphorus (as P)	SW9060 TOC		Sample Number	Location Name	Samp Type	Depth (ft bgs)* Top	Bottom
						1	2				3		4	5								6						
1	CH-L257701	WG	8/12/02	8:48							X	X												WG-WL-1036-LF4-02A	WL-1036	N1	26.50	28.25
2	CH-L257702	WG	8/12/02	8:48									X											WG-WL-1036-LF4-02A	WL-1036	N1	26.50	28.25
3	CH-L257703	WG	8/12/02	8:48																		X		WG-WL-1036-LF4-02A	WL-1036	N1	26.50	28.25
4																												
5																												
6																												
7																												
8																												
9																												
10																												
Cooler #		Turnaround Time:																										

Relinquished by: *(Signature)*	Date	Time

Received by: *(Signature)*	Date	Time

Code	Container/Preservative
1	3 - 40 mL VOA 4C HCL
2	6 - 1 L Amber Glass 4 deg C
3	1 - 1 L Plastic 4C HNO3
4	1 - 1 L Plastic 4C NAOH
5	1 - 1 L Plastic 4 deg C
6	1 - 1 L Plastic H2SO4
7	
8	
9	
10	
11	
12	
13	

Shipping Date / Carrier / Airbill Number

Received by Laboratory: *(Signature, Date, Time)* ***& condition***

* Bottom depth should not equal top depth

Jacobs Engineering Group
125 Broadway Oak Ridge, TN 37830 Attention Mike Houck
Phone: (865) 220-4866   Fax: (220) 220-4848

COC # CH-L2582

CHAIN-OF-CUSTODY RECORD

Project Name:	Example Project	**Laboratory:**	Ecology and Environment	
Project Number:	42K12345	**Point of contact:**	Alan Laffin, Analytical Services Center	
WBS Code:	320606503	**Ship to:**	4493 Walden Ave, Lancaster NY 14086	

Comments:

	Control Number	Matrix	Date	Time	Samp Init.	SW8260B VOLATILES	SW8081A PESTICIDES	SW8082 PCBS	SW8270C SEMIVOLATILES	SW8310 PAH	SW6010B ICP METALS	SW7470A MERCURY	SW9012A CYANIDE	SW160.1 TDS	SW160.2 TSS	E310.1 ALKALINITY	SW9056 ANIONS	E340.2 FLUORIDE	E375.4 SULFATE as (SO4)	E353.2 Nitrogen, Nitrate (as N)	E365.2 Phosphorus (as P)	SW9060 TOC		Sample Number	Location Name	Samp Type	Depth (ft bgs)* Top	Bottom
						1	2				3		4	5								6						
1	CH-L258201	WG	08/15/02	9:25							X	X												WG-WL-1004-LF1-02A	WL-1004	N1	16.25	17.25
2	CH-L258202	WG	08/15/02	9:25									X											WG-WL-1004-LF1-02A	WL-1004	N1	16.25	17.25
3	CH-L258203	WG	08/15/02	9:25										X	X	X		X	X	X	X			WG-WL-1004-LF1-02A	WL-1004	N1	16.25	17.25
4																												
5																												
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9																												
10																												

Cooler # | Turnaround Time: | Equipment:

Relinquished by: *(Signature)*	Date	Time

Received by: *(Signature)*	Date	Time

Code	Container/Preservative
1	3 - 40 mL VOA 4C HCL
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5	1 - 1 L Plastic 4 deg C
6	1 - 1 L Plastic H2SO4
7	
8	
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11	
12	
13	

Shipping Date / Carrier / Airbill Number

Received by Laboratory: *(Signature, Date, Time)* ***& condition***

* Bottom depth should not equal top depth

APPENDIX D

Air Monitoring Pilot Study
Using EPA Method TO 10-A

Air Monitoring Pilot Study
Using EPA Method TO 10-A
New Bedford Harbor Superfund Site

TO: Carl Wilson, Jacobs Engineering
FROM: Bob Cashins , Cashins & Associates, Inc.
SUBJECT: Justification for using EPA Method TO-10A for ambient air monitoring at NBH
DATE: August 5, 2004
REVISON: 2

Overview

The ambient air monitoring program for the New Bedford Harbor Project is intended to document the level of airborne PCBs that may impact the general population living close to the work areas. The monitoring data will also be used to validate the computer model used to predict the level of PCB contamination that may impact the community.

Laboratory

The laboratory (Severn Trent Laboratories, Knoxville, TN) selected for this work has considerable experience with the analysis of air samples for PCBs.

STL Knoxville developed an isotope dilution high resolution gas chromatography/high resolution mass spectrometry method for selected PCB congeners and homolog totals in 1989. This work used high-volume PUF/XAD/PUF cartridges to collect PCBs (and PCDD/Fs) in ambient air. This work was reported at the annual meeting of the Air and Waste Management Association. The laboratory first performed the full congener version of the method in 1993, in a joint project with the Tennessee Valley Authority and the University of Tennessee.

During the mid 1990's the laboratory performed studies for the New York Department of Environmental Conservation, and several private clients.

STL Knoxville has performed special applications of its proprietary method, as well as 1669 and 1668A to ambient air studies, and stack gas testing. One notable example is a successful trial burn program at the Department of Energy's K-25 TSCA Waste Incinerator, in Oak Ridge, TN. (This work was independently validated.)

Beginning in 1998, the laboratory provided analyses by Modified Method 1668 in support of the NY/NJ Harbor CARP program. In 2001, the lab began providing Method 1668 Revision A for the same program. Approximately 600 PCB congener analyses were provided under contract with the United States Geological Survey. The laboratory also provided 1668A analyses to support the NIST Intercomparison Exercise Program for Organic Contaminants in the Marine Environment in 2001 and 2002. Results from these studies are available on request.

STL Knoxville helped develop the Quality Assurance Program Plan for the Delaware River Basin Commissions PCB Monitoring Program for the DRBC Coalition of Municipal and Industrial Dischargers. The laboratory has provided approximately 500 analyses by 1668A and Modified 1668 for this program. (All of the analyses for this program have been independently validated.) The STL staff continues support of this program, including participation on the data quality subcommittee of the technical advisory group for the DRBC.

STL Knoxville has US Army Corp approval to perform the full congener analysis via 1668A. The laboratory has provided contract analyses for the EPA START program and EPA REPA contractors. STL also participated as the EPA's sample management lab in the Method 1668A validation study, due to be reported this summer.

In summary, since 1998, the laboratory has performed more than 1500 analyses by 1668A and Modified 1668. Much of the work has undergone independent validation. No validation issues have resulted in reissued results, to date. The laboratory also holds National Environmental Laboratory Accreditation Conference (NELAC) accreditation for Method 1668A for all 209 congeners in 3 fields of testing.

Sampling Method TO-10A

We propose to assess the ambient air PCB concentrations using battery powered air samplers in conjunction with PUF-XAD2-PUF tubes with a 32-mm quartz micro fiber pre-filter. The air sampling pump to be used is Model PQ-100 manufactured by BGI, Inc.

The PQ-100 is a portable sampling unit. With microprocessor control plus mass flow control, programmability and download/storage capacity, this advanced system of pump and accessories are designed for any sampling application that requires portability plus regulatory compliance. Because of the mass flow sensor, no flow corrections are needed. Calibration is easily confirmed or altered in the field using a flow meter. The unit display gives elapsed time, total sample volume, battery state and instantaneous flow rate. The built-in real time clock and associated microprocessor allows future run times to be entered.

The unit will operate from its internal battery for more than 24 hours, but an auxiliary, easily interchangeable battery greatly extends run time. The built in software permits programming of start and run time as required. Air flow is rigidly controlled to ±2% precision with state-of-the-art mass flow sensor. All relevant operations information such as date, time, flow rate and total flow are displayed.

We propose to use the PQ-100's with an external battery to extend the battery life and insure an uninterrupted air flow during the entire 24-hour period.

Filter Media

The filter media will be provided by the laboratory pre-assembled. The lab assembly will minimize the handling of filter components in the field thus reducing the chance of inadvertent contamination. The laboratory will also spike the media with an isotope that will aid in determining if breakthrough has occurred during sampling.

Justification

In justifying the use of EPA Method TO-10A the most important consideration is whether or not the data collected is sensitive enough to meet the established project criteria. A test run was completed on June 29, 2004 to demonstrate the collection method and analytical sensitivity.

Table No. 1 is a summary of the homolog group data that was collected during the 24 hour test. Sample No. 1 was collected behind the Aerovox Building. Sample No. 2 was collected behind the Area D Building.

Table No. 1
Test Survey Results Summary

	Typical Detection Limit (ng/sample)*	Aerovox Site		Area D Site	
		ng/sample	ng/m^3	ng/sample	ng/m^3
Monochlorodiphenyl	0.0534	44.4	6.17	0.183	0.025
Dichlorodiphenyl	1.2	493	68.6	5.74	0.80
Trichlorodiphenyl	1.09	1060	147.4	26.9	3.74
Tetrachlorodiphenyl	1.72	483	67.2	16.1	2.24
Pentachlorodiphenyl	1.79	174	24.2	5.51	0.76
Hexachlorodiphenyl	1.61	30.3	4.2	1.09	0.15
Heptachlorodiphenyl	0.656	1.82	0.25	0.122	0.017
Octachlorodiphenyl	0.228	<0.228	<0.032	<0.117	<0.016
Nonachlorodiphenyl	0.757	<0.0757	<0.011	<0.0288	<0.004
Decachlorodiphenyl	0.0106	<0.0106	<0.0015	<0.00691	<0.00096
Total PCBs (sum of homologs)***	8.38**	---	318.06	---	7.75

* These are the detection limits for Sample No. 1. Each sample has a different set of detection limits because the laboratory calculates individual detection limits based upon the signal to noise ratio for each sample. The calculated detection limit for each sample will vary slightly.

** As an example for Sample No. 1 the lowest total PCB detectable would be 8.38 ng/sample ÷ 7.19 m^3 = 1.16 ng/m^3

*** Total PCB concentrations assume the Octa, Nona, and Deca homologs are present at the listed detection limit.

The data clearly shows that the sampling and analytical method proposed can detect PCBs at very low concentrations.

Risk assessment information developed by Foster Wheeler for this project has identified 15 congeners of interest. Table No. 2 lists the congeners of interest and the concentrations detected during the 24 hour sampling.

Table No. 2
Summary of Concentrations of Congeners of Interest

WHO Congener Number	Sample No. 1 Aerovox (ng/m^3)	Sample No. 2 Area D (ng/m^3)
118	1.33	0.048
105	0.28	0.0092
114	0.031	<0.0011
77	0.145	0.0038
170	0.013	0.0018
180	0.044	0.005
156	0.032	<0.00162
123	0.031	<0.0012
169	<0.0043	<0.0013
167	0.015	<0.0013
81	0.0088	<0.0016
157	0.032	<0.00162
126	<0.0054	<0.0012
189	<0.0029	<0.0012
209	<0.0015	<0.00096

Table No. 3 below summarizes the total PCB results in comparison to the project Allowable Ambient Limits and annual average background concentrations that had been reported previously. The table also lists the Massachusetts Ambient Air Guidelines for PCBs which are published by the MA DEP Office of Research and Standards.

Table No. 3
Comparison of Test Data to Site Criteria, Annual Average Background Concentrations, and State Guidelines

Result	Concentration ng/m^3
6/29/04 24 Hour Average Concentration	
Aerovox Site	318
Area D	7.75
Minimum Detection Limit*	1.16
Allowable Ambient Limit	
Child Resident	409
Commercial Worker	894
*Annual Average Background Levels***	
Aerovox	75.0
CDF D Area	16.7
Brooklawn Park	2.3
Acushnet Substation	23.0
Cliftex	26.1
Sawyer Street	56.0
Early Action Area (not an annual avg.)	21.4
Massachusetts Ambient Air Guidelines:	
Allowable Threshold Concentration (ATC) (24 hour average)	*20*
Threshold Effects Exposure Limit (TEL) (24 hour average)	*3*
Allowable Ambient Air Limit (AAL) (annual average)	*0.5*

* Calculated based upon Sample No. 1 (Aerovox) detection limits.

** Taken from draft plan for the sampling of Ambient Air PCB Concentrations to support decisions to ensure the protection of the public during remediation activities New Bedford Harbor Superfund Site.

The above data demonstrates that the test data collected is consistent with what would be expected around the site. The data also indicates that the method can detect PCB levels below what has been reported to be background levels for areas around the site. The method also can detect PCBs at levels below the 24 hour ATC and TEL values. The AAL value is an annual average and is not appropriate for 24 hour sample comparison.

Benefits of Proposed Method

The benefits of this method include the following:

- Precise control (±2%) of air flow using mass flow controller.
- Automatic adjustment of air flow for temperature and barometric pressure changes that provide air volume sampled adjusted to standard conditions.
- Portable equipment is easy to move and relocate.
- Flexibility to be able to locate a sample at a location that does not have electricity.
- Reduced cost of sampling media.
- Overall accuracy of the data collected will be better than what would have occurred using high volume samplers.
- Equipment will be less visible in the neighborhood in comparison to the high volume samplers.
- No need for platforms at the sampling stations.
- Equipment is extremely quiet.

The PQ-100 pump uses the latest technology to insure that the sample volume is as accurate as possible. That, along with the portability and flexibility of the equipment, makes its use on this project superior to the less accurate and cumbersome high volume samplers.

Low Resolution vs. High Resolution GC-MS

The possibility of using low resolution GC-MS instead of the proposed high resolution GC-MS is being investigated. The preliminary assessment is that the project would be better served with the high resolution analysis. The reasons include poor detection limits, occurrence of false positives, and quality control issues associated with the low resolution GC-MS method. More information is being developed and will be provided when it is available.