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The Trusted Integrator for Sustainable Solutions

21 October 2011

U.S. Environmental Protection Agency Region III
Attn: Mr. Mike Towle
On-Scene Coordinator
1650 Arch Street
Philadelphia, Pennsylvania 19103

Attn: Mr. Mike Towle

Subject: DRAFT Field Sampling Plan – Removal Site Evaluations

Project: Governor Bacon Health Center- Landfill Area
EPA Contract No.: EP-S3-10-05
TDD No.: WS01-11-06-004
Document Control No.: W0071.1A.00204

Dear Mr. Towle:

Weston Solutions, Inc. (WESTON[®]) is submitting the Draft field sampling plan (FSP) for the Governor Bacon Health Center Landfill Area site. The FSP summarizes the planned removal site evaluation activities for XRF screening, soil, and shallow ground water sampling at the site. If you have any questions regarding this report, please call me at (610) 324-2117.

Very truly yours,

WESTON SOLUTIONS, INC,

A handwritten signature in dark ink, appearing to read "Charles Rapone".

Charles Rapone
Project Task Lead

**DRAFT
FIELD SAMPLING PLAN**

**REMOVAL SITE EVALUATION
GOVERNOR BACON HEALTH CENTER- LANDFILL AREA
SITE
DELAWARE CITY, NEW CASTLE COUNTY, DELAWARE**

**EPA CONTRACT NO.: EP-S3-10-05
TECHNICAL DIRECTION DOCUMENT NO.: WS01-11-06-004
DOCUMENT CONTROL NO.: W0071.1A.00204**

Prepared For:



**U.S. ENVIRONMENTAL PROTECTION AGENCY REGION III
HAZARDOUS SITE CLEANUP DIVISION
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Prepared By

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WESTON PROJECT No.: 20403.012.001.0071.00

OCTOBER 2011

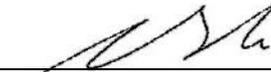
**DRAFT
FIELD SAMPLING PLAN
REMOVAL SITE EVALUTION
GOVERNOR BACON HEALTH CENTER- LANDFILL AREA SITE
DELAWARE CITY, NEW CASTLE COUNTY,
DELAWARE**



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ACRONYM LIST

ALARA	a low as reasonably achievable
bgs	below ground surface
C&D	Chesapeake & Delaware
CIH	Certified Industrial Hygienist
CLP	Contract Laboratory Program
cm	centimeter
CWM	Clear-Wide Mouth
DNREC	Department of Natural Resources and Environmental Control
DQR	Data Quality Report
EPA	U.S. Environmental Protection Agency
FID	Flame Ionization Detector
FSP	Field Sampling Plan
GBHC	Governor Bacon Health Center
GPR	ground penetrating radar
IDW	investigation derived wastes
ISM	inorganic superfund methods
MEC	munitions and explosives of concern
N/A	not applicable
OASQA	Office of Analytical Assurance and Quality Assurance
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
oz	ounce
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Poly Chlorinated Biphenyl
PID	Photo Ionization Detector
PPE	personal protective equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	quality control
RI	remedial investigation
SOP	Standard Operating Procedure
SOW	Statement of Work
START	Superfund Technical Assessment and Response Team
TAL	Target Analyte List
TAT	Turnaround time
TCL	Target Compound List
TDD	Technical Direction Document
U.S. EPA	United States Environmental Protection Agency
UFP	Uniform Federal Policy
UXO	unexploded ordnance
VCP	Voluntary Cleanup Program
WESTON	Weston Solutions, Inc.
XRF	X-Ray Fluorescence

1.0 INTRODUCTION

Under the Eastern Area Superfund Technical Assessment and Response Team (START) Contract No. EP-S3-10-05, Technical Direction Document (TDD) No. WS01-11-06-004, the U.S. Environmental Protection Agency (EPA) Region III tasked Weston Solutions, Inc. (WESTON[®]) to conduct a Site visit and sampling activities for a removal site evaluation of the Governor Bacon Health Center (GBHC) – Landfill Area (Site), adjacent to the Delaware River in Delaware City, New Castle County, Delaware.

The objective of the sampling assessment is to provide sufficient information to allow the EPA On Scene Coordinator (OSC) to determine if a potential human health or environmental threat is present. The purpose is to determine if possible releases could pose an imminent and substantial threat to public health and/or the environment. The areas of concern are sections of the landfill which are eroding into the Delaware River, and areas immediately upland of the eroding areas. In-situ field screening will be conducted utilizing x-ray fluorescence (XRF) analysis on surfaces of soil or and/or sediment. Sampling will include soil, sediment, and shallow ground water. All samples will be submitted to a Contract Laboratory Program (CLP) laboratory analysis of various parameters including: TAL metals and mercury, SVOCs, pesticides, PCB's (TCL), and herbicides. Liquid samples will be analyzed for TCL/TAL, herbicides and PCB congeners. All samples will be submitted for routine turnaround time of 28 days for unvalidated data.

The Site is located at a former military installation adjacent to the Delaware River. Portions of the landfill area are currently eroding into the Delaware River. Due to the Site's past history, the landfill area has a potential to contain ordnance materiel and historically significant artifacts. Samples will be collected to properly characterize the entire eroding area of the landfill and areas directly upland to the eroded areas. Approximately 30 sample locations at multiple depths will be considered. The exact locations will be determined based on conditions observed in the field, identified data gaps interpreted from previous investigations, and at the discretion of the OSC. Sampling activities will also be conducted with the oversight from an onsite qualified unexploded ordnance (UXO) Technician to perform avoidance activities during intrusive sampling. Also, sampling activities will be conducted in the presence of an archeologist to identify potential historically significant artifacts, if necessary.

Surface and subsurface soil and sediment sampling will consist of UXO avoidance sweeps and artifact evaluations at every potential sample location. For subsurface soil sampling, test pits will be dug using a mini-excavator. During excavations, the unearthed layer and excavated material will be screened for UXO and historically significant artifacts. Soil and sediment will be initially screened for metals using XRF technology.

This field sampling plan (FSP) presents site background information in Section 2.0, outlines project objectives and data use in Section 3.0, describes proposed field activities in Section 4.0, summarizes analytical parameters and methods in Section 5.0, specifies quality assurance and quality control (QA/QC) procedures in Section 6.0, presents proposed deliverables in Section 7.0, and outlines the proposed project schedule in Section 8.0. All references cited in this FSP are listed after the text. WESTON developed this FSP in accordance with the provisions of the *EPA Region III START 4 Program-Wide UFP QAPP* (WESTON, 2010a).

2.0 BACKGROUND

This section describes the site location, presents a description of the site, and summarizes previous site investigation activities.

2.1 SITE LOCATION

The Site is located in Delaware City, New Castle County, Delaware, as shown in Figure 1. The geographic coordinates of the approximate center of the Site are 39.5691° north latitude and - 75.5775° west longitude.

2.2 SITE DESCRIPTION

The Governor Bacon Health Center/Fort DuPont State Park is located in Delaware City, New Castle County, Delaware. The Site is generally bounded by the Delaware River to the east, the Chesapeake & Delaware (C&D) Canal to the south and the Delaware City Branch Channel to the west and north. The site consists of approximately 382 acres consisting of vegetated land, wooded and marshy areas. The Site is approximately 1 mile south of Delaware City.

2.3 SITE HISTORY

Fort DuPont is a former military base, which was used from the Civil War through World War II. The main purpose of Fort DuPont, along with the nearby Fort Delaware, and Fort Mott, was to protect the Delaware River and its shipping industry from attack. Following World War II, the military base was turned over to the State of Delaware and has been used for various purposes, including the Governor Bacon Health Center. The Health Center is currently operated and occupied by the Delaware Division of Public Health. Portions of the land were dedicated as Fort DuPont State Park in 1992. Fort DuPont State Park is operated by Department of Natural Resources and Environmental Control (DNREC), Division of Parks and Recreation.

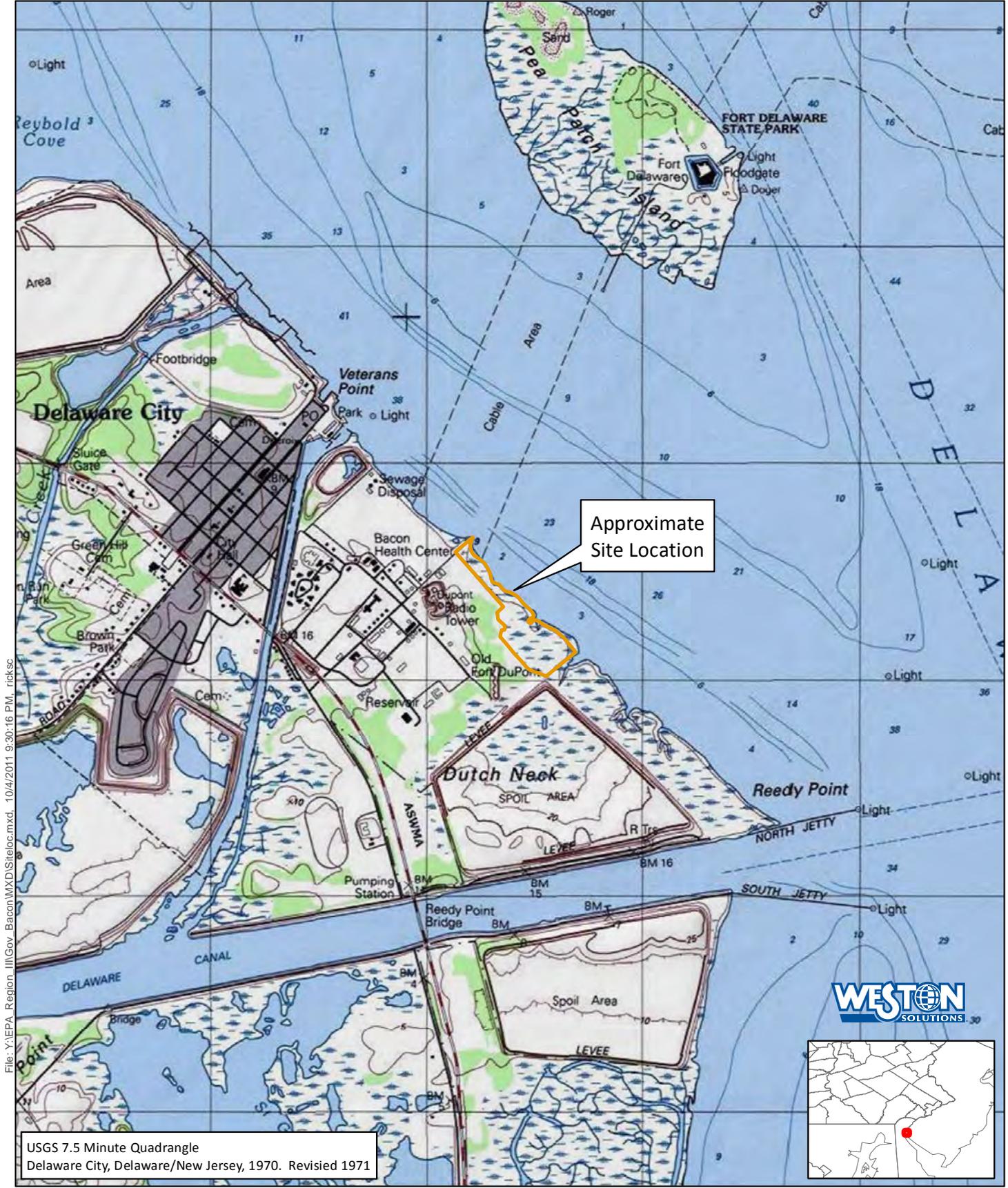
Historically, areas of the Site were used as a landfill for the military base and its operations. The contents and exact construction details of the landfill are not known. There is a potential for UXO related items and other military related materiel to be present in the landfill.

2.4 PREVIOUS INVESTIGATIONS

A previous investigation by Ecology and Environment, Inc. in 1992 revealed contaminated sediments on the bank of the Delaware River where the edge a former landfill (Landfill #1) on the Site had been exposed by erosion. Contaminants detected included several Polycyclic Aromatic Hydrocarbons (PAHs), one PCB (Aroclor 1254), petroleum hydrocarbons, and metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, and zinc). The report also noted that metal debris from the landfill was visibly eroding from the riverbank. Sediment samples were not collected as part of this investigation due to the potential for unexploded ordnance along the bank of the Delaware River. Ecology and Environment, Inc. recommended further delineation of metals contamination in sediments along the river in order to determine the potential for threats to human and environmental health. Ecology and Environment acknowledged that, while no explosive ordnance was detected during the investigation, potential for future exposures does exist (Ecology and Environment, 1992).

A Site Investigation in 2003 by DNREC Site Investigation and Restoration Branch collected samples from Landfill Area #1, Landfill Area # 2, the former DDT Building Area, the former

Mosquito Control Building Area, and the Drum Fire Area. The analytical data generated from the collection and laboratory analysis of the environmental samples were subsequently evaluated to determine the potential for human and environmental exposures to hazardous substances. Soil samples from Landfill Area #1 had lead concentrations as high as 9,090 mg/kg and Arsenic concentrations as high as 19.9 mg/kg. Sediment samples were not collected along the banks of the Delaware at Landfill Area #1 as part of this investigation due to the potential for unexploded ordnance along the bank of the Delaware River. DNREC recommended that any prospective purchaser or future developer of the Governor Bacon/Fort DuPont site enter into the DNREC Voluntary Cleanup Program (VCP) in order to conduct further investigation, in the form of a remedial investigation (RI) and cleanup of the Landfill 1 of the Governor Bacon Health Center/Fort DuPont site.



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USGS 7.5 Minute Quadrangle
 Delaware City, Delaware/New Jersey, 1970. Revised 1971



Legend

Approximate Site Location

Figure 1
 Site Location Map
 Governor Bacon Landfill #1
 Wilmington, DE



Legend

-  Approximate Site Location
-  Riverview Walking Trail



Figure 2
 Site Layout Map
 Governor Bacon Landfill #1
 Wilmington, DE

3.0 OBJECTIVE AND DATA USE

The objective of the sampling assessment is to provide sufficient information to allow the OSC to determine if contaminants on the Site could pose imminent and substantial threat to public health and/or the environment. To accomplish this, WESTON proposes to collect sediment and shallow groundwater samples along the eroded side of Landfill #1 for further assessment.

4.0 PROPOSED ACTIVITIES

This section describes the scope of work, WESTON project personnel, proposed sampling activities, and equipment decontamination procedures for the project.

4.1 SCOPE OF WORK

As part of the assessment activities conducted at the Site, WESTON will perform the following tasks:

- Submit an analytical request form outlining required laboratory analysis, detection limits and turn-around times in a timely fashion, to obtain a laboratory assignment under the EPA CLP.
- Identify sampling locations in the field based on:
 - the significance of landfill material eroding into the Delaware River.
 - data collected in previous studies.
 - the direction of a UXO technician.
 - discretion the OSC.
 - strategies identified in this FSP.
 - field conditions during the time of sampling.
- Collect sediment and soil samples from eroded areas of Landfill #1 adjacent to the Delaware River, and areas upland to the eroding edge. Multiple samples, at varying depths, may be collected from approximately 30 locations based on conditions observed in the field. Of these 30 soil and sediment samples, the following analyses may be performed:

- All samples will be screened in the field for metals using XRF technology.
- Suspected organic contamination will be screened onsite using a Photo Ionization Detector (PID), or Flame Ionization Detector (FID).
- All samples will be analyzed for TAL metals and mercury.
- Suspected soil/sediment samples may be analyzed for SVOC/Pesticide/PCBs.
- Approximately five samples will undergo herbicide analysis.
- Collect samples from shallow groundwater or seeps (approximately five) for TAL metals analysis, TCL SVOCs, pesticides, herbicides analysis, and also PCB congener analysis.
- Ship samples for analysis to an EPA CLP laboratory for analysis on standard turnaround time (TAT).
- Record each sampling location using a GPS and create a Site sketch detailing sample locations.
- Provide recommendations regarding the potential for erosion of landfill material into the Delaware River.
- Prepare and submit a Trip Report detailing laboratory analytical results, on-site XRF analysis results, sample locations, and other findings during the sampling event.

4.2 KEY PROJECT PERSONNEL

Management of the Site will be as documented in the *EPA Region III START 4 Program-Wide UFP QAPP* (WESTON, 2010a). Refer to the QAPP for an organizational chart, communication pathways, personnel responsibilities and qualifications, and special personnel training requirements.

Table 1 outlines the personnel that will be involved in planning and/or technical activities performed for this data collection activity.

TABLE 1
PROPOSED WESTON PROJECT PERSONNEL

Project Function	Name	Role
Project Task Lead	Charles Rapone	The Project Task Lead is responsible for implementing all activities identified in the TDD; responsible for developing and implementing the site health and safety plan; has authority to commit resources necessary to complete the work; prepares deliverables required by the TDD; communicates directly with the EPA OSC, the project team, and any other personnel needed to complete the project.
Field Support Personnel	To be determined	The Field Support Personnel perform necessary sampling, as well as other tasks defined in the TDD or assigned by the EPA OSC or the WESTON project task lead; communicate directly with the WESTON project task lead and, when appropriate, the EPA OSC.
UXO Technician	To be determined	The UXO Technician will perform on-site UXO avoidance support during sampling, and other earth disturbing activities.
Health and Safety Officer	George Crawford (CIH)	The Health And Safety Officer oversees and supports development of the site health and safety plan; communicates directly with the WESTON project task lead to ensure that all corporate health and safety protocols applicable to the site are being followed.
Sampling Coordinator	Christina Schauss	The Sampling Coordinator coordinates with the WESTON project task lead and chemist and procures or arranges necessary laboratory services. If necessary, the sampling coordinator communicates directly with the WESTON project task lead, field support personnel, EPA OSC, and START program manager.
Graphics and Mapping Specialist	Corey Ricks	The Graphics And Mapping Specialist generates maps and other figures for project deliverables or presentations; assists the WESTON project task lead or other personnel when global positioning system activities are required. Prepares Scribe database.
Project Work Scope Manager	Bob McGlade	The Project Work Scope Manager assists the WESTON project task lead as necessary to implement the project; commits or helps obtain all necessary company resources to meet the objectives of the TDD; provides document quality control reviews; addresses and helps resolve project management issues with the WESTON project task lead in addition to addressing quality assurance/quality control aspects of the START contract.

NOTES:

CIH – Certified Industrial Hygienist
EPA – U.S. Environmental Protection Agency
OSC – On-Scene Coordinator
QA – Quality Assurance
START – Superfund Technical Assessment and Response Team
TDD – Technical Direction Document
UXO – Unexploded Ordnance
WESTON – Weston Solutions, Inc.

4.3 SAMPLE COLLECTION

This section describes the proposed sampling activities and summarizes the identifiers, quantities, and locations for each sample to be collected as part of the soil sampling. All sample locations will be recorded using a hand-held GPS unit.

4.3.1 Unexploded Ordnance (UXO) Avoidance

The landfill area at the GBHC was once used as a military landfill, and may potentially contain UXO and other munitions and explosives of concern (MEC). Also the former landfill contains large quantities of metallic debris. Due to the potential for ordnance related items in the landfill a qualified, trained UXO Technician will be onsite to perform UXO avoidance activities and to assist with the sampling effort. The UXO Technician will use a Schonstedt magnetometer, or equivalent, to locate ferrous metal below ground surface (bgs) to a depth of approximately 2 feet. Because soil/sediment sample depths may go to a depth of 5 feet bgs, UXO detection will occur at 2-foot intervals for each sample location. Due to the amount of metallic debris observed throughout the site, UXO avoidance methods for the use of a Geoprobe[®] soil sampling would be impractical. The use of a mini-excavator is recommended to avoid UXO, and sample at depth. This method will allow fill material to be dug up and laid out for UXO and archeological identification, if necessary. The upland portion of the landfill is covered in a dense stand of phragmites. Areas to be sampled will need to be cleared of vegetation for a UXO avoidance survey to occur. A transect of vegetation in the upland portion of the landfill will need to be cleared to allow access for a UXO avoidance survey for the mini excavator to access sample locations.

Sediment samples to be collected along the shoreline and the banks of the river will be collected at low tide to maximize exposed areas along the river. Samples will be collected by wading into the water and collecting a grab sample with a hand auger. UXO avoidance will need to be conducted prior to sample collection. A Schonstedt magnetometer will be used to detect any metal objects below the water surface o locate a safe area to collect a grab.

4.3.2 Historical Artifacts

Historically significant artifacts may exist within the fill material of the Landfill at the GBHC. Some items observed during a Site walk within the fill material along the shoreline may be considered historical artifacts (pottery, military buttons, metallic hypodermic needles, etc). Due to archaeological concerns that exist at the site, an archaeologist may need to accompany the sampling team or be available for consultation.

4.3.3 X-Ray Fluorescence Spectrometry (XRF) Screening

XRF analysis will be performed in-situ in accordance to EPA method 6200-Section 11.3 (EPA, 2007). The XRF instrument will be operated according to the manufacturer's recommendations in in-situ mode. All federal, State, and local regulations will be followed while operating, or transporting the instrument, in addition to following WESTON FLD 63 (WESTON, 2010b). In-situ mode involves analysis of an undisturbed soil or bulk sample. For in-situ analysis, any large or non-representative debris will be removed from the soil surface before analysis. This debris includes rocks, pebbles, leaves, vegetation, roots, and concrete. Also, the soil surface must be as smooth as possible so that the probe window will have good contact with the surface. This may require some leveling of the surface with a stainless-steel, or plastic trowel. Soil or sediment sample locations should not be saturated with water greater than 5 to 20%. In preparation for analysis, the recommended technique for in-situ analysis is to tamp the soil to increase soil density and compactness for better repeatability and representativeness. Source count times for in-situ analysis usually range from 30 to 120 seconds, but source count times will vary among instruments and depending on the desired method sensitivity. Due to the heterogeneous nature of the soil samples, in-situ analysis can provide only "screening" type data. Because of the non-destructive nature of in-situ XRF analysis, sample material can be used for confirmation testing, if necessary.

Sediment or soil samples may be assessed ex-situ using XRF technology. Sediment or soil samples containing a high moisture content will be dried in an oven prior to homogenizing the sample, subsequently followed by XRF analysis. The instrument will be operated using all manufacturer's recommendations. Generally, these ex-situ procedures can give analytical results that are more representative of the soil/sediment being analyzed.

Both radioisotope containing handheld XRF analyzers and the X-Ray tube type handheld XRF analyzers have the potential for worker exposure to ionizing radiation. Because the XRF instrument will produce a small amount of radiation when energized, a low as reasonably achievable (ALARA) approach will be followed, and with monitoring of operators following a dosimeter program. All operators and transporters of the equipment will be properly trained in the use, handling, and transport of the instrument.

4.3.4 Sediment and Soil Sampling

Up to 30 sample locations from the edge of the Delaware River along the eroded side of Landfill Area #1 and areas immediately upland from the leading edge, will be collected in accordance with WESTON Standard Operating Procedure (SOP) No. 302, "*Surface Soil Sampling*" (WESTON, 2006a), WESTON SOP 304 "*Subsurface Soil Sampling*" (WESTON, 2007a) and also with WESTON SOP No. 303 "*Sediment Sampling*" (WESTON, 2007b). All sample locations and their depth intervals will be screening using a PID, FID, or similar equipment.

Sediment samples will be collected during low tide in order to maximize exposed areas along the edge of the Delaware River. Samples will be collected along the edge of the Delaware River by wading out into the water and using a hand auger for a grab sample. Sediment will first be placed into an aluminum pan and homogenized, then placed directly into an appropriate container. Due to the large amounts of debris and unstable ground, sediment sample collection using a mini-excavator at sample locations along the water's edge may be impractical. In this case sediment samples will be excavated at depth using a shovel, where practicable.

Due to the large amount of metallic and other debris in the landfill area, the use of Geoprobe sampling equipment will likely not be feasible due to the inability to perform proper UXO detection. Soil samples may be collected by use of a mini-excavator to avoid potential UXO, identify historical artifacts, and sample at depth. This method will allow fill material to be dug up and laid out for UXO and archeological identification, if necessary. Following sampling, the excavated material will be backfilled in place.

Prior to sampling, any vegetation or debris will be removed with a stainless steel trowel and the soil will be loosened in preparation for sample collection. Surface soil samples will be collected from each location using a dedicated plastic scoop and nitrile sample gloves. Soil samples collected at depth will be excavated using a mini excavator or other means to unearth the sample. The sample will be collected from the excavated material using dedicated plastic scoops. Soil will first be placed into an aluminum pan and homogenized. Once homogenized, the soil will then be placed directly into an appropriate container.

4.3.5 Shallow Ground Water Sampling

Approximately five shallow groundwater or seeps sample may be collected during the sampling effort. Exact locations in the general landfill area shall be determined in the field by the OSC and sampling team. Should shallow perched groundwater or seeps be encountered, samples will be collected in accordance with WESTON SOP No. 203, “*Surface Water Sampling*” using a grab method or a peristaltic pump with dedicated tubing (WESTON, 2007c).

4.4 SAMPLE HANDLING AND PREPARATION

Sample handling, packaging, and shipment procedures will be in accordance with U.S. EPA Region III Sample Submission Procedures (EPA, 2009) and WESTON’s *Environmental Sample Shipment Checklist* (WESTON, 2010c). Samples to be shipped to a CLP laboratory will be recorded on the Scribe chain-of-custody and traffic report. Routine TAT will be established for all samples.

The WESTON site manager will assure that sample quality and integrity are maintained in accordance with WESTON’s *EPA Region III START 4 Program-Wide UFP QAPP* (WESTON, 2010a).

WESTON will use a unique identifier for each sample collected during the sampling. Samples will be designated in the following format:

- GBHC-S-MMDDYY-ft- ## (for soil and sediment samples)
- GBHC-GW-MMDDYY- ## (for Shallow groundwater samples)
- GBHC-FB-MMDDYY-## (for field blanks)

The “GBHC” portion of the sample designation refers to the Governor Bacon Health Center site name; “MMDDYY” represents the sample collection date; “S” represents a soil sample, “ft” in the soil sample designation indicates the depth interval of the sample in feet; “GW” represents a groundwater or seep sample; “FB” represents a field blank sample, “##” represents the numeric value for samples (01, 02, 03, etc).

4.5 EQUIPMENT DECONTAMINATION

Dedicated sampling equipment and personal protective equipment (PPE) will be double-bagged and disposed of as dry, industrial waste. Non-dedicated sampling equipment will undergo a gross decontamination with tap water, followed by a mixture of Alconox and tap water, and finished with a double rinse with distilled water, in accordance with WESTON SOP No. 301, “*Decontamination Procedures*” (WESTON, 2006b). Non-dedicated sampling equipment items will be decontaminated before each use. Dedicated sampling equipment will be disposed of after use. All investigation-derived waste will be double-bagged and disposed of as dry, non-hazardous industrial waste.

4.6 INVESTIGATION DERIVED WASTES

For purposes of this plan, investigation-derived wastes (IDW) are defined as any byproduct of the field activities that is suspected or known to be contaminated with hazardous substances. The performance of field activities will produce waste products, such as spent sampling supplies (e.g., tubing, foil pans, scoops, etc.), and expendable PPE Disposable sampling equipment and personal protective equipment will be double-bagged and disposed of as dry, non-hazardous waste.

5.0 ANALYTICAL PARAMETERS AND METHODS

WESTON will initially screen sediments, soil, and similar media in the field for lead and other metals using XRF technology. Based on the results of the XRF screening and conditions observed in the field, the number, location, and depths of the samples will be determined in the field by the sampling team. Soil and similar media will be analyzed for TAL metals and mercury in accordance with CLP Statement of Work (SOW) ISM01.2 (EPA, 2010). Suspected soil and

sediment locations will be sampled with OSC approval for analysis of SVOCs, pesticides and PCBs. It is expected for the OSC to request approximately five of these samples to also undergo herbicide analysis. Specific analytical methods and detection limits for the laboratory samples will be determined by EPA's contract minimum requirements. **Table 2** summarizes analytical parameters including matrices, analysis, analytical methods, containers and preservatives, detection limits, and maximum holding times for soil, sediment and aqueous samples proposed for collection during this sampling event.

**TABLE 2
SAMPLING AND ANALYSIS SUMMARY**

Matrix	Analytical Parameter	Analytical Method	Containers (Numbers, Size, and Type)	Preservation Requirements	Number of Sampling Locations	Number of Field Duplicates	Number of MS/MSDs ¹	Number of Blanks (Trip, Field, Equipment Rinsate) ²	Total Number of Samples to Laboratory ³	Detection Limit	Holding Time
Soil and Sediment	Lead and TAL instrument-specific metals	EPA 6200	In-Situ Testing XRF analyses	N/A	Approximately 30	N/A	N/A	N/A	N/A	N/A	N/A
Soil and Sediment	TAL Metals & Mercury	CLP SOM ISM01.2 ICP-AES	1 – 8 oz. CWM glass jar	Ice Only	Approximately 30	2	2	1 Field Blank	Approximately 35		180 days
Soil and Sediment	TCL SVOC/Pesticides /PCBs	CLP SOM ISM01.2-	8 oz. amber glass jar	Ice only	Approximately 15	1	1	1 Field Blank	Approximately 18		14 days
Soil and Sediment	Herbicide	CLP SOM ISM01.2-	8oz amber glass jar	Ice only	Approximately 5	1	1	1 Field Blank	Approximately 8		14 days
Shallow ground water/seeps	TCL SVOC/Pesticides /Herbicides/PCB Congeners	CLP SOM01.	2-1L amber glass jars	Ice Only	Approximately 5	1	1	1 Field Blank	Approximately 8		7 days
Shallow ground water/seeps	TAL Metals	CLP SOW ISM01.	500 mL poly jar	HNO ₃ pH<2, ice (Do Not Freeze)	Approximately 5	1	1	1 Field Blank	Approximately 8		180 days



NOTES:

¹ For the samples designated for MS/MSDs, triple volume is required for VOCs and double volume for other parameters.

² Trip blanks are required only for VOCs in water samples.

³ Total number of samples to the laboratory does not include MS/MSD samples.

CLP	=	Contract Laboratory Program
CRQL	=	Contract Required Quantitation Limits
CWM	=	Clear Wide Mouth
EPA	=	U.S. Environmental Protection Agency
ISM	=	Inorganic Superfund Methods
kg	=	kilogram
µg	=	microgram
mg	=	milligram
ml	=	milliliter
MS/MSD	=	Matrix Spike/Matrix Spike Duplicate
N/A	=	Not Applicable
oz	=	Ounce
SOW	=	Statement of work
TAL	=	Target Analyte List
XRF	=	X-ray fluorescence
pH<2	=	Less than a pH of two

6.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

This section describes the quality assurance (QA) and quality control (QC) procedures for personnel during the site sampling event, including responsibilities, field QC, XRF QC, laboratory QC, data evaluation, and management.

6.1 RESPONSIBILITY

The WESTON project task lead will be responsible for ensuring that sample quality and integrity are maintained in accordance with the EPA “Quality Assurance/Quality Control Guidance for Removal Actions” (EPA, 1990), and that sample labeling and documentation procedures are in accordance with WESTON’s *EPA Region III START 4 Program-Wide UFP QAPP* (WESTON, 2010a).

6.2 FIELD QUALITY CONTROL

Each screening and sampling location will be noted in the field logbook in accordance with WESTON SOP No. 101, “*Logbook Documentation*” (WESTON, 2006c). Field QA/QC measures will consist of collecting field duplicates and equipment blank samples, and maintaining photographic, logbook, and chain-of-custody documentation. These measures will be applied in accordance with WESTON’s *EPA Region III START 4 Program-Wide UFP QAPP* (WESTON, 2010a).

6.3 LABORATORY QUALITY CONTROL

Samples will be shipped to the EPA CLP laboratory assigned by the EPA Region III. Laboratory QC measures will consist of all QC elements identified in the CLP SOW and will include all forms and deliverables required in the SOW.

6.4 DATA VALIDATION

QA staff at the EPA Region III Central Regional Laboratory will validate data for the field samples sent to the CLP laboratory. The data will be validated in accordance with EPA Region

III modifications to the CLP national functional guidelines for data review, and will be validated to the inorganic IM2 level (EPA 1993, 1995).

6.5 DATA EVALUATION AND MANAGEMENT

This section describes how WESTON will (1) evaluate data generated from the sampling event; (2) determine whether data are representative of the site, and (3) make certain that data are secure and retrievable.

6.5.1 Data Evaluation

WESTON will evaluate the data obtained by the on-site XRF screening and laboratory analysis and prepare a table and draft Trip Report for the EPA OSC.

6.5.2 Data Representativeness and Completeness

This FSP is designed to obtain data representative of site conditions. If sampling activities vary significantly from this plan because of unexpected conditions in the field or other unforeseeable factors, the Trip Report will address how those variations affect data representativeness.

6.5.3 Data Management

WESTON will record XRF analytical results in the site logbook and update a Scribe database for the Site. If possible, the laboratory will submit analytical data in electronic form, as well as in the required hard-copy packages. WESTON will compare the electronic data deliverables with the hard-copy data packages to ensure consistency. After the data set has been approved by CLP QA/QC staff and the appropriate data qualifiers have been attached, the electronic data will be released to the WESTON project task lead for reporting. If analytical data are not available from the laboratory in electronic form, WESTON will manually enter the data into the Scribe database. Each hard-copy data package will be kept in the EPA site project file maintained by WESTON.

7.0 DELIVERABLES

When sampling and the appropriate QA/QC procedures are complete, WESTON will provide a draft Trip Report documenting laboratory sample and field screening results, sampling locations and sampling means and methods.

8.0 SCHEDULE

WESTON estimates that this FSP will be implemented in Late November or December 2011 for sampling actions. This timeframe will coincide with the seasonal die-back of invasive phragmites reeds. Their dense, vegetative growth could make access and UXO avoidance difficult. Because the sampling locations are adjacent to the Delaware River, sediment sampling will be dependent on the tides. Sediment samples will be collected at low tide, as some sample locations may be covered with water during high tides. Verbal results for soil, sediment, and shallow groundwater samples are due 21 days from the CLP laboratory. Validated data results are expected to be received 28 days after sample receipt. WESTON will provide a Trip Report summarizing and documenting the analytical data. **Table 3** below provides the proposed project schedule.

**TABLE 3
PROJECT SCHEDULE**

Task	Completion Timeframe
Receive and accept TDD	June 2011
Develop site health and safety plan	July 2011
Submit FSP	October 2011
Mobilize to site and sample	November or December 2011
Submit XRF results	5 days after completing field XRF analyses
Receive verbal data from the laboratory	21 days after laboratory receipt of samples
Receive validated analytical data	28 days after laboratory receipt of samples
Evaluate data	5 days after receipt of data
Submit Draft Trip Report	30 days after evaluating data
Write AOC and close out TDD	30 days after all work is completed

Notes:

AOC = Acknowledgement of Completion
FSP = Field Sampling Plan
WAM = Work Assignment Manager

EPA = U.S. Environmental Protection Agency
TDD = Technical Direction Document

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