Addendum
Feasibility Study for Sediments in Tidal Flats and Outfall 008

FINAL
FIELD SAMPLING PLAN

for

Stratford Army Engine Plant
Stratford, Connecticut

Contract No.: W912WJ-15-D-0003
Task Order No.: 003

February 12, 2020

Prepared for:

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This is to certify that Wood has performed a peer technical review of this deliverable under USACE NAE Contract No. W912WJ-15-D-0003 consistent with Wood Quality Management Program Procedure-PJM-PRO-002, Technical Review.

United States Army Corps of Engineers, New England District
Stratford Army Engine Plant, Stratford, CT
Final Field Sampling Plan

QUALITY ASSURANCE STATEMENT

Delivery Order Title: Stratford Army Engine Plant Feasibility Study Addendum

Task Order No.: 0003

Wood Environment & Infrastructure, Inc. (Wood) (Formerly Amec Foster Wheeler) has prepared this Field Sampling Plan for the Feasibility Study Addendum Work Plan for the Stratford Army Engine Plant, Stratford, CT project. The Program Manager and Project Manager have completed a technical and quality assurance review of this document for technical accuracy and completeness, in accordance with the objectives of the revised Performance Work Statement, dated November 26, 2019 and Woods's Final Proposal, dated November 26, 2019.

Rod Pendleton, P.G.
Project Manager

February 12, 2020
Date

Jeffrey S. Pickett, C.G.
Program Manager

February 12, 2020
Date

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure
AOI	Area of Investigation
ASTM	American Society for Testing and Materials
bgs	below ground surface
BL	Blank
CENAE	United States Army Corps of Engineers New England District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain-of-Custody
CT DEEP	Connecticut Department of Energy and Environmental Protection
DGPS	Differential GPS
DI	de-ionized
DUP	Duplicate
EB	Equipment Blank
ERM-Q	Effects Range Medium Quotient
FDR	Field Data Record
FOL	Field Operations Leader
FS	Feasibility Study
FSP	Field Sampling Plan
GPS	global positioning system
ID	Identification
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAD	North American Datum
NAVD	North American Vertical Datum
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated Biphenyls

ppm	parts per million
Project	Stratford Army Engine Plant Feasibility Study
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SAEP	Stratford Army Engine Plant
SB	Source Blank
SD	Sediment
SOP	Standard Operating Procedure
SPT	standard penetration test
SSHP	Site-Specific Safety and Health Plan
TBD	to be determined
TSCA	Toxic Substances Control Act
USACE	United States Army Corps of Engineers
U.S. Army	United States Department of the Army
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
Wood	Wood Environment & Infrastructure Solutions, Inc.
XRF	x-ray fluorescence

1.0 INTRODUCTION

This Field Sampling Plan (FSP) has been prepared by Wood Environment & Infrastructure Solutions, Inc. (Wood) for the Stratford Army Engine Plant (SAEP) Feasibility Study (FS) (Project), in Stratford, Connecticut (**Figure 1-1**) on behalf of United States Army Corps of Engineers (USACE), New England District (CENAE). The purpose of the FSP is to collect data that can be used in combination with data from previous investigations to provide pre-design data for the proposed remediation of contaminated sediments in the Tidal Flats area adjacent to the SAEP facility, and geotechnical data for evaluation of soil stability in the Outfall 008 (OF-008) Drainage Ditch area proposed for remediation of contaminated sediments.

The FSP provides guidance for field work to be conducted including the sampling and data-gathering methods Wood and its subcontractors will use to collect Project data during the pre-design investigations. The work proposed within this FSP, as well as preparation of the revised Sediment Remediation Endpoints Report Addendum, will be conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980.

1.1 Background

The former SAEP is located at 550 Main Street, Stratford, Connecticut. The Site Areas of Investigation (AOIs) for this project are the Tidal Flats area between the SAEP and the Housatonic River channel, and the Outfall 008 drainage ditch. The locations of these AOIs, along with the background reference area, are presented in **Figure 1-2**. This FSP contains proposed investigative activities for collection of sediment analytical data in the Tidal Flats, and subsurface soils geotechnical data near the Outfall 008 Drainage Ditch.

The property was initially developed in 1927 for Sikorsky Aircraft. Aircraft and engines have been manufactured at the facility since 1929. Wastes generated included waste oils, fuels, solvents, and paints. An on-site chemical waste treatment plant operated to treat waste generated at the facility, and released effluent to the Housatonic River under a National Pollutant Discharge Elimination System (NPDES) permit. Lagoons on the Site were regulated under the Resource Conservation and Recovery Act (RCRA), and were closed under RCRA in the 1980s. The facility was cited in 1983 for violating the Toxic Substances Control Act (TSCA) regarding reporting of polychlorinated biphenyl (PCB)-containing transformers. The Site was owned by the United States (U.S.) Air Force until 1976, when ownership was transferred to the U.S. Army (USEPA, 2016).

All manufacturing operations at the facility have ceased, and some office space is currently utilized for site security and building maintenance. The Connecticut Department of Energy and Environmental Protection (CT DEEP) is the lead regulatory agency in remedial oversight at the Site (USEPA, 2016).

1.2 FSP Organization

The FSP provides the sampling objectives and describes the sediment sampling program for the Tidal Flats area, as well as geotechnical boring program to be conducted. This FSP complements the Site-Specific Safety and Health Plan (SSHP) (Wood, 2020a) and the Quality Assurance Project Plan (QAPP) (Wood, 2020b), which are provided under separate cover. The FSP addresses the following topics:

- Section 1.0 – Introduction
- Section 2.0 – Project Background
- Section 3.0 – Project Organization and Responsibilities
- Section 4.0 – Objectives and Scope
- Section 5.0 – Field Procedures
- Section 6.0 – Field Operations Documentation
- Section 7.0 – Sample Designation, Packaging, and Shipping
- Section 8.0 – Investigation Derived Waste
- Section 9.0 – Non-Conformance/Corrective Actions
- Section 10.0 – Reporting
- Section 11.0 – References

2.0 PROJECT BACKGROUND

2.1 Investigation History

There have been numerous investigations of the sediments in the Tidal Flats area since 1992, as summarized below:

- Sampling of the Tidal Flats and Outfall 008 drainage ditch sediments was conducted by the U.S. Army in 1992, 1994, and 1999 as part of a Remedial Investigation (RI).
- Background/reference sediment sampling was conducted in 1994, 1999, 2009, and 2012.
- In April 2014, the U.S. Department of the Army issued the Final Work Plan for Determination of Sediment Remediation Endpoints, Tidal Flats and Outfall 008, Stratford Army Engine Plant, Stratford, Connecticut (AMEC, 2014a). The Final Work Plan was reviewed by CT DEEP. The Final Work Plan proposed sediment toxicity testing as a means to assist in developing the remediation endpoint goals for the sediments in question, and laid out the steps for development of the remediation endpoints. The Final Work Plan also presented some of the historical sediment data referenced above. In April and May 2014, additional sediment sampling and toxicity testing were conducted, and in September 2014 the Army issued the Draft Sediment Remediation Endpoints Report for the Tidal Flats and Outfall 008 (AMEC, 2014b). The report presented the results of sediment chemical characterization, toxicity testing results, and proposed sediment remediation endpoints for the Tidal Flats and Outfall 008 areas. The results of the toxicity testing were that toxicity was not definitively linked with a specific chemical present in the sediment. As an alternative to using toxicity test results alone for development of remediation endpoints, the report presented statistical analyses of the data and proposed using and Effects Range Medium Quotient (ERM-Q) of 1.0 for the metals cadmium, chromium, and copper.
- On December 2, 2014, the CT DEEP submitted comments on the Draft Sediment Remediation Endpoints Report (AMEC, 2014b). CT DEEP concluded from their review of the report that toxicity was not definitively linked with a specific chemical, and recommended setting the remedial goal based on multiple chemicals to more accurately describe the chemical quality associated with the non-toxic samples. CT DEEP's recommendations for determining the sediment remediation endpoint goals were as follows:
    - Use an ERM-Q of 0.5 for the eight metals arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc; an ERM-Q greater than 0.5 would require remediation.
    - Concentrations of mercury and PCBs should generally not be present in post-remedial conditions.

   - Additional site characterization was needed to refine the area of sediment contamination both at depth within the Tidal Flat and Outfall 008 areas, as well as within surficial and deeper sediments between the eastern edge of the intertidal flats and the Housatonic River.
- On February 17, 2015, the U.S. Department of the Army responded to CT DEEP's comments indicating that they agreed to removal of contaminated sediments with ERM-Qs greater than 0.5 from the 0-2 foot below ground surface (bgs) interval in both the Tidal Flats and Outfall 008 areas, as well as replacement with CT DEEP-approved backfill. Following further discussions with CT DEEP, the U.S. Department of the Army issued a memorandum to CT DEEP on March 24, 2015 indicating that they were committed to proceeding with the additional sampling in a timely manner to ensure re-development of the SAEP site without further delay.
- In April 2015, additional sediment sampling was conducted in the Tidal Flats and Outfall 008 areas, as follows:
   - between the Tidal Flats and the margin of the dredged Housatonic River channel
   - at depths greater than 2 feet (ft) bgs in the Tidal Flats
   - at depths greater than 2 ft bgs in the Outfall 008 drainage ditch.
- In November 2015, Amec Foster Wheeler was placed under contract to analyze the sediment samples collected in April 2015, and to incorporate the analytical results into a revised version of the Sediment Remediation Endpoints Report. The revised Sediment Remediation Endpoints Report was issued to the Army on July 29, 2016, and to the CT DEEP on March 7, 2017.
- On May 17, 2017, the Army received comments from the CT DEEP on the Sediment Remediation Endpoints Report. As a result of CT DEEP and USEPA comments, the U.S. Army developed a Field Sampling Plan (Amec Foster Wheeler, 2018b) to conduct sediment sampling and analyses in the Tidal Flats to further delineate:
   - concentrations of PCBs from 0-2 feet below ground surface (bgs) at locations where total PCBs have been detected at concentrations exceeding 50 ppm; and
   - concentrations of PCBs and mercury at depths between 4 and 8 feet bgs near the historic wastewater outfalls which discharged to the Tidal Flats west of the Causeway.
- Results of the sediment chemical characterization, proposed sediment remediation endpoints, and preliminary remediation footprints for the Tidal Flats and Outfall 008, are presented in the Sediment Remediation Endpoints Report (Amec Foster Wheeler, 2018B).

2.2 Physical Project Description

The Tidal Flats area is approximately 5,000 ft upstream of the mouth of the Housatonic River, where the river enters Long Island Sound. The Tidal Flats are classified as estuarine and marine wetlands. The Tidal Flats consist of fine-grained sediments exposed twice daily during low tide.

The sediment is soft and deep, and walking more than a few feet out onto the Tidal Flats is not possible without sinking to depths above the knee. Maximum water depth in the Tidal Flats area is approximately five feet at high tide, but only two to three feet deep near the Dike boundary adjacent to the Tidal Flats.

The sediments are un-vegetated, except for the northwest portion supporting limited emergent vegetation. A Causeway extends from the upland SAEP facility toward the river channel and divides the Tidal Flats into two areas (see **Figure 1-2**). The Causeway was constructed over the Tidal Flats in 1929 to provide access to the river channel. A stone jetty borders the Tidal Flats on the northeast, separating the Tidal Flats from the river. The jetty was built in 1932 to divert effluent from the Stratford Wastewater Treatment Plant, which is located immediately upstream from the Tidal Flats. Numerous outfalls formerly released liquid waste streams from SAEP industrial operations to the Tidal Flats. Several of the outfalls currently function to pump storm water and groundwater infiltration from the SAEP facility.

2.3 Summary of Existing Project Data

Data from previous Tidal Flats area investigations indicate a general decrease in metals and PCB concentrations with depth, with the exception being the area around the tip of the Causeway, as well as the outer fringes of the Tidal Flats adjacent to the stone jetty and toward the Housatonic River channel. The additional data collected in 2015 at the outer limits of the Tidal Flats support prior interpretations that there may be source(s) of contamination that are not associated with the SAEP facility, transported to the Tidal Flats by the Housatonic River. This interpretation is supported by ERM-Q, total PCB, and mercury distributions in the 2-3 and 3-4 foot bgs sample intervals.

Total PCBs exceeding 1.0 parts per million (ppm), and mercury concentrations greater than the ERM value of 0.71 ppm, are generally co-located with samples having an ERM-Q greater than 0.5. The 5-6 and 7-8 foot bgs data indicate no criteria were exceeded, except for a 7-8 foot bgs total PCBs concentration greater than 1.0 ppm along the Dike near outfalls OF-002 & OF-003.

Based on data from the 2017 Tidal Flats Investigation and included in the Addendum-Final Sediment Remediation Endpoints Report (Amec Foster Wheeler, 2018b) a remedial footprint and estimated volume of sediment to be removed from the Tidal Flats area was proposed and a remedial footprint and volumes for the Outfall 008 drainage area presented in Final Sediment Remediation Endpoints Report (Amec Foster Wheeler, 2018a). The Final Feasibility Study (Wood, 2018) and Draft Final Proposed Plan (Wood, 2019) also present the proposed remedial footprints.

3.0 ORGANIZATION AND RESPONSIBILITIES

The proposed project team, shown in the attached Project Organizational Chart (**Table 3-1**), consists of staff from our Portland, Maine, office. The project team is familiar with many of USACE's requirements, which will enable the work to be performed efficiently, safely, and in accordance with USACE's policies and procedures.

The project will be managed out of our Portland, Maine office by Rod Pendleton. In addition to Rod Pendleton, the following presents a list of key personnel that will work on the project:

Table 3-1 Project Organization Chart

Name	Title
Jeff Pickett, CG	Program Manager
Rod Pendleton, PG	Project Manager
Jason Raimondi	Project Sediment Remediation Specialist
Nicholas Langlais, P.E. (ME)	Project Geotechnical Engineer
Brad Wolfe, CG	Project Geologist
Wolfgang Calicchio	Project Chemist
Karen Furey	Project Administrator
Natalie Cormier	Project Accountant

The qualifications of key Wood personnel and their organizational responsibilities are summarized below.

Jeffrey Pickett, CG, is the **Program Manager**, responsible for the overall quality of the project, as well as ensuring that the necessary resources are made available to the Wood PM for execution of the work. He also provides a critical outlet for CENAE outside the core project team and can coordinate with other Wood executives to implement corrective actions.

Rod Pendleton, PG, is Wood's **Project Manager**. He will be the primary day-to-day contact with CENAE personnel and will be ultimately responsible for the technical and relational success of the effort. He is a Wood -certified project manager with 31 years of experience performing and managing environmental investigations.

Jason Raimondi is Wood's Project **Sediment Remediation Specialist.** Jason co-authored the Final Feasibility Study and authored the Draft Proposed Plan for the Tidal Flats and OF-008 Drainage Ditch remediation. Jason will be consulted by the project team on an as-needed basis for engineering support.

Nicholas Langlais, PE, is Wood's Project **Geotechnical Engineer.** Nick will be supervising the completion of the geotechnical borings and evaluation of the geotechnical data.

Brad Wolfe, CG, is Wood's Project **Geologist.** Brad will manage and direct the field operations associated with the additional sediments sampling to be conducted in the Tidal Flats.

Wolfgang Calicchio will act as the Project **Chemist**, responsible for development of the QAPP, as well as need for corrective action for field and analytical issues. He is responsible for notifying the PM of any QA/QC issues with project field samples or analytical results as soon as discrepancy is identified. He will be the primary point of contact with the analytical laboratory responsible for the analysis of sediment samples collected during the project.

Worksheet #s 5 through 7 in the QAPP specify organization and responsibilities, communications pathways, and personnel responsibilities and qualifications, respectively (Wood, 2020b).

The following subcontractors will be involved in this project:

Sediment Coring Subcontractor:
TG&B Marine Services, Inc.
Monument Beach, MA
Mark Avakian
Tel. # 508-326-5686

Analytical Laboratory:
Eurofins Lancaster
24 25 New Holland Pike
Lancaster, PA 17601
Jane Huber
Tel. # 717-456-2300

Geotechnical Drilling:
New England Boring Contractors
129 Kreiger Lane
Glastonbury, CT
Steve Preli
Tel. # 860-633-4649

Geotechnical laboratory:
GeoTesting Express
125 Nagog Park
Acton, MA 01720
Joe Tomei
Tell. # 978-635-0424

4.0 OBJECTIVES AND SCOPE

This section identifies the objectives and scope of the project activities planned, as well as the project schedule.

4.1 Objectives

The general objective of the work to be conducted in this FSP is to supplement the usable, existing Project data collected to date to support development of the Design for remediation of contaminated sediments in the Tidal Flats and Outfall 008 Drainage Ditch. In particular, the sampling and analyses specified in this FSP will fill data gaps and allow for remedial footprints of contaminated sediments in the Tidal Flats Area to be refined vertically. The FSP also includes proposed geotechnical soil sample collection, analyses, and testing of soils from the South Parking Lot and OF-008 Drainage Ditch area.

The objectives of the sediment investigations and geotechnical components of the work proposed in this FSP are as follows:

1. Perform sediment sampling and analyses in the Tidal Flats to further delineate:
    a. The vertical extent of ERM-Q values for eight metals exceeding 0.5 part per million (ppm), and
    b. The vertical extent of ERM-Q values for PCB concentrations exceeding 1 ppm, or
    c. The vertical extent of ERM-Q values for mercury above 0.55 ppm.
    d. Utilize XRF on each sample to evaluate XRF and ICPME/6020 copper results to identify if XRF copper results can be utilized real time for confirmation sampling following sediment excavation.
2. Collect geotechnical subsurface soil samples from the South Parking lot and in the vicinity of the Outfall 008 Drainage Ditch:
    a. to provide data for design temporary sheeting and construction of future remediation measures in the Outfall 008 area; and
    b. to determine the ability of the foundation soils to support stockpiled dredged material.

Section 4.2 presents the scope of work proposed to meet the objectives outlined above.

4.2 Scope of Work

The scope of work detailed in the subsections below presents the major elements of the investigation proposed for the Tidal Flats Area sediments and geotechnical soil borings.

4.2.1 Tidal Flat Sediment Sampling for Vertical Metal, PCB or Mercury Delineation

Sediment core sampling will be conducted to determine the vertical extent of ERM-Q values for eight metals exceeding 0.5, and PCB concentrations exceeding 1 part per million (ppm) or mercury above 0.55 ppm. Up to 5 sediment cores to a depth of 5 feet bgs and 25 sediment cores to a depth of 8 feet bgs will be required to complete vertical delineation of total metals (including mercury) and PCB contamination. Proposed pre-design sediment core sampling locations and GPS coordinates are shown on **Figure 4-1.**

The locations, sample intervals, number of cores, and sample parameters will be collected as shown in **Table 4-1**.

Table 4-1 - Required Sediment Core Sampling Schedule

Select Area	Depth of Core	Number of Cores	Sample Intervals	Sample Parameters	Rationale
B-1	5 feet	1	4-5 ft.	Metals, XRF-Cu	One ERM-Q exceedance at 3-4 feet. Clean intervals for all contaminants for 5-6 feet and 7-8 feet, but the 4-5-foot interval has not been sampled
H-1	5 feet	4	4-5 ft.	Metals, Hg, PCBs, XRF-Cu	Two ERM-Q, 1 PCB and 2 mercury exceedances at 3-4 feet. Clean intervals for all contaminants for 5-6 feet and 7-8 feet, but the 4-5-foot interval has not been sampled
B-7	8 feet	4	0-8 ft.	Metals, Hg, XRF-Cu	Metals and Hg exceedances 3-4 feet, no PCB exceedances from 0-4 feet
E-7	8 feet	7	0-8 ft.	Metals, Hg, XRF-Cu	Metals and Hg exceedances 3-4 feet, no PCBs >1 ppm from 0-4 feet
H-5	8 feet	9	0-8 ft.	Metals, Hg, XRF-Cu	Metals and Hg exceedances 3-4 feet, no PCBs from 3-4 feet
L-3	8 feet	5	0-8 ft.	Metals, Hg, XRF-Cu	One ERM-Q and one Hg exceedance at 3-4 feet interval, one PCB detection at 0.54 ppm

From the seven sediment cores to 5 feet bgs, Wood will collect up to seven sediment samples for PCBs to vertically delineate the remedial footprint of PCBs greater than 1 ppm from 4-5 ft bgs. Up to seven samples for total metals will be collected from the sediment cores to vertically delineate the remedial footprint for metals results and an average ERM-Q Index greater than 0.5 from 4-5 ft. Wood will collect up to four sediment samples for mercury in order to vertically delineate the remedial footprint of mercury greater than 0.55 ppm from 4-5 ft bgs.

From the 25 sediment cores to 8 feet bgs, Wood will collect up to 100 samples for total metals to vertically delineate the remedial footprint for metals results and an average ERM-Q greater than 0.5 from 4-8 ft. Wood will collect up to 100 sediment samples for mercury analysis in order to vertically delineate the remedial footprint of mercury greater than 0.55 ppm from 4-8 ft bgs.

Wood will collect an additional sample aliquot from each sample and field screen for copper utilizing a portable XRF - the results will be used by USACE in the design process to evaluate if XRF copper results can be utilized real-time in confirmation sampling following sediment excavation. Wood will prepare and analyze each sediment aliquot per standard operating procedure for “Elemental Analysis Using the Innov-X System Field X-Ray Fluorescence Analyzer (XRF)”, included in the QAPP (Wood, 2020b). Results will be recorded on the Sediment Core and Discrete Sample Logs included in **Appendix A**. The XRF records date, time, and results of sample analysis. The XRF results will be downloaded to an Excel file at the end of the analytical screening program, which will be used to create a table of results.

Sediment coring will be performed by TG&B Marine Services, Inc. of Monument Beach, MA.

4.2.2 Geotechnical Borings

Four geotechnical borings will be advanced to characterize the physical and engineering properties of soils beneath the South Parking Lot and OF-008 Drainage Ditch area at the Site. The information obtained from these borings will be used to design temporary sheeting and construction of future remediation measures in the Outfall 008 Area, in addition to determining the ability of the foundation soils to support stockpiled dredged materials. Geotechnical boring locations and GPS coordinates are shown on **Figure 4-2.**

The geotechnical boring schedule is presented below.

Table 4-2 – Geotechnical Boring Drilling, Sampling, and In-Situ Testing Schedule

Boring Number	Boring Depth (ft)	Drilling Method	Split-Spoon Sampling Interval (ft)	Standard Penetration Test (SPT) Interval (ft)	Shelby Tube Sampling Interval (ft)
FD-20-01	50	Rotary wash with 4” casing	5	5	TBD
FD-20-02	50	Rotary wash with 4” casing	5	5	TBD
FD-20-03	50	Rotary wash with 4” casing	5	5	TBD
FD-20-04	50	Rotary wash with 4” casing	5	5	TBD

Wood will subcontract New England Boring Contractors of Glastonbury, Connecticut to advance four borings, FD-20-01 through FD-20-04, using 4-inch steel casing at the approximate locations indicated on **Figure 4-2** and in **Table 4-4**. Final coordinates of these borings will be provided to Wood by CENAE prior to performing utility locating activities. Field work and submittals will reference and report results relative to the NAD 1983 Connecticut State Plane coordinate system Mainland Zone (horizontal), and NAVD 1988 vertical datum. Measurements will be made in feet, and tenths of feet. Inches may be used for measuring amount of spoon penetration if less than 6 inches. Wood will locate borings, using the northings and eastings provided to Wood by CENAE, in the field using Differential GPS (DGPS) survey methods with sub-meter accuracy. Wood will direct the drilling contractor to position and set up the rig in such a way that actual field drilling locations are within 5 feet of the location coordinates provided by CENAE. The final coordinates will be recorded on the logs and tabulated separately in the report.

Borings will be advanced to a depth of 50 feet below ground surface. Split-spoon sampling (2-inch diameter) and in-situ testing (SPT) of soils will be performed at 5-foot intervals. SPT will be conducted in general accordance with ASTM D 1586. Visual classification of soil samples retrieved will be performed by Wood's geotechnical engineer or geologist overseeing the field explorations. Visual classification will be performed in accordance with ASTM D 2488. Boring logs will include the measured depth to water, sampler size and hammer or ram weight. Split-spoon samplers will not be advanced more than 24 inches ahead of the casing without authorization by the CENAE. Borings will be advanced by roller-bit and wash methods as appropriate. Refusal of the sampling spoon for the purposes of this project is defined as 60 blows per inch of penetration or bouncing refusal. If refusal is encountered, the casing and bit will be advanced, and sampling/testing will then be performed at the next 5 ft interval.

If organic silts are encountered during the field investigation, undisturbed Shelby tube samples will be collected in general accordance with ASTM D 1587. It is anticipated that up to four undisturbed samples will be collected. Prior to sampling, the bottom of the borehole will be cleared of excess drill cuttings and any loose, disturbed soils. The sampler will then be attached to the end of the drill string and lowered to the bottom of the borehole. If sampling below the groundwater table, the water level in the drill casing will be maintained full both during sampler insertion and removal activities. The sampler will then be advanced by hydraulic push until 24 inches of penetration is achieved. A minimum of 10 minutes, measured from the time of insertion to the time of removal, will be accommodated to allow for sample adhesion to the walls of the sampler. Prior to removal, the sampler will be rotated approximately two complete revolutions to shear off the sample.

Upon removal, recovery (expressed both as inches recovered over inches of penetration, and percent) will be determined and recorded on the boring log. First, the distance from the top of the tube to the top of the sample will be measured. A mark will be made on the outside of the tube at this distance, indicating that the sample starts at that point. The samples recovered via thin-walled tubes will be preserved and transported in general accordance with ASTM D 4220. To help preserve the natural moisture content of samples, the tube ends will be sealed with wax or plastic expandable packers. The top of the tube will be sealed with wax, with a minimum thickness of 1 inch. After the wax, has set up, approximately 1 to 1.5 inches of natural material will be removed from the bottom of the tube and classified and recorded on the boring log. The bottom of the tube will then be sealed with either wax or a plastic expandable packer. Plastic slip caps will be applied to the ends of the tubes. Slip caps will be sealed with tape and then dipped and sealed in two or more layers of wax.

Geotechnical borings will be backfilled (i.e., tremie-grouted) with cement-bentonite grout, and the ground surface will be restored to pre-work conditions (i.e., cold patch in pavement areas). Investigation-Derived Waste (IDW) (i.e., drill cuttings and fluids) will be containerized in 55-gallon DOT-approved drums, and subsequent sampling, analysis, and characterization will be carried out by Wood.

Wood will provide a drilling inspector who is trained as a geologist or geotechnical engineer. The inspector will be knowledgeable in the visual soil classification methods of ASTM D 2488, in the Unified Soil Classification System of ASTM D 2487, and in the general drilling procedures to be used for this project. The inspector will have at least two years of experience in this type of work, including collection of samples for environmental testing. The inspector will perform field inspection, develop field exploration logs, select and classify samples, perform quality control, record the daily operations of the drill crew, and perform other recording and coordination duties as required. The inspector will have no other duties other than the inspection work described. No member of the drilling crew will perform the inspection function in addition to their drilling crew duties. No drilling work or other fieldwork of this project, other than mobilization and demobilization, will be performed in the absence of the inspector. Wood understands that the inspector will be CENAE's primary point-of-contact for this project. Wood will provide the inspector with a cellular telephone or equal means of communication so that contact with CENAE is possible during work hours. The Wood inspector will provide daily progress reports to CENAE via email including location drilled, depth drilled, samples collected, and associated boring logs. CENEA will be contacted when soft silts and clays are encountered during drilling prior to sampling.

4.3 Schedule

Table 4-3 below presents the major milestone events through the completion of the Sediment Remediation Endpoints Report Addendum and Geotechnical Boring Report.

Table 4-3 – Project Schedule

Task	Event	Date
13	Project Management	From NTP through Dec 2020
14	Work Plan Addenda	21 days from NTP
15	Field Sampling of Tidal Flats with Mobilization and Lab Support	21 days from Final Work Plan Approval
16	(Optional) – Field Sampling of Tidal Flats without Mobilization	21 days from Final Work Plan Approval
17	(Optional) – Laboratory Support	21 days following Field Sampling
18	Sediment Remediation Endpoint Report Addendum	21 days following receipt of validated data
19	Geotechnical Borings and Report	45 days from receipt of Final Work Plans

5.0 FIELD PROCEDURES

This section of the FSP presents the major elements of the investigation proposed for the Tidal Flats area sediments. Standard Operating Procedures (SOPs) are include in the QAPP (Wood, 2020b), and are listed below:

- S-1 Sediment Sampling
- S-2 Calibration of Field Equipment
- S-3 Decontamination of Field Equipment
- S-4 Sample Chain of Custody Procedure
- S-5 Field Sample Tracking System
- S-6 Sample Packaging and Shipment
- S-7 Use of Field Logbooks
- S-8 X-Ray Fluorescent Analyzer
- S-9 Geotechnical Drilling, Sampling and Logging

5.1 Rationale/Design

The rationale for the additional sediment delineation and for geotechnical borings are presented in Section 4.2.

5.2 Utility Clearance

Call Before You Dig will be contacted at least one week in advance of investigation activities in the Tidal Flats. Note that prior investigations on the Tidal Flats have not determined that there are any overhead or buried utilities in the Tidal Flats area.

5.3 Decontamination Procedures for Field Equipment

Decontamination is performed as a QC measure and a safety precaution. It prevents cross-contamination between samples and also helps to maintain a clean working environment for the safety of field personnel.

Decontamination of sediment sampling equipment will be performed between coring locations. Decontamination of sediment coring devices will be conducted via scrubbing surfaces with a phosphate free detergent (LiquiNox), and rinsing with available surface water. Decontamination of field equipment used for sample collection and processing (i.e., stainless steel spoons and bowls for homogenization) will be performed in the same manner, except that the final rinse will be with DI water. The decontamination procedures are described in SOP S-4 in the QAPP (Wood, 2020b). Polycarbonate sleeves for collection of Piston-Vibracore® samples will only be used once; therefore, no decontamination is required. The effectiveness of decontamination procedures will be assessed by collection of one equipment rinse blank per type of sample collection equipment per week during the program for samples collected without dedicated equipment/tubing, as discussed in Section 5.10. During the investigation program, a QC blank sample of the source water used for decontamination will be collected (see Section 5.10).

5.4 Sediment Sample Collection, Processing, and Analysis

Sediment samples will be collected as outlined below. Sampling equipment must be decontaminated prior to sample collection, as described in Section 5.3.

TG&B Marine Services will use a Trimble® *Ag*GPS 124/132 differential GPS receiver with sub-meter accuracy to maneuver their boat to the coordinates provided in **Table 4-2** for the PCB delineation samples. For sediment samples, the boat will be maneuvered to the areas portrayed in **Figure 4-1**. The boat will be anchored approximately 80 feet up wind of the designated sample location, and maneuvered back to the sampling coordinates, where a spud will be set, thus allowing the boat to remain stationary over the desired location. The user manual for the Trimble® *Ag*GPS 124/132 can be found here: http://trl.trimble.com/docushare/dsweb/Get/Document-9665/Ag124_132%20Rev%20C1.pdf. The depth of water from surface to the top of the sediment will be measured and recorded, as well as the time of collection of the measurement.

TG&B Marine Services will use a heavy duty pneumatic Piston-Vibracore® sampler (BH-5) for the work in the Tidal Flats. A rigid polycarbonate tube (2-5/8" inner diameter and 1/16" wall thickness) will be used for sediment core collection and placed inside a 3" stainless steel core barrel. A vibrating hammer drives the core barrel into the sediments. To decrease the amount of compaction caused by the vibration, a fixed piston will be utilized inside the core tube, creating a negative pressure directly above the sediments inside the tube. As the tube is advanced, the negative pressure facilitates the sediments to move upwards relative to the core tube, reducing the amount of sediment compaction due to vibration and surface friction. For collection of the Piston-Vibracore® samples, the following steps will be taken:

- After arriving at each core location and anchoring the boat, prepare a sediment core log (**Appendix A**).
- Measure water height above the surface of the sediment using a weighted tape, and record on sediment core log, along with the exact time of measurement.
- Cut a four or eight-foot core of polycarbonate tube, insert the piston, and feed the tube into the core assembly.
- Lower the assembly to the bottom (mudline) and secure the piston wire.
- Using the mechanical Piston-Vibracore®, advance core to the appropriate depth, record depth of penetration on the sediment core log.
- Retrieve the core assembly and remove the core tube.
- Decant water from the top of the core tube if present.
- Using a tape measure with 0.1-foot increments, measure and record the total length of the retrieved sediment core.
- Calculate percent recovery. The Army Core of Engineers recovery standard in harbor

dredge material is 80%. Typical recovery rates in the cores collected from the 2017 sediment investigation were between 85% and 100%. The target recovery for cores will be 85%. Cores pushed to 5 feet will be within 0.75 ft of penetration (i.e., 85 percent). The target recovery for cores pushed to 8 feet will be within 1.2 ft of penetration. Cores that do not meet these criteria will be rejected and another core attempted. The following decision tree will be utilized when collecting cores

1st Core

1. If core recovery is 95% or greater, move onto next location.
2. If core recovery is < 95%, set core aside.
3. Step out and conduct a second coring attempt.

2nd Core

1. If core recovery is 95% or greater, move onto next location.
2. If core recovery is < 95%, set core aside.
3. Step out and conduct a third coring attempt.

3rd Core

1. If core recovery is 95% or greater, move onto next location.
2. If core recovery is < 95%, assess all three core recoveries.
3. If one of the three core recoveries is 85% or greater, keep that core and move onto the next location.
4. If all three core recoveries are < 85%, call the Army Corps of Engineers (Dion Lewis) to discuss results and how to proceed at the location.

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A maximum of three cores will be attempted at any one location.

- Cap and tape both ends and label the core tube with the Location ID and top/bottom.
- Record coordinates for the core location from the GPS onto the sediment core log.
- Transport sediment cores in a vertical position to the field office at the SAEP facility.
- Mark the depth from sediment surface corresponding with sample interval on the polycarbonate tubes with indelible marker.
- Cut the polycarbonate tube and sediment core lengthwise using a knife designed for the purpose.
- Record description of sediment core by depth interval on sediment core log, and take digital photograph(s), with scale, core location ID and up direction noted in the photograph.
- Cut the core into sections specified in **Table 4-1** using a decontaminated stainless steel knife.
- Place each sample interval from the core into separate, decontaminated stainless steel

bowls for homogenization.

- Containerize samples for analysis in accordance with the QAPP (Wood, 2020b).
- Place sample aliquot in a Ziploc bag and screen for copper using the XRF in accordance with the QAPP (Wood, 2020b).

For delineation samples, one core per sample location will provide adequate volume for chemical analyses.

The analytical laboratory testing program for sediments in the Tidal Flats consists of metals, PCB, and mercury as follows:

The numbers and types of samples, including methods and Quality Assurance (QA)/Quality Control (QC) samples, will be collected as shown in **Table 5-1**.

Table 5-1 – Sediment Core Sampling Analytical Test Requirements

Parameters	Preparation/ Analysis Method	#Field Samples	QC Samples			TOTAL
			Field Dups	Field Blank	MS/ MSD	
Metals	SW-846 6020 Inductively Coupled Plasma Mass Spectroscopy	130	7	10	7/7	161
PCBs	EPA Method 680 (Homologues)	4	1	1	1/1	8
Mercury	SW-846 7474/7471	129	7	10	7/7	160
XRF	SW-846 6200	130	7	N/A	N/A	137

Field samples collected during the investigation will be analyzed by a certified laboratory via analytical methods published by the United States Environmental Protection Agency (USEPA) as listed in QAPP Worksheet #19A (sediment) Analytical SOP Requirements (Wood, 2020b). Project-specific measurement performance criteria are established for analytical methods presented in Worksheet #12 of the QAPP (Wood, 2020b) for each analytical method and media planned for the investigation. Additional information on analytical method sensitivity, target analytes, and detection limits is provided on Worksheet #15 of the QAPP (Wood, 2020b).

Analytical chemistry methods will be completed by Eurofins Lancaster of Lancaster, PA using parameters as listed in Worksheet #23 of the QAPP (Wood, 2020b).

Deeper sample intervals from each location will be stored in an on-site freezer pending analysis of shallower intervals samples. If there are concentrations above ERM-Q values for metals, mercury, or PCBs, then the next deeper interval will be retrieved from the freezer and sent to the laboratory for analysis. This procedure will continue until the deepest sample interval from each core has concentrations less than remedial action values for ERM-Q metals, mercury, and PCBs.

5.5 Geotechnical Laboratory Testing

Wood will select representative soil samples to be tested at Geotechnics in East Pittsburgh, Pennsylvania. The laboratory will perform the following testing, as specified by CENAE:

Table 5-2 – Geotechnical Laboratory Testing Summary

Test Description	Test Method	Estimated Quantity
Soil Classifications (USCS)	ASTM D2487	6
Sieve Analysis	ASTM D6913	6
Hydrometer Analysis	ASTM D7928	6
Multi-point Atterberg Limit	ASTM D4318	4
Moisture Content	ASTM D2216	4
CU Triaxial with Pore Pressure, 3 Points, 3" Diameter (Undisturbed)	ASTM D4767	2

Testing will be performed by the geotechnical testing laboratory in general accordance with the ASTM standards referenced in **Table 5-2**. The type and number of tests may be adjusted depending on conditions encountered during the subsurface investigations.

Wood understands that soil samples to be tested will be inspected and approved by CENAE prior to testing.

5.6 Sample Containers and Preservation Techniques

Specifications for sample collection processes and the containers and preservative used to store samples prior to analysis were determined based on requirements in the published analytical methods or USEPA Region I data validation guidelines (USEPA, 1996). Required sample volumes, containers, and preservation requirements for each method and matrix is presented in **Table 5-2**, and the QAPP Worksheets #19A and #19B (Wood, 2020b).

5.7 Sample Chain of Custody (COC) and Shipping

Procedures are established to document the custody of samples that are collected during investigations and to identify and track samples delivered or shipped to the analytical laboratory for analysis. Tracking procedures are also established to verify that data for samples are obtained from the laboratory. The sample custody process is illustrated in Worksheet #26 and SOP S-5 of the QAPP (Wood, 2020b).

A computerized sample tracking program will be used to ensure that relevant sample information is recorded accurately and completely at each stage of the sample handling process. The field sample tracking system is described in SOP S-6 in the QAPP (Wood, 2020b). The sample tracking program will be the primary method used to record sample collection information and print individual bottle labels as described in the QAPP. COC forms may be handwritten or computer generated. Examples of the handwritten and computer generated COC are presented in Appendix D of the QAPP (Wood, 2020b).

The primary chemical analyses include PCBs, metals, and analyses for waste disposal characterization. The collection of QC samples (blanks, spikes, and duplicates) and formal data quality reviews will be included in investigation programs as outlined in detail in the QAPP (Wood, 2020b).

5.8 Field Quality Control Sampling Procedures

The field quality control samples, for the sediment investigations only, will consist of the following:

- Rinsate (or equipment) blanks from decontaminated equipment
- Decontamination source water (Source blank)
- Field duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples

5.8.1 Rinsate Field Equipment Blank

Following equipment decontamination procedures, a rinsate blank (also referred to as an equipment blank) will be collected and submitted for analyses to confirm that the decontamination water is not introducing low-level impacts to Project samples. The parameters to be analyzed will depend on, and include, the same parameters as analyzed during the affected investigation program. The rinsate blank will be collected as follows.

- Thoroughly decontaminate the sampling device from which the blank will be collected (see Section 5.4).
- Assign sample ID for rinsate sample and attach bottle labels.
- Pour source water over the equipment surfaces that have contacted the sample.
- Run source water through the entire sampling apparatus that was used to collect samples.
- Collect or “catch” the rinsate water directly into the appropriate sample bottles.
- Record the collection time and sample ID in the field logbook.
- Store, pack, and ship samples in accordance with Section 7.0.
- Document the sampling activities and general identifying information on an FDR.
- Document sample collection requirements for each analytical fraction including the container types/volumes, time collected, sample bottle IDs, analyses to be performed etc., on the FDR.

5.8.2 Decontamination Water Source

A sample of the potable tap water (also known as a Source blank) from the SAEP facility, to be used for decontamination of sampling equipment, will be collected for analysis of PCB Homologs and metals. The Source blank will be collected as follows.

- Assign sample ID for source sample and attach bottle labels.
- Turn on potable water tap and allow to run for one minute before collecting the water directly into the appropriate sample bottles.

- Record the collection time and sample ID in the field logbook.
- Store, pack, and ship samples in accordance with Section 7.0.
- Document the sampling activities and general identifying information on an FDR.
- Document sample collection requirements for each analytical fraction including the container types/volumes, time collected, sample bottle IDs, analyses to be performed etc., on the FDR.

5.8.3 Field Duplicates and Matrix Spike/Matrix Spike Duplicates

Field duplicate samples will be collected following sediment sample homogenization, then apportioning into two sets of containers. Both sets of containers will be submitted for analyses with one set designated as an "original sample," the other designated as a "duplicate sample". Field duplicate samples will be collected at a rate of one per 10 field samples.

Matrix spike and matrix spike duplicate (MS/MSD) samples will be collected following sediment sample homogenization, then apportioned into three sets of containers. The three sets of containers will be submitted for analyses with one set designated as an "original sample," the second designated as a "matrix spike", and the third designated as a “matrix spike duplicate”. MS/MSD samples will be collected at a rate of one per 20 field samples, and submitted to the laboratory for analysis of PCB Homologs.

5.9 Sample Location Surveys

The sediment sample horizontal coordinates for metals, PCB, and mercury delineation will be collected via differential GPS with sub-meter accuracy by TG&B Marine Services as sediment cores are collected. Coordinates will be collected and recorded in the Connecticut State Plane coordinate system on FDRs, and provided by TG&B Marine Services in their data report.

Wood will locate geotechnical borings, using the northings and eastings provided to Wood by CENAE, in the field using Differential GPS (DGPS) survey methods with sub-meter accuracy.

6.0 FIELD OPERATIONS DOCUMENTATION

Records of field data will be made throughout the project as described in Worksheet #29 of the QAPP (Wood, 2020b) to capture information that might be needed later, such as during preparation of the report or for use by other investigators who were not present when the data were collected. The field activities and the collection of field samples will be documented using Project and field logbooks, FDR forms, and COC forms. **Appendix A** contains the field forms to be utilized in the documentation of field efforts. Photography will also be used to document field activities.

The Wood FOL has the responsibility to maintain files containing logbooks, forms, and notebooks that document daily field activities. Individual responsibilities may be delegated to other field staff, as appropriate. Special emphasis will be placed on the completeness and accuracy of information recorded in the field logbooks, forms, and notebooks. Documentation will contain statements that are legible, accurate, and inclusive of required documentation for project activities. Because the logbooks, FDR forms, and COC forms provide the basis for future reports, they must contain accurate facts and observations.

Examples of the project record types for this project include:

- Chain-of-Custody (COC) Records
- Project and field logbooks
- Sample FDRs
- Field Instrument Calibration Records; etc.

Original records will be scanned at Wood's Portland, Maine office and uploaded to the electronic Project file. CENAE will also be provided with electronic Project files, including the native format files for work plans and reports. Hardcopy originals will be maintained in the Project paper file in the Portland, Maine office.

6.1 Chain of Custody Forms

COC forms are used to document the custody of samples that are collected during investigations, and to identify and track samples delivered or shipped to the analytical laboratory for analysis. Use of COC forms is described in Section 5.9 and in the QAPP (Wood, 2020b).

6.2 Logbooks

The Wood field team will follow the procedures described in the QAPP and SOP S-8 to complete field logbook entries. Project and field logbooks will be newly procured, and provide the means of recording the chronology of data collection activities performed during the investigation in detail. As such, entries will be described in as much detail as possible so that a field activity could be reconstructed without reliance on memory.

Logbooks will be hardcover permanently bound field survey books or notebooks and be project-specific. Logbooks will be stored in the project files when not in use. Each logbook will be identified by the Wood project number and logbook number. Logbooks will be water resistant and have sequentially numbered pages.

The title page of each logbook will contain the following:

- Logbook number
- CENAE Contract Number
- Wood project number
- Project name
- Logbook start/end date

The Project and field logbooks provide a daily hand written account of field activities. Entries will be written in a clear, logical and legible manner, and made in permanent black or blue ink. Any correction to an entry will be made with a single line with the author initials and date. Each page of the logbook will be dated and signed by the person completing the logbook. Partially completed pages will have a line drawn through the unused portion at the end of each day, and signed and dated by the person making the entry.

Field and Project logbooks are the property of CENAE and will be given to CENAE (if requested) at the end of this project. These documents will also be scanned and saved to the electronic Project file.

6.2.1 Project Logbook

The Project logbook is a record of major tasks completed for each day or operation. Entries are made each day. The FOL responsible for on-Project field operations will complete the Project logbook and will include at a minimum the following information:

- A list of field logbooks created for the project;
- Names and titles of project related personnel present at the Project during each day of operation;
- A summary of activities completed for each day of operation;
- A listing of changes made to established program procedures; and
- A summary of problems encountered during the day including a description of corrective actions and impacts on the project.

Due to the short duration of the proposed field work (approximately 5 days), the Field Logbook may substitute for the Project Logbook for this Project.

6.2.2 Field Logbook

Field logbooks are daily records of field task activities that are entered in real time by the on-Project field technicians and scientists. The following information will be entered into the field logbooks:

- The date and time of each entry. The daily log will begin with weather conditions and the names and organizations of personnel performing the documented task;
- A summary of important tasks or subtasks completed during the day;
- A description of any field tests completed in association with the daily task;
- A description of any samples collected including documentation of any quality control samples that were prepared (equipment blanks, field duplicates, MS/MSDs, trip blanks, etc.);
- Documentation of equipment maintenance and decontamination activities; and
- A summary of any problems encountered during the day including a description of corrective actions and impacts on the daily task; and.
- Other pertinent information as appropriate.

6.3 Sample Collection and Exploration Records

FDRs document details of explorations and sample collection activities. A sample collection record is completed each time a field sample is collected. The goal of the FDR is to document exploration and sample collection methods, materials, dates and times, sample locations, and identifiers. Field measurements and observations associated with a given exploration or sample collection task are recorded on the sample collection record. Sample collection records are maintained throughout the field program by the FOL in files that become a permanent record of field program activities. A listing of investigation and sample collection records is included on Worksheet #29 of the QAPP (Wood, 2020b) including:

- Daily Project Safety and Health Inspection Checklist
- Daily Tailgate Safety Meeting Checklist
- Summary of Daily Activities
- Field Instrument Calibration Record
- Equipment Blank Sampling Record
- Sediment Core and Discrete Sample Log
- Geotechnical Boring Log

6.4 Photographic Records

Photographs of field activities will be taken to supplement other field documentation. Photos will be collected of the sediment core in the post open/pre-section state; that also documents total length, and sample collection intervals. Information about each photograph's location and subject matter will be recorded in the field. Photographs will be saved to the electronic Project file and used in reporting as appropriate.

7.0 SAMPLE DESIGNATION, PACKAGING, AND SHIPPING

Samples collected during the investigations will be designated and identified consistently as described in **Section 7.1**, and each location will be surveyed for incorporation into the Project database as described in **Section 7.2**.

7.1 Sample Designation

Samples collected during Project activities will be assigned unique sample identifications (IDs) as described in **Section 7.2** below that will be used to identify and track each sample collected for analysis during completion of the Project scope of work. In addition, the sample IDs will be used to identify and retrieve the analytical results received from the laboratory, as well as other data related to the sample.

The contracted laboratories will provide appropriate containers for the collection of the Project samples as described in the QAPP (Wood, 2020b). Each sample bottle will be identified with a separate ID label. Labeling will be pre-printed and/or augmented by notations completed in indelible/waterproof ink. Entry errors will be crossed out with a single line, dated, and initialed. Each securely-affixed label will include the following information:

- Project ID
- Location ID
- Field sample ID
- Preservatives present and/or added
- Date and time of collection
- Analytical fraction and method
- Sampler(s) initials

Prior to each sampling event, the Wood FOL will check that labels are applied to each sample container including containers intended for QC sample aliquots (e.g., field duplicate, matrix spike, etc.).

7.2 Sample Numbering System

7.2.1 Assigning Location IDs

A unique location ID will be assigned to each sampling location with unique horizontal coordinates. Examples are provided below:

- Sediment cores:
  - For delineation sample cores, the location IDs will be in the form "SC-01", and are given sequential two digit numbers in the last two characters of the location ID. SC = sediment core, and 01 is the core number.
- Geotechnical Borings:
  - Location IDs will be in the form FD-20-01 and are given sequential two digit numbers in the last two characters of the location ID, as identified in the RFP.
- QC Samples:
  - Equipment blanks will be given unique location IDs in the form "EB-01", and are given sequential three digit numbers in the last three characters of the location ID.
  - The source water blank will be given the unique location ID "SB-01"
  - Trip blanks, if necessary, will be given unique location IDs in the form "TB-01", and are given sequential three digit numbers in the last three characters of the location ID.

7.2.2 Sample IDs

A unique sample ID will be assigned to each sample collected during the investigation, and will be identified by the character naming system, as follows:

<u>Sample Type (2 to 3 digits)</u>

SC – sediment core sample

SB – source water blank

EB – equipment rinsate blank

FD – Field Duplicate

<u>Horizontal Sample Locator from Location ID (2 digits)</u>

Examples: 01, 03, etc.

<u>Sample Depth Interval in feet</u>

Examples 0001 = 0' to 1' bgs

0812 = 8' to 12' bgs

<u>Sample Modifiers (2 to 3 digits)</u>

DUP – Duplicate Sample

MS – Matrix Spike

MSD – Matrix Spike Duplicate

EB – Equipment Blank

SB – Source Blank

<u>Example Field Sample IDs</u>

- A sediment sample collected from sample location 37, from the depth interval 7-8' bgs would be identified as "SC370708".
- A duplicate sediment sample collected from sample location 15, from the depth interval 1-2' bgs would be identified as "SC150102DUP".
- An MS sample from sediment core from sample location 29 collected from a depth interval of 3-4' bgs would be identified as "SC290304MS".

Depth information for samples will be noted in field notes and on Field Data Records (FDRs) (**Appendix A**). The Wood FOL is responsible for checking that labels are affixed to the sample containers prior to each sampling task, and that labels are completed correctly prior to the sample being submitted to the laboratory.

Future samples collected at previously sampled locations will be identified using the previously identified location ID.

7.3 Sample Packaging and Shipment

Sample packaging and shipment procedures are presented in QAPP SOP S-6 (Wood, 2020b), and are provided in the following bullets:

- Be certain that containers are sufficiently tight, preserved, and labeled correctly.
- Sediment samples will be allowed to settle for a minimum of 2 hrs prior to shipping to the laboratory.
- The sample manger will look closely at sediment samples to see if a clear water layer forms above the sediment. Any water layer will be decanted from the sample jar prior to shipping to the laboratory.
- Clean the exterior of each sample container such that no gross contamination remains.
- Complete the Chain of Custody (COC) as described QAPP SOP S-4. When the COC form is completed, verify that bottle labels, analytical fractions, and bottle numbers match what is written on the COC form.

- Wrap sample containers in bubble wrap. Zip-type plastic baggies may be used as additional containment.
- Line the cooler with the trash bag and add a layer of packing material. If the cooler has a drain, close and seal to prevent leakage of water from melting ice.
- Place sample containers into the cooler, and pack them sufficiently to prevent them from shifting during shipment.
- Place ice-filled double zip-type bags on samples such that samples are contacted by the ice.
- Place sufficient ice to retain the sample temperature between 2 and 6 degrees C. Place a temperature blank in with the samples.
- Fill the remaining space in the cooler with packing material and close and secure the top of the trash bag.
- On the chain of custody, sign in the relinquished by box and add in the subsequent received by box the name of the courier/carrier and the air bill number (if applicable).
- Place the COC into a plastic bag and tape it to the inside top of the cooler.
- Close the cooler and tape the cooler shut with strapping tape or similar high-strength shipping tape.
- If more than one cooler is being shipped under the same COC, copies of the COC should be placed into each additional cooler in the same manner as the original COC.
- If shipped through FEDEX or other shipping vendor, apply custody seals to the cooler such that the seals must be broken in order to open the cooler.
- Apply “UP Arrows” in the appropriate direction on at least opposing sides of the cooler exterior, or indicate on top “this side up”.
- Add the appropriate shipping address labels to the cooler along with a return address to the cooler. If more than one cooler is being shipped, add “one of X” to the label so that the recipient is aware that more than one cooler should be received.

8.0 INVESTIGATION-DERIVED WASTE

As part of the field activities, a certain amount of waste material will be generated in association with personal protection, sample handling, and decontamination. Effort will be taken to minimize the waste generated. Personal protective equipment will be bagged and disposed of as municipal waste. Consistent with previous investigative activities, if there is sediment Investigation-Derived Waste (IDW) produced, it will be containerized in 55-gallon DOT-approved steel drums. Disposition of IDW will be determined when analytical results of the investigation sampling are available.

9.0 NON-CONFORMANCE/CORRECTIVE ACTIONS

Worksheet # 31 - Planned Project Assessments Table, and Worksheet #32 - Assessment Findings and Corrective Action Responses in the QAPP (Wood, 2020b), present the proposed project assessments and corrective action Reponses for the project. Corrective action procedures will be taken in the event a discrepancy is discovered by field personnel or during a desk or field audit, or the laboratory discovers discrepancies or problems. Typical discrepancies or problems include but are not limited to: improper sampling procedures, improper instrument calibration procedures, incomplete or improper sample preservation, and problems with samples upon receipt at the laboratory.

10.0 REPORTING

The following subsections discuss the electronic data deliverable requirements for the project, as well as the content of the Sediment Investigations Report. Files and records associated with the deliverables will be maintained on the Wood Portland, Maine office server. CENAE will be provided with electronic Project files, including the native format files for work plans and reports. Report deliverables will be submitted to regulatory agencies for review in electronic PDF format, and native format files will be supplied upon request.

10.1 Electronic Data Deliverables

Both the analytical laboratory and Wood will obtain the most recent version (ADR.NET) of the LDC ADR software. Wood will develop comprehensive ADR library files (i.e., Electronic Quality Assurance Project Plan or EQAPP) for analytical methods to be used on the project. The library files will be submitted to CENAE for approval prior to field sampling. Approved library files will be used by the subcontract laboratory and Wood to check the laboratory electronic data deliverables (EDDs) for compliance, and the ADR module will be used to perform applicable data validation reviews. ADR validation actions will be reviewed/verified by the Wood project chemist. Final results will be provided to CENAE and be entered into EDMS.

Data from field activities and the analytical laboratory will be entered into the Wood's TED environmental database. The contract laboratory will submit Stage 2a EDDs to Wood using the Staged Electronic Data Deliverables (SEDD) format (i.e., xml format files) by Sample Delivery Group (SDG). The contract laboratory will ensure that SEDD files are checked using the Contract Compliance Screening (CSS) tool contained in the laboratory version of the ADR software. The laboratory shall prepare a separate non-conformance report addressing and explaining any items identified by the CSS tool. SEDD files will be submitted on CD along with the hardcopy data package and will also include a transmittal letter ensuring that the SEDD files are error-free and in agreement with hard copy data packages.

10.2 Sediment Remediation Endpoints Report Addendum

Wood will revise the Sediment Remediation Endpoints Report Addendum (Appendix A-2 of the Final Focused Feasibility Study [Wood, 2018]) to summarize the field sampling efforts and incorporate the sediment analytical data. Figures will be "D"-size and depict newly collected sample results overlaid with historic sampling results. Each sample location will have a specific symbol based on the year the sample was collected. Average ERM-Q indices greater than 0.5 will be depicted in red, while average ERM-Q Indices less than 0.5 will be depicted in green. An overall shading of red will be used for each depth interval (0-1, 1-2, 2-3, 3-4 etc.) to depict the area of Tidal Flats that need to be remediated based on metals and average ERM-Q Index results. Similarly, separate figures will be completed for PCBs with newly collected samples overlaid with historic sampling results. Each PCB sample location will have a specific symbol based on the year the sample was collected. PCB results greater than 1 ppm will be depicted in red, while PCB results less than 0.5 will be depicted in green. An overall shading of red will be used for each depth interval (0-1, 1-2, 2-3, 3-4 etc.) to depict the area of Tidal Flats that need to be remediated based on PCB results.

Limitations and uncertainties will be identified as part of the evaluation, including a discussion of bias (low/high) in analytical data, and the implications of this on the recommendations for sediment reuse for construction and redevelopment purposes.

The Sediment Remediation Endpoints Report Addendum will be submitted to CENAE for review in electronic PDF format, and the text of the report will be submitted in MS-Word format. The Draft Final Report will be submitted to both CENAE and regulatory agencies in electronic PDF format, with native format files available upon request. The Final Report will be submitted in both electronic native format and hardcopy format to CENAE and the regulatory agencies.

10.3 Geotechnical Reporting

At the completion of the field investigation, Wood will submit a Draft Geotechnical Investigation Report which will include the field boring logs and soil samples. The report will consist of a narrative of activities, field logs, safety reports and plans marked with actual boring locations. All data and graphs from laboratory testing of samples will be included in the report. The narrative will describe the results and highlight any significant conditions encountered such as refusals, or other observed physical features significant to understanding the site conditions. The survey methods used to locate the borings will also be documented. The Draft Report will be submitted to CENAE for review in electronic PDF format, and the text of the report will be submitted in MS-Word format. The Final Report will be submitted in both electronic native format and hardcopy format to CENAE.

The electronic version of the Final Report will be submitted on computer compact disk (DVD) and will include all drawings, tables, graphs, and text. The DVD will be clearly labeled with the file name and description in an orderly fashion. All text files will be done in Microsoft Word. In addition, the electronic version will be submitted as one consolidated file in PDF format (Adobe Acrobat, most current version), including scanned copies of the field logs. The final report will include standard limitations to geotechnical reports and important information regarding geotechnical reports by the Geoprofessional Business Association.

11.0 REFERENCES

AMEC, 2014a. Final Work Plan for Determination of Sediment Remediation Endpoints, Tidal Flats and Outfall 008, Stratford Army Engine Plant, Stratford, Connecticut. April 16, 2014.

AMEC, 2014b. Draft Sediment Remediation Endpoints Report, Tidal Flats and Outfall 008, Stratford Army Engine Plant, Stratford, Connecticut. September 26, 2014.

Amec Foster Wheeler, 2018a. Final Sediment Remediation Endpoints Report, Stratford Army Engine Plant, Stratford, Connecticut. January 10, 2018.

Amec Foster Wheeler, 2018b. Addendum Final Sediment Remediation Endpoints Report, Stratford Army Engine Plant, Stratford, Connecticut. October, 2018.

United States Environmental Protection Agency (USEPA), 2016. Waste Site Cleanup & Reuse in New England - Stratford Army Engine Plant. Updated May 31, 2016. https://yosemite.epa.gov/r1/npl_pad.nsf/8b160ae5c647980585256bba0066f907/535708bdb8e8342085256b4200606200!OpenDocument

USEPA, 1996. Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses. July 1996. Revised December 1996.

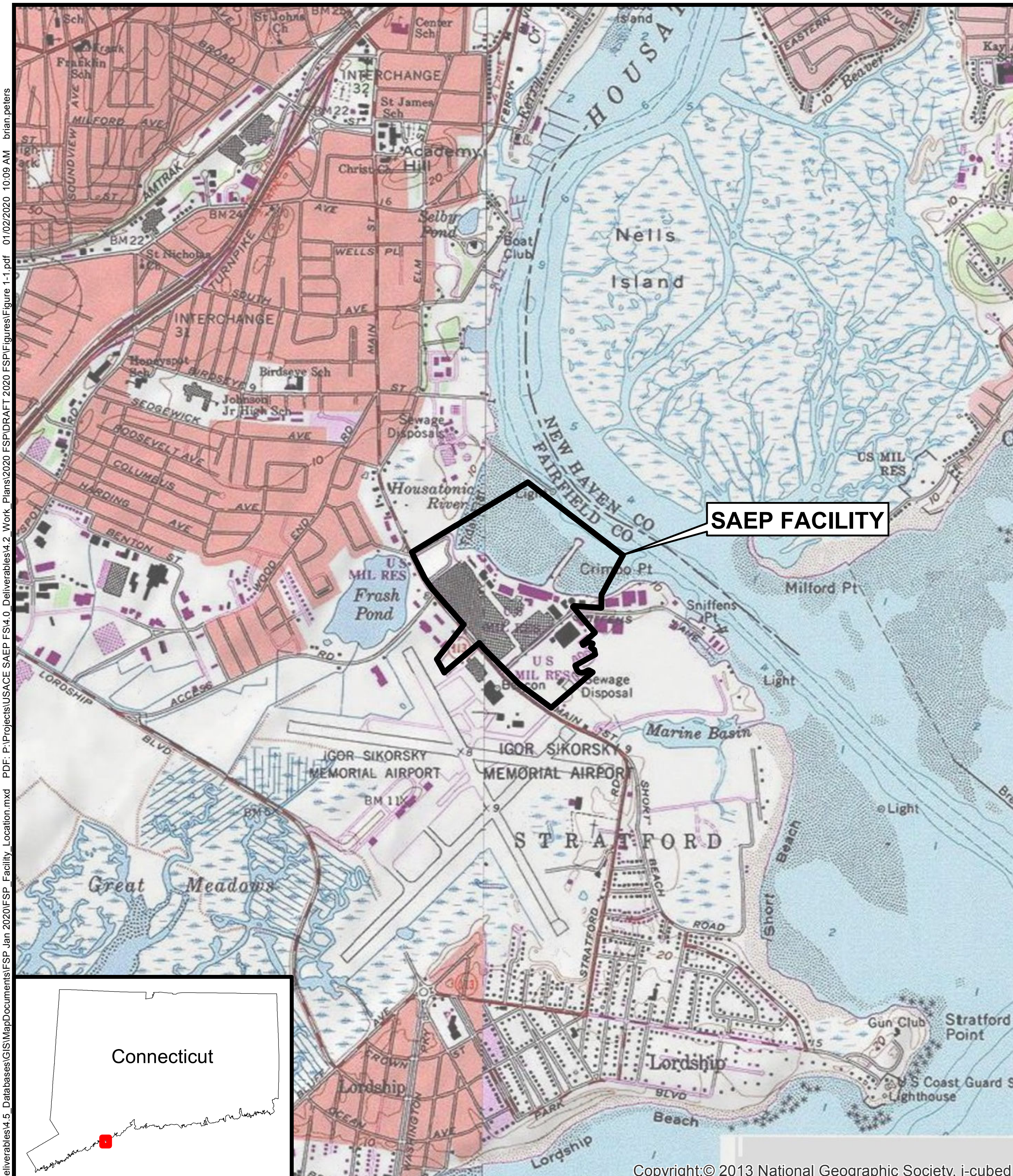
Wood, 2018. Final Focused Feasibility Study, Stratford Army Engine Plant, Stratford, Connecticut. October 2018.

Wood, 2019. Draft Final Proposed Plan, Stratford Army Engine Plant, Stratford, Connecticut. October 2019.

Wood, 2020a. Draft Site Safety and Health Plan (SSHP), Stratford Army Engine Plant, Stratford, Connecticut. January 2020.

Wood, 2020b. Draft Quality Assurance Project Plan (QAPP), Stratford Army Engine Plant, Stratford, Connecticut. January 2020.

FIGURES



N

0 1,000 2,000
Feet

Prepared/Date: BRP 01/02/20 | Checked/Date: BW 01/02/20

Figure 1-1
Facility Location

Draft Field Sampling Plan
Stratford Army Engine Plant
Stratford, Connecticut

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wood.

2014 Aerial Imagery: USDA
National Agriculture Imagery Program

N 0 300 600 Feet

Prepared/Date: BRP 01/02/20 | Checked/Date: BW 01/02/20

Figure 1-2
Location of Areas of Interest

Draft Field Sampling Plan
Stratford Army Engine Plant
Stratford, Connecticut

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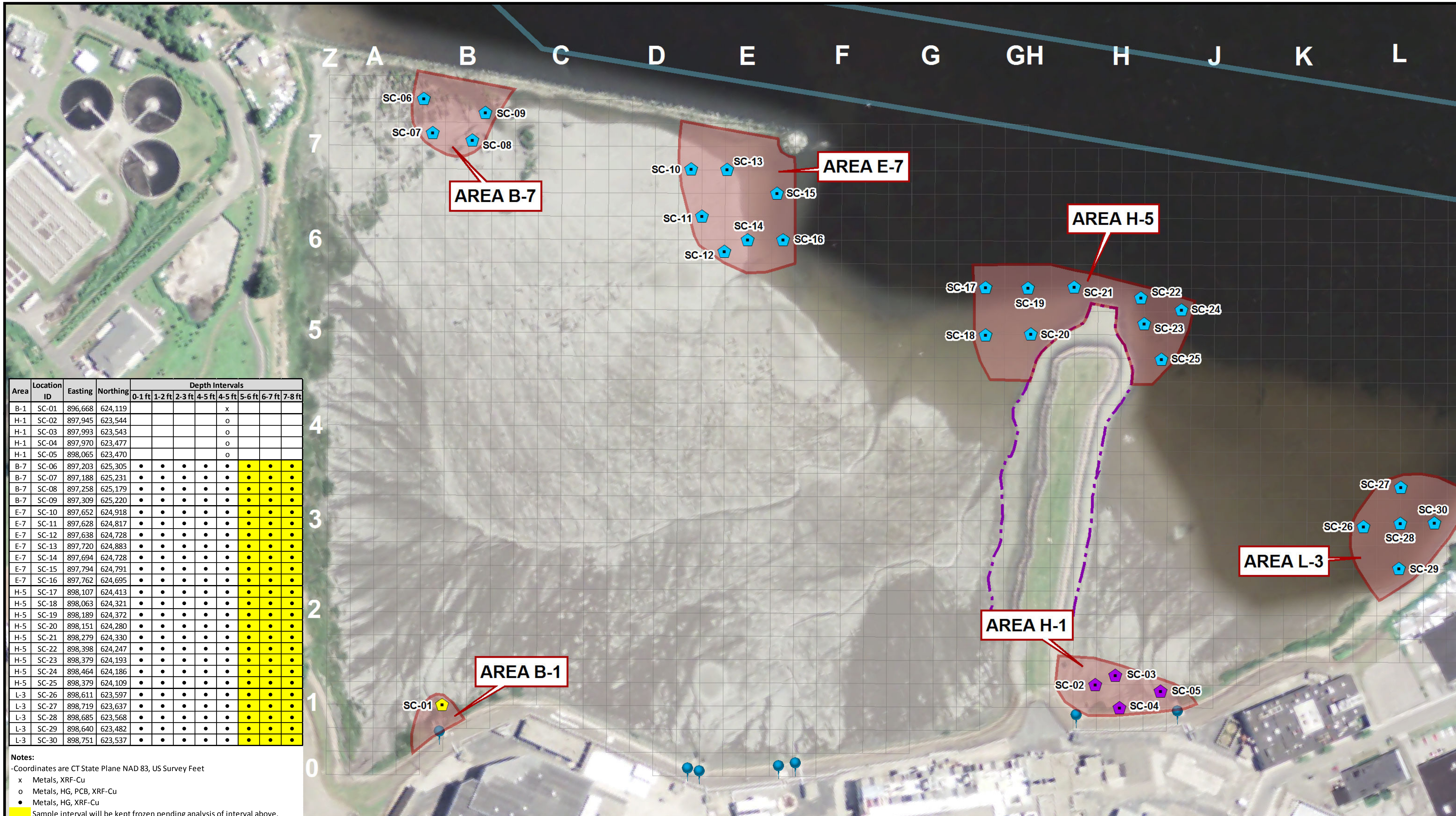

Area	Location ID	Easting	Northing	Depth Intervals							
				0-1 ft	1-2 ft	2-3 ft	4-5 ft	4-5 ft	5-6 ft	6-7 ft	7-8 ft
B-1	SC-01	896,668	624,119					x			
H-1	SC-02	897,945	623,544					o			
H-1	SC-03	897,993	623,543					o			
H-1	SC-04	897,970	623,477					o			
H-1	SC-05	898,065	623,470					o			
B-7	SC-06	897,203	625,305	•	•	•	•	•	•	•	•
B-7	SC-07	897,188	625,231	•	•	•	•	•	•	•	•
B-7	SC-08	897,258	625,179	•	•	•	•	•	•	•	•
B-7	SC-09	897,309	625,220	•	•	•	•	•	•	•	•
E-7	SC-10	897,652	624,918	•	•	•	•	•	•	•	•
E-7	SC-11	897,628	624,817	•	•	•	•	•	•	•	•
E-7	SC-12	897,638	624,728	•	•	•	•	•	•	•	•
E-7	SC-13	897,720	624,883	•	•	•	•	•	•	•	•
E-7	SC-14	897,694	624,728	•	•	•	•	•	•	•	•
E-7	SC-15	897,794	624,791	•	•	•	•	•	•	•	•
E-7	SC-16	897,762	624,695	•	•	•	•	•	•	•	•
H-5	SC-17	898,107	624,413	•	•	•	•	•	•	•	•
H-5	SC-18	898,063	624,321	•	•	•	•	•	•	•	•
H-5	SC-19	898,189	624,372	•	•	•	•	•	•	•	•
H-5	SC-20	898,151	624,280	•	•	•	•	•	•	•	•
H-5	SC-21	898,279	624,330	•	•	•	•	•	•	•	•
H-5	SC-22	898,398	624,247	•	•	•	•	•	•	•	•
H-5	SC-23	898,379	624,193	•	•	•	•	•	•	•	•
H-5	SC-24	898,464	624,186	•	•	•	•	•	•	•	•
H-5	SC-25	898,379	624,109	•	•	•	•	•	•	•	•
L-3	SC-26	898,611	623,597	•	•	•	•	•	•	•	•
L-3	SC-27	898,719	623,637	•	•	•	•	•	•	•	•
L-3	SC-28	898,685	623,568	•	•	•	•	•	•	•	•
L-3	SC-29	898,640	623,482	•	•	•	•	•	•	•	•
L-3	SC-30	898,751	623,537	•	•	•	•	•	•	•	•

Notes:
-Coordinates are CT State Plane NAD 83, US Survey Feet
x Metals, XRF-Cu
o Metals, HG, PCB, XRF-Cu
• Metals, HG, XRF-Cu
(yellow) Sample interval will be kept frozen pending analysis of interval above.

wood.

2014 Aerial Imagery: USDA
National Agriculture Imagery Program

Prepared/Date: BRP 01/30/20 | Checked/Date: BPW 01/30/20

N

0 100 200 Feet

Legend

Proposed Pre-Design Investigation Sediment Core Locations:
- 5 FT METALS
- 5 FT METALS, HG, PCBS
- 8 FT METALS, HG

Outfall Locations

Margins of Dredged Housatonic River Channel

Extent of Causeway Cover System

Figure 4-1
Proposed Pre-Design Investigation
Sediment Core Locations - Tidal Flats
Draft Field Sampling Plan
Stratford Army Engine Plant
Stratford, Connecticut

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Location ID	Easting	Northing	Depth
FD-20-01	899,058	621,532	50 ft
FD-20-02	898,657	621,923	50 ft
FD-20-03	897,863	622,463	50 ft
FD-20-04	896,165	623,922	50 ft

Notes:
- Coordinates are CT State Plane NAD 83, US Survey Feet
- Split spoon sampling 5 ft intervals
- Standard Penetration Test (SPT) 5 ft intervals
- Shelby tube sampling intervals TBD

wood.

Legend

Proposed Geotechnical Boring Locations

2014 Aerial Imagery: USDA
National Agriculture Imagery Program

N

0 150 300 Feet

Prepared/Date: BRP 01/30/20 | Checked/Date: BPW 01/30/20

Figure 4-2
Proposed Geotechnical Boring Locations

Draft Field Sampling Plan
Stratford Army Engine Plant
Stratford, Connecticut

Document: P:\Projects\USACE SAEP FS\4.0_Deliverables\4.5_Databases\GIS\MapDocuments\FSP Jan 2020\FSP_Jan2020_11x17LS.mxd PDF: P:\Projects\USACE SAEP FS\4.0_Deliverables\4.2_Work_Plans\2020 FSP\DRAFT 2020 FSP\Figures\Figure 4-2.pdf 01/30/2020 8:55 AM brian.peters

APPENDIX A

FIELD DATA RECORDS

Tailgate Safety Meeting Report

Check One:

☐ Initial Kickoff Safety Meeting ☐ Regular/Daily Tailgate Safety Meeting ☐ Unscheduled Tailgate Safety Meeting

Date: ______________________ Site: ______________________

Site Manager: ______________________ Site Health and Safety Officer: ______________________

Print *Print*

Order of Business

Topics Discussed (Check all that apply – Boxed bold items to be covered daily)

- ☐ **Scope of Work**
- ☐ **Anticipated Weather (snow, high winds, rain)**
- ☐ **Personnel Roles and Responsibilities**
- ☐ **Data Collection Objectives**
- ☐ **Safe work practices**
- ☐ **Logs, Reports, Recordkeeping**
- ☐ Site History/Site Layout
- ☐ Site Control (visitor access, buddy system, work zones, security, communications)
- ☐ Training/Permit Requirements
- ☐ Applicable SOPs (e.g., Hearing Conservation Program, Safe Driving, etc.)
- ☐ PPE Required/PPE Used
- ☐ Define PPE Levels, Donning, Doffing Procedures
- ☐ Decontamination Procedures for Personnel and Equipment
- ☐ Sanitation and Illumination
- ☐ Medical Surveillance Requirements
- ☐ Hazard Analysis of Work Tasks (chemical, physical, biological and energy health hazard effects)
- ☐ Chemical Hazards and Controls
- ☐ Signs and symptoms of over exposure to site chemicals
- ☐ Physical Hazards and Controls (e.g., overhead utility lines)
- ☐ Biological Hazards and Controls (e.g., poison ivy, spiders)
- ☐ Temperature Extremes (heat or cold stress symptoms and controls)
- ☐ Engineering Controls
- ☐ Monitoring Instruments and Personal Monitoring, Action Levels
- ☐ Perimeter Monitoring - Type and Frequency
- ☐ Near Misses/Hazard ID including worker suggestions to correct and work practices to avoid similar occurrences
- ☐ Incident Reporting Procedures
- ☐ Hazardous Materials Spill Procedures
- ☐ Medical Emergency Procedures (e.g., exposure control precautions, location of first aid kits, etc.)
- ☐ Route to Hospital and Medical Care Provider Visit Guidelines
- ☐ ______________________

Safety Suggestions by Site Workers: ☐ None Provided ☐ Input Given (record in field below)

Action Taken on Previous Suggestions: ☐ None Needed ☐ Actions (record in field below)

Injuries/Incidents/Personnel Changes since last meeting: ☐ None ☐ Occurred (record in field below)

Tailgate Safety Meeting Report

Observations of unsafe work practices/conditions that have developed since previous meeting:

Location of (or changes in the locations of) evacuation routes/safe refuge areas:

☐ Applicable Procedures (AHA, JHA, SWP):

☐ Field Level Risk Assessment Completed (FLRA) (e.g. new hazards identified due to site or equipment conditions):

Attendee signatures below indicate acknowledgment of the information and willingness to abide by the procedures discussed during this safety meeting

Name (Print)	Company	Signature

Meeting Conducted by: ______________________ Title: ______________
Print Name

Signature: ______________________ Time: ______________

PROJECT SITE
OCCUPATIONAL HEALTH & SAFETY INSPECTION CHECK LIST

DATE:	**PROJECT LOCATION:**	**NAME (S) OF PERSON/PEOPLE CONDUCTING INSPECTION:**
PROJECT NUMBER:	**PROJECT MANAGER:**	**PROJECT NAME:**
SITE ACTIVITIES:	**WEATHER:**	**PERSONNEL PRESENT (AMEC, CLIENT, & CONTRACTORS):**

This checklist documents AEI & Subcontractor safety compliance at the project.
Please check (√) the appropriate box next to the specific item.

"Y" **Indicates compliance.**
"N" **Indicates non-compliance and requires immediate correction.**
"NA" **Indicates that the item is not applicable at the project.**
"CA" **Corrective action – Initials of responsible person to complete.**

	Planning and Documentation	Y	N	N/A	CA
1	Project Specific Job Hazard Assessment completed	☐	☐	☐	
2	Site Specific Safety Plan Available and signed	☐	☐	☐	
3	Project safety program for subcontractors submitted	☐	☐	☐	
4	HAZCOM/WHMIS program provided	☐	☐	☐	
5	MSDS available	☐	☐	☐	
6	Tailgate/Tool Box safety meetings held	☐	☐	☐	
7	Project orientation provided	☐	☐	☐	
8	Project Specific Safety training provided where necessary	☐	☐	☐	
9	First-aid supplies available	☐	☐	☐	
10	Qualified first aid person on project	☐	☐	☐	
11	Safety bulletins, rules, regulations, etc. posted	☐	☐	☐	
12	Emergency telephone numbers posted	☐	☐	☐	
13	Communication system in place	☐	☐	☐	
14	Signs posted where necessary	☐	☐	☐	
	General Safety	**Y**	**N**	**N/A**	**CA**
15	Slip, Trip & Fall hazards identified and cleared	☐	☐	☐	
16	Utility mark out completed	☐	☐	☐	
17	Overhead hazards identified	☐	☐	☐	
18	Safety Zones established (Exclusion, Contamination Reduction, Support)	☐	☐	☐	
19	Decontamination procedure/area established	☐	☐	☐	
20	Confined space procedures followed	☐	☐	☐	
21	Adequate ventilation in work areas	☐	☐	☐	
22	Adequate lighting provided and maintained in work areas	☐	☐	☐	
23	Sharp objects properly disposed of or protected	☐	☐	☐	
24	Proper storage of tools and materials	☐	☐	☐	
25	Accumulation of contaminated debris within acceptable levels	☐	☐	☐	
26	Adequate trash containers provided	☐	☐	☐	
27	Adequate number of toilets and washing facilities	☐	☐	☐	

	Personal Protective Equipment	Y	N	N/A	CA
28	Hardhats worn by workers	☐	☐	☐	
29	Safety glasses or protective eyewear used when required	☐	☐	☐	
30	Appropriate respirators used when required	☐	☐	☐	
31	Proper work shoes worn by all employees	☐	☐	☐	
32	Appropriate hearing protection used when required	☐	☐	☐	
33	Safety vests worn when required	☐	☐	☐	
34	Proper protective clothing used when required	☐	☐	☐	
35	Personal Flotation Devices (PFD) utilized when required	☐	☐	☐	

	Fire Protection and Prevention	Y	N	N/A	CA
36	Fire suppression equipment available and inspected routinely	☐	☐	☐	
37	Flammable and combustible materials stored properly	☐	☐	☐	
38	Flammable liquid stored in approved safety cans	☐	☐	☐	
39	Safety cans have self closing lids and flame arresters	☐	☐	☐	
40	Combustible waste materials routinely disposed of	☐	☐	☐	
41	Flammable containers properly labeled	☐	☐	☐	

	Tools: Hand and Power	Y	N	N/A	CA
42	Proper tool used for job	☐	☐	☐	
43	Hand tools in good condition and free of visible defects	☐	☐	☐	
44	Guards in place	☐	☐	☐	
45	Tool handles not broken	☐	☐	☐	
46	Electric tools double insulated or properly grounded	☐	☐	☐	
47	Power cords on electric tools in safe working condition	☐	☐	☐	
48	Powder actuated tools: operators certified	☐	☐	☐	
49	All belts, chains, sprockets and pulleys properly guarded	☐	☐	☐	
50	Power finishing machines equipped with dead man's switch	☐	☐	☐	

	Electrical	Y	N	N/A	CA
51	GFCI or assured grounding in use	☐	☐	☐	
52	Extension cords are approved three wire construction grade	☐	☐	☐	
53	Extension cords free of visible defects	☐	☐	☐	
54	Extension cords not running through water	☐	☐	☐	
55	Extension cords strung to avoid damage	☐	☐	☐	
56	Temporary lighting properly guarded	☐	☐	☐	
57	Temporary lighting properly suspended	☐	☐	☐	
58	All live circuits and panels clearly posted	☐	☐	☐	
59	Live panels secured to prevent unauthorized access	☐	☐	☐	
60	Only qualified persons working on live circuits and panels	☐	☐	☐	

	Fall Protection	Y	N	N/A	CA
61	Excavations properly guarded to prevent fall	☐	☐	☐	
62	Workers by excavation openings utilized fall protection if deeper than 6’	☐	☐	☐	
63	Full body harnesses used as fall protection at unprotected edges greater than 6’	☐	☐	☐	
64	Harnesses are properly worn by worker	☐	☐	☐	
65	Lanyard of proper length to limit fall to less than six feet	☐	☐	☐	
66	Lanyards secured to proper anchorage	☐	☐	☐	
67	Lifelines secured to proper independent anchorage	☐	☐	☐	
68	Controlled access zone warning lines in place	☐	☐	☐	

	Heavy Equipment (Backhoe,Excavator, Drill Rig, Loader)	Y	N	N/A	CA
69	Permits, inspections and licenses in order and valid	☐	☐	☐	
70	Daily inspection of equipment performed	☐	☐	☐	
71	Backup alarm operational	☐	☐	☐	
72	Signal person provided	☐	☐	☐	
73	Clearance to power lines is adequate (20')	☐	☐	☐	
74	Backhoe outriggers fully extended and supported during operation	☐	☐	☐	
75	Boom down prior to drill rig movement	☐	☐	☐	
76	Personnel properly positioned	☐	☐	☐	

	Ladders	Y	N	N/A	CA
77	Ladders are free of visible defects	☐	☐	☐	
78	Ladders proper height for work	☐	☐	☐	
79	Workers do not overextend reach of ladders	☐	☐	☐	
80	Ladders erected on solid level surface	☐	☐	☐	
81	Nonconductive ladder is used when necessary	☐	☐	☐	
82	A-frame ladders used in open position	☐	☐	☐	
83	Workers do not use top two steps of A-frame ladders	☐	☐	☐	
84	Workers do not climb back of A-frame ladders	☐	☐	☐	
85	Straight ladders secured	☐	☐	☐	
86	Straight ladders extend 36 inches above landing	☐	☐	☐	
87	Straight ladders pitched at 1 to 4 ratios	☐	☐	☐	
88	No skid feet provided on straight ladders	☐	☐	☐	

	Public Liability	Y	N	N/A	CA
89	Fencing provided where necessary	☐	☐	☐	
90	Warning signs posted where necessary	☐	☐	☐	
91	Flag persons used to direct pedestrian and vehicle traffic if needed	☐	☐	☐	

	Life Safety	Y	N	N/A	CA
92	Evacuation plans posted	☐	☐	☐	
93	Paths of emergency egress kept clear	☐	☐	☐	
94	Rescue equipment and team available	☐	☐	☐	

	Excavation	Y	N	N/A	CA
95	Sheeting, shoring and bracing in place (excavation greater than 4')	☐	☐	☐	
96	Sloping and bracing where necessary (excavation greater than 4')	☐	☐	☐	
97	Ingress and egress provided (excavation greater than 4')	☐	☐	☐	
98	Guardrails in place (excavation greater than 4')	☐	☐	☐	
99	Spoils two feet from excavation (excavation greater than 4')	☐	☐	☐	

NOTE: Based on the results of this inspection, all causing, exposing and contractors responsible for correcting deficiencies and non-compliance will be contacted in writing to perform necessary corrective actions.

COMMENTS/ NOTES:

___

___

Use back or additional pages for comments and explanations.

wood.

FIELD ACTIVITY DAILY LOG

DAILY LOG	DATE			
	NO.			
	SHEET		OF	

Project Name:	Project No.

Installation/Investigation Area:
Description of daily activities and events:
List Samples Collected:

Visitors on Site:	**Deviation from plans:**
Weather conditions:	**Important telephone calls / photos taken:**
Personnel on Site:	
Name/Signature:	**Date:**
QA/QC'd by:	**Date:**

EQUIPMENT BLANK SAMPLING RECORD

wood.

PROJECT NAME	SAMPLE LOCATION	PROJECT NO
Stratford Army Engine Plant		3616176064

Rinsate Blank Sample I.D.:	
Date/Time:	
DI Water Source:	
Equipment Used:	

Sample I.D.s associated with above Rinsate Blank	Comment

Created By: BPW
Checked By:

wood.

Stratford Army Engine Plant - Feasibility Study

SEDIMENT CORE and GRAB SAMPLE LOG

Site: Stratford Army Engine Plant	**Project No.:** 3616176064	**Logger:**
Sub:	**WO:**	**Crew:**
Date:	**Time :**	**Vessel:**

Coordinates: Lat **Long**

Sampling Station:

Weather/Conditions:	Traffic:	Water Temp:

Measured Water Depth:	Total Boring Depth (refusal):
Number of intervals:	*Conditions:*
Off Site Sample: **Y N**	
Dup/MS/MSD:	

Interval	Recovery (ft)	Description (Odor, Color, Type, etc.)	Sample ID
0-1'			
1-2'			
3-4'			
4-5'			
5-6'			
6-7'			
7-8'			
8-10'			

Number of containers:					Equipment Sampler Type
Type of container:	40 ml VOA	Amber Jar	Plastic bag	other	Capacity

Live Organisms present	Y	N	**Comments**
Oil-Like Present	Y	N	
Odor Present	Y	N	
Debris Present	Y	N	

Photo Numbers

Depth (ft)	Casing Blows/ft	Sample No.	Sample Depth (ft)	Blows / 6"	Recovery (ft)	SOIL DESCRIPTION	USCS	Piez. Data	PID

Sample & Test Types: S:split spoon **R**:rock core **C**:2" dia. thin wall tube **U**: 3" thin wall tube **V**: field vane **TV**: torvane **PP**: pocket pen.

SOIL DESCRIPTION: Color, predominant soil type and gradation, secondary soil proportions and gradation, structure (stratified, varved, cemented/bonded, etc.), sand/gravel shape (angular, rounded, subangular, subrounded), consistency or density, plasticity, moisture. Other observations (debris, organics, refusal/drilling difficulty, wash water/mud start depth, color variations [mottling, etc.]).

Water Level Readings				
		Depth of (ft)		
Date	Time	Casing	Hole	Water

Project Information	
Client:	
Project:	
Project No.:	
Location:	
Contractor:	
Driller:	Drill Rig:

Equipment	ID	Hammer/Drop
Casing / Augers:		
Split spoon:		
SPT Info:		
Core Barrel ID:		
Core Barrel Type:		
Other:		

Ground Surface Elev. (ft)	
Date Boring Completed:	
Boring Logged By:	

wood.

BORING ______

page # 1

Depth (ft)	Casing Blows/ft	Sample No.	Sample Depth (ft)	Blows / 6"	Recovery (ft)	SOIL DESCRIPTION	USCS	Piez. Data	PID

Sample & Test Types **S**:split spoon **R**:rock core **C**:2" dia. thin wall tube **U**: 3" thin wall tube **V**: field vane **TV**: torvane **PP**: pocket pen.

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Ground Surface Elev. (ft)	
Date Boring Completed:	
Boring Logged By:	

wood.

BORING ______

page