FINAL PHASE I RCRA FACILITY INVESTIGATION WORK PLAN SWMU 76 - BUILDING 2300

For NAVAL ACTIVITY PUERTO RICO
EPA I.D. No. PR2170027203
CEIBA, PUERTO RICO

Prepared for:

Department of the Navy
NAVFAC SOUTHEAST
North Charleston, South Carolina

Prepared by:

Baker

Michael Baker Jr., Inc.
Moon Township, PA

Contract No. N62470-07-D-0502
DO 0002

March 31, 2009

IQC for A/E Services for Multi-Media Environmental Compliance Engineering Support

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Prepared by:

MICHAEL BAKER JR., INC.
Moon Township, Pennsylvania

I certify under penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that this document and its attachments were prepared either by me personally or under my direction or supervision in a manner designed to ensure that qualified and knowledgeable personnel properly gather and present the information contained therein. I further certify, based on my personal knowledge or on my inquiry of those individuals immediately responsible for obtaining the information, that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowingly and willfully submitting a materially false statement.

Signature David O Criswell

Name: __David Criswell, P.E.__

Title: __Deputy Base Closure Manager__

Date: __March 31, 2009__

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LIST OF ACRONYMS AND ABBREVIATIONS

Baker	Baker Environmental, Inc.
bgs	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CRQL	Contract Required Quantitation Limit
DI	Deionized
DO	Delivery Order
DPT	Direct Push Technology
DQO	Data Quality Objective
Eco-SSL	Ecological Soil Screening Level
ECP	Environmental Condition of Property
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
FID	Flame Ionization Detector
FMTUD	Facility Management Transportation and Utility Division
GIS	Geographic Information System
GPS	Global Positioning System
HAS	Hollow Stem Augers
ID	Internal Diameter
IDW	Investigation Derived Waste
LANTDIV	Naval Facilities Engineering Command Atlantic Division
MCL	Maximum Contaminant Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAPR	Naval Activity Puerto Rico
NAWQC	National Ambient Water Quality Criteria
NAVFAC	Naval Facilities Engineering Command
NFESC	Naval Facilities Engineering Service Center
NSRR	Naval Station Roosevelt Roads
NTU	Nephelometric Turbidity Unit
PAH	Polynuclear Aromatic Hydrocarbons
PID	Photoionization Detector
PMO	Program Management Office
PQO	Project Quality Objectives
PR LRA	Puerto Rico Local Reuse Authority
PVC	polyvinyl chloride

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SE	Southeast
SL	Screening Level
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
UCL	Upper Confidence Limit of the mean
ULM	Upper Limit of the Mean
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This document describes the activities required for the implementation of a Phase I Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) at Solid Waste Management Unit (SWMU) 76 –Building 2300 located at Naval Activity Puerto Rico (NAPR) formerly Naval Station Roosevelt Roads (NSRR), located in Ceiba, Puerto Rico.

This work plan has been prepared by Michael Baker Jr., Inc. (Baker), for the Navy Base Realignment and Closure (BRAC) Program Management Office (PMO) Southeast (SE) office under contract with the Naval Facilities Engineering Command (NAVFAC), SE (Contract Number N62470-07-D-0502, Delivery Order [DO] 0002).

1.1 NAPR Description and History

NAPR occupies over 8,800 acres on the northern side of the east coast of Puerto Rico (see Figure 1-1), along Vieques Passage with Vieques Island lying to the east about 10 miles off the harbor entrance. NAPR also occupies the immediately adjacent islands of Piñeros and Cabeza de Perro, as presented on Figure 1-2. The northern entrance to NAPR is about 35 miles east along the coast road (Route 3) from San Juan. The property consists of 3,938 acres of upland (developable) property and 4,955 acres of environmentally sensitive areas including wetlands, mangrove, and wildlife habitat. The closest large town is Fajardo (population approximately 37,000), which is about 5 miles north of NAPR off Route 3. Ceiba (population approximately 17,000) adjoins the west boundary of NAPR (see Figure 1-1).

The facility was commissioned in 1943 as a Naval Operations Base, and finally re-designated as a Naval Station in 1957. NSRR operated as a Naval Station from 1957 until March 31, 2004. NSRR has undergone operational closure as of March 31, 2004 and has been designated as Naval Activity Puerto Rico. NAPR will continue until the real estate disposal/transfer is completed. The mission of NAPR is to protect the physical assets remaining, comply with environmental regulations, and sustain the value of the property until final disposal of the property.

In anticipation of operational closure of NSRR the Naval Facilities Engineering Command, Atlantic Division (LANTDIV) prepared Phase I/Phase II Environmental Condition of Property (ECP) Reports to document the environmental condition of NSRR. Section 8132 of fiscal year 2004 Defense Appropriations Act, signed into law on September 30, 2003, directed that NSRR be disestablished within 6 months, and that the real estate disposal/transfer be carried out in accordance with procedures contained in the BRAC Act of 1990. This legislation requires that the base closure be conducted in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended by the Community Environmental Response Facilitation Act (CERFA).

The Draft Phase I ECP Report dated March 31, 2004 (LANTDIV, 2004) identified new sites at NAPR based on the results of a review of records, an analysis of historic aerial photographs, physical site inspections, and interviews with persons familiar with past and current operations and activities. The new ECP sites had not been previously identified or investigated under existing environmental program areas. A Phase II ECP field investigation was conducted in April 2004 to conduct environmental sampling to determine if a release/disposal actually occurred at any of the Phase I ECP sites recommended for further evaluation in the Phase I ECP and, if so, whether any potential risk to human health was present. The Final Phase I/ II ECP Report recommended additional sampling (to be undertaken as part of the RCRA Program) at several sites to permit a more detailed assessment (NAVFAC Atlantic, 2005). However, the decision was made by LANTDIV not to investigate ECP Site 22 (Building 2300) based on this site remaining under the ownership of the federal government.

The United States Environmental Protection Agency (USEPA) issued a RCRA 7003 Administrative Order on Consent (Environmental Protection Agency [EPA] Docket No. RCRA-02-2007-7301) identifying SWMU 76 (formerly referred to as ECP 22) as having documented releases of solid and/or hazardous waste and hazardous constituents, and requires the submittal to the USEPA for their approval an acceptable work plan to complete the equivalent of a Phase I RFI investigation. Following a public comment period the Consent Order became effective on January 29, 2007. This document meets the requirements for a Phase I RFI Work Plan.

1.2 Site Location and History

As outlined in the Final Phase I/II ECP Report (NAVFAC Atlantic, 2005), Bldg. 2300, the U.S. Army Reserve Boat Maintenance Facility, located in the waterfront area near Pier 1 (see Figure 1-2 for location) has, conducted painting and stripping (hydro-blasting) operations in the main maintenance bay, with waste frequently exiting the facility either into the trench drain and associated oil water separator or to the ground surface immediately outside the building. The facility was constructed around 1990 and has operated since then that time. Forrestal Drive is located approximately 175 feet to the north while an associated boat launch into Ensenada Honda is approximately 225 feet south of the site. Land uses in and around the site are predominantly industrial (including fuel storage and dispensation) and port activities at the Ensenada Honda. Given the close proximity of Building 2300 to Ensenada Honda, potential releases to sediment may have also occurred. No previous investigation or remediation at this facility is documented; however the nearby shoreline along the Ensenada Honda was included in previous investigations as discussed further in Section 2.2

As shown on Figure 1-3, Building 2300 (where the boat maintenance activities occurred) is located near the downstream end of two storm water sewers that discharge at Outfalls 010 and 011. These storm sewers serve the drainage boundaries of surrounding areas including one which serves the SWMU 7/8 area (shown to the northeast of SWMU 76 on Figure 1-2). These drainage boundaries are also shown on Figure 1-3. The SWMU 7/8 (Tow Way Fuel Farm [TWFF]) area was the subject of previous investigations including the additional data collection activities (reported in Baker, 2003a) in support of a Corrective Measures Study Task I Report (Baker, 2003b). Surface water and sediment samples were collected during this investigation from several locations, including areas near the Ensenada Honda shoreline. As shown on Figure 3-1, several of these sample locations were established downgradient of SWMU 76. In addition, several groundwater monitoring wells were installed in the vicinity of SWMU 76 (see Figure 1-3) as part of field investigations associated with the TWFF (SWMU 7/8).

1.3 Objectives

The purpose of this work plan is to describe the activities necessary to obtain the data to further characterize the impacts to the environment due to past operations at SWMU 76. A Phase I RFI is required as outlined in the NAPR RCRA 7003 Order issued by the USEPA Region II. Therefore, this RCRA Order provides for the development of a work plan, field investigation, and reporting on the findings of the investigation with recommendations on follow-up actions necessary to ensure protection of human health and the environment.

The site location and its immediate surroundings are shown on Figure 1-3. The objectives of the investigation to be performed at SWMU 76 are outlined below.

Based on the lack of previous environmental sampling in the immediate vicinity of the site and the request of the RCRA 7003 Order, an investigation consisting of the collection of surface soil, subsurface soil and groundwater (near the oil/water separator) will be performed at SWMU 76. The investigations will characterize the possibility of impacts to the environment taking into consideration site characteristics such as topography, potential locations for paint particle dispersion (taking into account the building design and configuration and prevailing wind direction), stressed vegetation, and adjacent land use(s) as a means of determining migration pathways and the possible locations where releases may have occurred at the site. A surface soil sampling program is proposed to verify whether releases of metals, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) have occurred at the site from the paint stripping (hydroblasting) and painting operations. A subsurface soil and groundwater sampling program is proposed to determine if releases of VOCs, SVOCs, and metals from the oil/water separator have occurred. As discussed in Section 1.2, a previous investigation included the collection of surface water and sediment within the Ensenada Honda downgradient from SWMU 76. Therefore, no surface water or sediment samples will be collected from the Ensenada Honda during this investigation.

1.4 Organization of the Work Plan

This work plan is organized into seven sections. Section 1.0 of this document includes the site history and objectives of this RFI. Section 2.0 provides a description of the current conditions and usage of the site, as well as a summary of previous investigations. Section 3.0 provides a description of the scope of investigations for the upcoming field work. The proposed scope of investigations include soil sampling and analysis program, permanent monitoring well installation program, and groundwater sampling and analysis program, and quality assurance/quality control (QA/QC) samples, as well as other investigation considerations. The reporting activities that will be conducted following the completion of the field investigation are described in Section 4.0. Section 5.0 discusses the proposed project schedule that will be followed for this Phase I RFI investigation. The site management structure that will be utilized during this investigation, including project team responsibilities and field reporting requirements, is presented in Section 6.0, while Section 7.0 presents the report references.

2.0 SITE BACKGROUND AND CURRENT CONDITIONS

The following sections provide a discussion of the current conditions that exist at SWMU 76 along with any previous investigations that may have been conducted.

2.1 Current Site Conditions/Usage

Building 2300, the U.S. Army Reserve Boat Maintenance Facility is located in the waterfront area near Pier 1 (see Figure 1-2 for location). Forrestal Drive is located approximately 175 feet to the north while an associated boat launch into Ensenada Honda is approximately 225 feet south of the site. Outfall 010 that serves the stormwater drainage boundary of upland areas (north of Building 2300) and Outfall 011 that serves the stormwater drainage boundary including an area surrounding this building discharge within a distance of 75 feet of each other in the Ensenada Honda. Land uses in and around the site are predominantly industrial, including petroleum storage and dispensation facilities in nearby locations. The immediate surroundings of Building 2300 are flat and consist of paved and grass-covered areas. Appendix A contains photographs of this building. East of this building a handrail surrounds an oil/water separator that serves the boat maintenance activities.

Based on the limited information available regarding the operations at the site, certain assumptions regarding the chemical usage and release are necessary. Building 2300 consists of a large open-ended bay, with openings along a northeast-southwest axis through the building, and walls on the other two sides. It is supposed that dispersion of paint (including lead-based paint) and eroded metal particles from the surface of boats (during the hydroblasting operations) could have occurred, with a resulting deposition on the surface soil. It is also supposed that hydrocarbons (associated with painting operations) may have entered the trench drain and pre-treatment in the oil/water separator associated with the building. The pre-treated water from the oil/water separator discharges to a sanitary wastewater treatment plant at NAPR.

2.2 Previous Investigations

This site was identified during the Phase I ECP and was recommended for investigation under the Phase II ECP. However, it was not investigated under the Phase II ECP because the facility was to remain in operation by the U.S. Army Reserves and under federal government ownership. Therefore, no analytical data has been collected specifically to investigate potential releases from the activities within this SWMU. However, as discussed in Section 1.2, surface water and sediment data is available from several locations in the Ensenada Honda shoreline adjacent to this SWMU and this data is considered relevant for evaluation of potential offshore impacts of this site. In particular, surface water data (from 7SW2, 7SW3, 7SW4, and 7SW5) and sediment data (from 7SD5, 7SD6, 7SD7, 7SD8, and 7SD13) that were collected during the additional data collection investigation activities at the Tow Way Fuel Farm (SWMU 7/8) (reported in Baker, 2003a) will be considered for use under the Phase I RFI investigation for SWMU 76.

As shown on Figure 1-3, some of the groundwater monitoring wells installed during previous investigations at the Tow Way Fuel Farm (UGW06, UGW07, UGW08, GW06, 7MW13, and 7MW14) may be utilized during the investigation. Groundwater elevation measurements indicate that groundwater flow in the vicinity of SWMU 76 is to the southwest (refer to the RCRA Quarterly Report, Baker 2007a and 2007b). Groundwater analytical data from the SWMU 7/8 wells will be reviewed as part of the data evaluation and analysis portion of this Phase 1 RFI for SWMU 76.

3.0 SCOPE OF INVESTIGATION

Surface soil, subsurface soil, and groundwater will be collected from SWMU 76 as part of the Phase I RFI. Sampling locations presented in this section were identified based on an understanding of the boat maintenance operations, site features and surroundings, and expected groundwater flow direction when selecting sampling locations. The sampling and analytical program for this investigation is summarized in Table 3-1. The proposed sampling locations for SWMU 76 are shown on Figure 3-1. The various investigation elements are listed below and described in detail within the subsections that follow.

- Seven surface soil samples will be collected from seven locations to evaluate potential impacts from paint and metal particle dispersal.

- Two subsurface soil samples will be collected from a single boring (76-SB01) to evaluate if a release from the oil/water separator has occurred. A minimum of two samples will be collected from different depths at this boring location. One sample will be collected from any area of suspected contamination (based on flame ionization detector (FID) or photo ionization detector (PID) readings, olfactory, and visual screening) and the other will be obtained just above the groundwater interface. If suspected contamination is noted in multiple samples, additional samples will be obtained from the boring location.

- One groundwater sample will be collected from a permanent monitoring well to be installed at soil boring location 76-SB01, immediately adjacent to and downgradient (southwest) of the oil/water separator.

As the implementation of this work plan will be completed by a third party (Army National Guard), standard operating procedures (SOPs) for the field activities (e.g., sampling) described within the sections that follow are not provided within this document. However, relevant SOPs will be provided to the EPA Region II by the Army National Guard's selected contractor prior to implementation of field sampling activities.

3.1 Soil Sampling and Analysis Program

Surface and subsurface soil samples will be collected from SWMU 76 in the area surrounding Building 2300. The following outlines the specific sampling protocol.

Figure 3-1 identifies the locations of seven surface soil samples that will be collected at SWMU 76. All surface soil samples will be collected from the 0 to 1.0 foot depth interval using stainless steel spoons. On-shore winds prevail at this portion of NAPR; therefore, four surface soil samples (76-SS03, 76-SS04, 76-SS05 and 76SS-06) will be located downwind of the former paint stripping operation, which is generally north of the building on the Forrestal Drive side. The openings of the bay are on each end of the building perpendicular to the northeast-southwest axis through the building; therefore, the on-shore winds are expected to preferentially transport particles from the hydroblasting operations generally towards the northern opening of the building. Because the building walls are perpendicular to the northwest-southeast axis, transport of paint particles from site operations are not expected outside the walled sides of the building. However, owing to the presence of an opening on the southwestern end, three additional samples (76-SS01, 76-SS02 and 76-SS07) will be collected outside the bay at the southwestern end of the building to account for other wind directions and random distribution of hydroblasting paint residue from the operations within the building.

Two subsurface soil samples will be collected from boring location 76SB01 using HSAs and split-spoon samplers. The location of 76-SB01 will be determined in the field; however, the boring will be placed immediately adjacent to, or as close as field conditions allow (drill rig access, utilities, structures, etc.), on the downgradient (southwest) side of the oil/water separator. Data from this location will be used to evaluate whether releases from the oil/water separator have occurred. One sample will be collected at a depth determined in the field based on PID or FID readings, olfactory and visual observations of contamination, while the second sample will be collected just above the water table interface. A boring log will be prepared indicating lithology, water occurrence, FID/PID measurements and miscellaneous observations.

The subsurface soil samples will be obtained using split-spoon samplers during soil boring advancement for monitoring well installation. All soil sampling locations will be flagged in the field and will be surveyed for horizontal location utilizing a portable GPS unit.

The surface soil samples will be labeled consecutively (beginning with 76SS01) in a manner consistent with previous sample designations at NAPR.

76SS01 —	SMWU 76 Sample
76SS01 —	Surface Soil Sample
76SS01 —	Surface Soil location identifier

At the subsurface soil location, extensions to the sample identification will reflect the depth at which the sample was obtained. For the purposes of this work plan, two-foot discrete depths will be used. Sample identification extensions will follow the pattern shown below. Subsurface soil samples will be designated as follows (actual depths will be determined in the field):

76SB01-01 —	First subsurface sampling interval, 1-3 feet bgs
76SB01-02 —	Second subsurface sampling interval, 3-5 feet bgs, and so on.

The actual sample depth will be determined in the field. Note that a surface soil sample is not proposed at soil boring location 76SB01 since any releases from the oil/water separator would have occurred to the subsurface soil.

Surface soil samples will be analyzed for Appendix IX list of metals, VOCs, and SVOCs (including low-level PAHs) that may be associated with the paint-removal and painting operations described in Section 2.1. Subsurface soil samples will be analyzed for Appendix IX list of metals, SVOCs (including low-level PAHs), and VOCs to verify whether releases associated with the paint removal and painting operations have occurred from the oil/water separator to subsurface soil. The VOCs analysis for subsurface soil is expected to provide data on potential releases of any solvents that may have been used as part of the paint removal and painting operations. The analytical program is summarized in Table 3-1.

Samples will be packed in ice and shipped next day air to the "fixed base" laboratory. Because of previously encountered delays associated with sample shipments from Puerto Rico to the United States, additional insurance to cover re-sampling costs should be claimed on the bill of laden. At least one member of the field team will remain on the island until verification by the laboratory of receipt of all shipments. This will minimize any potential re-sampling costs associated with mobilization. Tracking numbers for each shipment will be forwarded to the project manager for assisting in verification of receipt of samples by the laboratory.

All analysis at the laboratory will be performed using the analytical presented in Table 3-2. All analytical work performed on the mainland of the U.S.A. must be certified by a licensed Puerto Rico chemist. The specific laboratory and third party validator, as well as a certified licensed chemist from Puerto Rico, will be determined at a later date. SOPs used by the analytical laboratory will be requested from the analytical laboratory after selection.

3.2 Monitoring Well Installation Program

One permanent monitoring well will be installed at the soil boring location (76-SB01) on the northeast side of SWMU 76, immediately adjacent to and southwest of the oil/water separator. This monitoring well will be located downgradient (i.e. towards the surface water in Ensenada Honda) from the oil/water separator and in close proximity thereof, as shown approximately on Figure 3-1. The exact location of the monitoring well must be determined in the field after identifying the oil/water separator and associated piping.

Hollow-stem augers (HSAs) or air rotary techniques will be used to advance the borehole, depending on the underlying stratigraphy. The well will be constructed of 2-inch ID, Schedule 40 PVC, with flush joint threads. The well screen will be 10-feet long and installed to straddle the water table (estimated at 15 feet below the ground surface). The following provides an outline of the well installation activities:

- Soil sampling will be conducted in order to classify the soil during well installation. Upon completion of soil sampling, the borehole will be reamed as necessary to the desired depth using the prescribed drilling method. The well construction materials will be installed through the HSAs, casing, or in an open borehole.

- The well screen and bottom cap will be set at the bottom of the borehole. The screen will be connected to threaded, flush-joint, riser. An expandable, water tight locking cap or slip-cap with a vent hole will be placed at the top of the casing.

- The annular space around the well screen will be backfilled with a well-graded, fine to medium sand as the HSAs or casing are being withdrawn from the borehole. The sand will extend to approximately 2 feet above the top of the screened interval. The thickness of the sand above the screened interval may be reduced if the well is too shallow to allow for placement of adequate sealing material.

- An approximate 2-foot thick sodium bentonite seal (minimum of 6 inches for very shallow wells) will be placed above the sand pack. If bentonite pellets or chips are used, they will be sized appropriately given the well and borehole diameter and placed in a careful manner that will prevent bridging. The bentonite will be hydrated with potable water, as necessary.

- The annular space above the bentonite seal will be backfilled with cement/bentonite grout to prevent surface and near subsurface water from infiltrating into the screened groundwater monitoring zone. The grout will consist of five to ten percent (by dry weight) of bentonite powder and seven gallons of potable water per 94-pound bag of portland cement. For very shallow wells, the cement/bentonite grout may be omitted.

- The depth intervals of all backfilled materials will be measured with a weighted measuring tape to the nearest 0.1-foot and recorded in the field logbook.

- The monitoring well will be completed at the surface using a "flush" manhole type cover. The flush-mounted cover will be surrounded by a concrete pad and slightly elevated above the ground surface with the concrete sloping away from the cover to the existing ground surface.

- All wells will have a locking cap installed on the PVC riser or protective steel casing.

In the event of shallow refusal or other reason for relocating a monitoring well location, the borehole will be abandoned by backfilling with the drill cuttings to the extent practicable, in order to minimize the burden of waste disposal. The surface of the borehole will then be patched with bentonite grout.

The new permanent monitor well will be developed using pumping and surging methods after allowing suitable time for the cement/bentonite grout to cure (typically a minimum of 24 hours). The purpose of well development is to restore the permeability of the formation which may have been reduced by the drilling operations and to remove fine-grained materials that may have entered/accumulated in the well or filter pack. The well will be developed until the discharged water runs relatively clear of fine-grained materials. It should be noted that the water in some wells does not clear with continued development. Typical limits placed on well development may include any one or a combination of the following:

- Clarity of water based on visual determination
- A maximum time period (typically two hours for shallow wells)
- A maximum borehole volume (typically three to five borehole volumes plus the amount of any water added during the drilling or installation process)
- Stability of pH, specific conductance, and temperature measurements (typically less than 10 percent change between three successive measurements)
- Clarity based on turbidity measurements [typically less than 20 Nephelometric Turbidity Units (NTU)]

A record of the well development will be completed to document the development process.

The well boring will be sampled and logged as described in Section 3.1. The well location will be assigned the same number as the associated boring. For example, a permanent monitoring well installed at boring location 76SB01 will be assigned as 76GW01.

3.3 Groundwater Sampling and Analysis Program

The groundwater sample will be used to verify whether the groundwater at the most likely location for a subsurface release (i.e., the oil/water separator) may be potentially affected by activities associated with SWMU 76. One groundwater sample (76GW01) will be collected from the permanent monitoring well. The sample will be analyzed for Appendix IX VOCs, metals (total and dissolved), and SVOCs (including low-level PAHs), as shown on Table 3-1 to verify whether releases of the paint-removal and painting operations have occurred from the oil/water separator to the subsurface soil and migrated vertically into the groundwater.

The groundwater will be sampled using a low flow sampling technique. Appendix B includes a detailed description of low-flow sampling technique. Field parameters of pH, temperature, turbidity, conductivity, dissolved oxygen, and oxidation-reduction potential will be obtained with appropriate instrumentation during sampling of the permanent monitoring well.

Samples will be packed in ice and shipped next day air to the “fixed base” laboratory. Because of previously encountered delays associated with sample shipments from Puerto Rico to the United States, additional insurance to cover re-sampling costs should be claimed on the bill of laden. At least one member of the field team will remain on the island until verification by the laboratory of receipt of all shipments. This will minimize any potential re-sampling costs associated with mobilization. Tracking numbers for each shipment will be forwarded to the Project Manager for assisting in verification of receipt of samples by the laboratory.

All analyses at the laboratory will be performed using current analytical methodologies as presented in Table 3-2. All analytical work performed on the mainland of the U.S.A. must be certified by a licensed Puerto Rico chemist. The specific laboratory and validator, as well as a certified licensed chemist from Puerto Rico, will be determined at a later date.

3.4 Quality Assurance/Quality Control Samples

Field specific quality assurance/quality control (QA/QC) procedures are given below. QA/QC samples will be analyzed for parameters as shown in Table 3-3 by methods presented in Table 3-2.

The collection of QA/QC samples will be obtained during this investigation. These will include the collection of equipment rinsate samples, field blanks, trip blanks, field duplicates, and matrix spike/matrix spike duplicate (MS/MSD).

Equipment rinsate blanks will be collected daily from reusable (non-dedicated and non-disposable) sampling equipment during the sampling event. Initially, samples from every other day should be analyzed. If analytes pertinent to the project are detected in any equipment rinsate blank, the remaining rinsate blanks will be analyzed. As an added level of QA/QC, a rinsate blank will also be collected from each batch of disposable sampling tools such as stainless steel spoons, Macro Core liners, groundwater sample tubing, etc. The results from the blanks will be used to verify that the decontamination of reusable equipment has rendered them free of cross-contaminating chemicals at levels of concern for the site; and to verify that disposable sampling tools were free of contaminants at levels of concern for the site. This comparison is made during data validation, and the equipment rinsate blank is analyzed for the same parameters as the related samples.

Field blank samples will consist of lab grade deionized water (D.I.), store-bought distilled water, and NAPR potable water if they are used during this investigation.

Trip blank samples will be required to accompany the samples to the laboratory for the samples scheduled for analysis of VOCs. One trip blank sample will accompany each cooler containing samples for the afore-mentioned analyses.

Soil sample field duplicates for SVOCs and metals will be homogenized and split and collected at a frequency of ten percent per media (soil samples for VOCs will not be homogenized). One groundwater duplicate sample will be collected including total and filtered fractions.

Analysis of duplicate and blanks associated with soil and groundwater sampling will include Appendix IX VOCs, SVOCs (including low-level PAHs), and metals.

MS/MSD samples are collected to evaluate the matrix effect of the sample upon the analytical methodology. An MS and MSD must be performed for each group of samples of a similar matrix (e.g., surface soil). MS/MSD samples will be collected at a frequency of five percent per media. Samples for MS/MSD are specified in Table 3-1.

3.5 Data Validation

All mainland laboratory data generated by the investigation will be subjected to independent, third party, validation. The USEPA Region II Data Validation Standard Operating Procedures will be followed. The specific data validator will be determined at a later date.

3.6 Other Field Activities

During the investigation, the following activities will be performed:

- Utility Clearance
- Investigation Derived Waste (IDW) Management
- Decontamination
- Surveying
- Health and Safety Procedures
- Chain of Custody

3.6.1 Utility Clearance

If this work plan is initiated while NAPR is still under operation, the following procedure must be followed to obtain utility clearance. Fifteen days prior to the initiation of the proposed fieldwork, a digging permit request will be submitted to the Facility Management Transportation and Utility Division (FMTUD) of the Public Works Department at NAPR. The proposed soil boring and monitoring well location will be cleared by the base utility department.

If this work plan is initiated after NAPR is no longer maintaining the facility, then the party conducting the implementation of this work plan will be responsible for clearing all proposed soil boring and temporary monitoring well locations of utilities.

3.6.2 Investigation Derived Wastes

The generation of IDW associated with soil sampling and monitoring well installation, including soil cuttings and decontamination fluids, will be collected and stored temporarily in 55-gallon drums. Two IDW samples will be collected during this investigation. One composite aqueous sample will be collected from all drums containing decontamination fluid (from sampling equipment), and one composite soil sample will be collected from all drums containing drill cuttings. The samples will be analyzed for parameters as shown in Table 3-3 by methods presented in Table 3-2. These samples will provide the necessary data to be able to dispose of the generated IDW at an appropriate disposal facility. Upon completion of the field program, the drums will be moved and stored at a secure location by the contractor. The soil and water IDW will be removed and disposed of from the site by an approved vendor upon receipt and review of the IDW sample analytical data.

3.6.3 Decontamination

All reusable (non-dedicated and non-disposable) soil sampling equipment (i.e. DPT probe, split-spoon samplers, etc.), will be decontaminated between each sampling location in accordance with an EPA Region II approved SOP that the contractor shall prepare. The drill rig will be decontaminated before arriving at the site and before leaving the site. The remaining contaminant-free sampling equipment and materials utilized during this investigation will be disposable.

3.6.4 Surveying

All sampling locations will be surveyed. Traditional survey equipment or survey grade global positioning system (GPS) unit will be utilized to obtain vertical (+/- 0.01 foot) and horizontal (+/- 0.1 foot) locations and top of PVC elevation of the permanent monitoring well.

3.6.5 Health and Safety Procedures

The health and safety procedures to be employed during this investigation are to be developed by the contractor implementing this work plan. These health and safety procedures are to be submitted to USEPA Region II for review prior to implementation of this work plan.

3.6.6 Chain-of-Custody

Chain-of-Custody procedures will be followed to ensure a documented, traceable link between measurement results and the sample/parameter that they represent. These procedures are intended to provide a legally acceptable record of sample preparation, storage, and analysis.

A chain-of-custody form will be completed for each shipment in which the samples are shipped. After the samples are properly packaged, the shipping container will be sealed and prepared for shipment to the analytical laboratory.

4.0 REPORTING

This section outlines the reporting activities that are associated with the field investigation. The reports shall include at a minimum:

- Introduction and Site Background
- SWMU Investigation
- Physical Characteristics of Study Area
- Nature and Extent of Contamination
- Conclusions and Recommendations
- References

The Phase I RFI reports sections are discussed in the following subsection.

4.1 Introduction and Site Background

The introduction will consist of a discussion of the site location, its current condition, and its historical background including any investigations conducted at the SWMU. The introduction will also provide a regulatory framework for NAPR and the SWMU.

4.2 SWMU Investigation

The investigation methodologies employed to fulfill the Phase I RFI work plan objectives for the SWMU will be discussed, including the sample locations, sample collection and handling procedures, QA/QC procedures, and analytical methods used. This section will also discuss any problems encountered, including any deviations from the work plan and problem resolution.

4.3 Physical Characteristics of Study Area

The physical characteristics of the SWMU will be recorded in the field. Those observations will be photographically recorded and summarized in this section.

4.4 Nature and Extent of Contamination

The nature and extent of contamination section will present analytical results and interpretation of the data. The surface soil and subsurface soil analytical data will be screened against USEPA Regional Industrial Screening Levels (SLs) and USEPA Regional Residential SLs (USEPA, 2008). Analytical data for surface soil and subsurface soil collected from the 1 to 3-foot depth interval also will be compared to ecological soil screening values previously developed for use in ecological risk assessments (ERAs) at NAPR (Baker, 2006a and 2006b). The ecological soil screening values will be updated as necessary to reflect current information from the literature (i.e., ecological soil screening levels [Eco-SSLs] available at http://www.epa.gov/ecotox/ecossl/). Subsurface soil collected from deeper depth intervals (e.g., 3 to 5-feet bgs) will not be compared to ecological soil screening values since these depths are not likely to represent a significant exposure point for ecological receptors (most soil heterotrophic activity and soil invertebrates occur on the surface or within the oxidized root zone [Suter II, 1995]). The groundwater data will be compared to USEPA Regional Tapwater SLs (USEPA, 2008). Based on the close proximity of SWMU 76 to Ensenada Honda (see Figure 1-2), the groundwater analytical data also will be compared to ecological surface water screening values. Identical to the ecological soil screening values, ecological surface water screening values used in the comparison will be those previously developed for use in ERAs at NAPR (Baker, 2006a and 2006b). Ecological surface water screening values will be updated as necessary to reflect current information from the literature (e.g., current National Ambient Water Quality Criteria [NAWQC] available at http://www.epa.gov/waterscience/criteria/wqctable/).

Surface water data (from 7SW2, 7SW3, 7SW4, and 7SW5) and sediment data (from 7SD5, 7SD6, 7SD7, 7SD8, and 7SD13) that were collected during the additional data collection investigation activities (reported in Baker, 2003a) will be re-evaluated in the context of the soil and groundwater contaminants that may be detected at SWMU 76. Regional Tapwater SLs and Regional Residential LLs (USEPA, 2008) will be conservatively used as human health screening criteria. Identical to soil and groundwater, the ecological surface water and sediment screening values used in the comparison will be those previously developed for use in ERAs at NAPR (Baker, 2006a and 2006b), updated to reflect current information from the literature (i.e., NAWQC).

In addition to the human health and ecological screening values discussed above, soil, surface water, sediment, and groundwater analytical data for metals will be compared to upper limit of the mean (ULM) concentrations contained in the Revised Final II Summary Report for Environmental Background Concentrations (Baker, 2008).

The results of the screening evaluations will be presented on tables and figures with textual explanation. Results of QA/QC procedures also will be presented within the nature and extent of contamination section.

4.5 Conclusions and Recommendations

Information from the nature and extent of contamination will be synthesized into conclusions regarding whether a release has occurred at this site. Recommendations will be made from these conclusions as to whether a full RFI is needed or the SWMU can proceed toward a determination of Corrective Action Complete.

5.0 SCHEDULE

A schedule for the implementation of this work plan, and follow-up reports for the Phase I RFI reports for SWMU 76 is provided as Figure 5-1.

Implementation of this work plan will be completed by a third party (i.e., Army National Guard, new owner) after transfer of the property to the receiving entity. After the property transfer is completed, dates for the remaining items on the schedule will be submitted to the USEPA for review.

It should be noted that this schedule is dependent upon USEPA review time. Many other factors can also extend the schedule such as: resampling if further re-characterization is required, weather delays in the field, or consensus cannot be reached on how the USEPA's comments are to be incorporated.

6.0 SITE MANAGEMENT

An organization chart presenting the proposed staffing for this project is provided on Figure 6-1. This section also outlines the responsibilities and reporting requirements of field personnel and staff.

6.1 Project Team Responsibilities

A Project Manager (to be determined) will manage the Project Team. His/her responsibilities will be to direct the technical performance of the project staff, costs and schedule, ensuring that QA/QC procedures are followed during the course of the project. He/she will maintain communication with the USEPA Region II Caribbean Section RCRA Programs Branch, Mr. Timothy R. Gordon. A QA/QC Officer will be assigned to administer overall QA/QC for this project.

The field activities of this project will consist of one field team managed by the Geologist (to be determined). The Geologist/site manager's responsibilities include directing the field team and subcontractors. A report manager (to be determined) will direct the reporting effort of the field investigation. The report manager will direct and ensure that all necessary staffing is utilized to assist in developing the Phase I RFI Reports for SWMU 76.

6.2 Field Reporting Requirements

The Geologist will maintain a daily summary of each day's field activities. The following information will be included in this summary:

- Contractor and subcontractor personnel on site
- Major activities of the day
- Samples collected
- Problems encountered
- Other pertinent site information

The Geologist will receive direction from the Project Manager regarding any changes in scope of the investigation.

7.0 REFERENCES

Baker Environmental, Inc. (Baker). 2008. Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds, Naval Activity Puerto Rico, Ceiba, Puerto Rico. Coraopolis, Pennsylvania. February 29, 2008.

Baker Environmental, Inc. (Baker). 2007a. RCRA § 7003 Administrative Order on Consent Quarterly Progress Report, February 1 2007 – April 30, 2007 for Naval Activity Puerto Rico, Ceiba Puerto Rico. Coraopolis, Pennsylvania. May 31, 2007.

Baker Environmental, Inc. (Baker). 2007b. RCRA § 7003 Administrative Order on Consent Quarterly Progress Report, August 1, 2007 – October 31, 2007 for Naval Activity Puerto Rico, Ceiba Puerto Rico. Coraopolis, Pennsylvania. November 28, 2007.

Baker Environmental, Inc. (Baker). 2006a. Final Additional Data Collection Report and Screening-Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment at SWMUs 1 and 2, Naval Station Roosevelt Roads, Ceiba, Puerto Rico. Coraopolis, Pennsylvania. May 18, 2006.

Baker. 2006b. Final Additional Data Collection Report and Screening-Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment at SWMU 45, Naval Activity Puerto Rico, Ceiba, Puerto Rico. Coraopolis, Pennsylvania. January 11, 2006.

Baker. 2006c. Revised Final Summary Report for Environmental Background Concentrations of Inorganic Compounds, Naval Activity Puerto Rico, Ceiba, Puerto Rico. Coraopolis, Pennsylvania. October 17, 2006.

Baker. 2003a. Final Additional Data Collection Investigation Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads. Coraopolis, Pennsylvania. April 22, 2003.

Baker. 2003b. Corrective Measures Study Task I Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads. Coraopolis, Pennsylvania. April 22, 2003.

Baker. 1995. Final RCRA Facility Investigation Management Plans, Naval Station Roosevelt Roads, Ceiba, Puerto Rico. September 14, 1995.

Naval Facilities Engineering Command, Atlantic Division (LANTDIV). 2004. Draft Phase I Environmental Condition of Property Report. Norfolk, Virginia. March 31, 2004.

Naval Facilities Engineering Command Atlantic (NAVFAC Atlantic). 2005. Final Phase I/II Environmental Condition of Property, Former U.S. Naval Station Roosevelt Roads, Ceiba, Puerto Rico. Norfolk, Virginia.

Naval Facilities Engineering Service Center (NFESC). 2004. Guidance for Environmental Background Analysis. Volume III: Groundwater. NFESC User's Guide UG-2059-ENV,

NFESC. 2002. Guidance for Environmental Background Analysis. Volume I: Soil. NFESC User's Guide UG-209-ENV. April 2002.

Suter II, G.W. 1995. Guide for Performing Screening Ecological Risk Assessments at DOE Facilities. Oak Ridge National Laboratory, Environmental Restoration Division, ORNL Environmental Restoration Program. ES/ER/TM-153.

United States Environmental Protection Agency (USEPA). 2008. Regional Screening Levels Table. http://epa-rgs.ornl.gov/chemicals/index.shtml.

TABLES

TABLE 3-1

SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM
SWMU 76-BUILDING 2300
PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

		Fixed Based Analytical Lab Analysis					
Media	**Sample Depth (ft bgs)**	App IX VOCs	App IX SVOCs	Low Level PAHs	App IX Metals (Total)	App IX Metals (Dissolved)	**Comment**
Surface Soil Samples							
76SS01	0.0 - 1.0	X	X	X	X		
76SS02	0.0 - 1.0	X	X	X	X		
76SS03	0.0 - 1.0	X	X	X	X		
76SS04	0.0 - 1.0	X	X	X	X		
76SS05	0.0 - 1.0	X	X	X	X		
76SS06	0.0 - 1.0	X	X	X	X		
76SS07	0.0 - 1.0	X	X	X	X		
76SS07D	0.0 - 1.0	X	X	X	X		Duplicate
76SS07MS/MSD	0.0 - 1.0	X	X	X	X		Matrix Spike/Matrix Spike Duplicate
Subsurface Soil Samples(2)							
76SB01-XX(1)	TBD	X	X	X	X		
76SB01-XX(1)	TBD	X	X	X	X		
Groundwater Samples							
76GW01	NA	X	X	X	X	X	
76GW01D	NA	X	X	X	X	X	Duplicate
76GW01MS/MSD	NA	X	X	X	X	X	Matrix Spike/Matrix Spike Duplicate

Notes:

(1) XX - This indicates the proper designation for the depth interval from which the sample will be collected (i.e., 01 = 1-3ft bgs, 02 = 3-5 ft bgs, etc.). This will be established in the field.

(2) - Although two subsurface soil samples are proposed, additional subsurface soil will be collected if areas of staining or other indicators of contamination are encountered at other depths. If necessary, the number of QA/QC samples listed on Table 3-3 will be adjusted.

ft bgs - feet below ground surface.
NA - Not Applicable.
TBD - To be determined in the field

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 76 PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

Volatiles	Water (µg/L)	Low Soil (µg/kg)	Method Number
Acetone	25	50	8260B (5030)(low level)
Acetonitrile	40	200	8260B (5030)(low level)
Acrolein	20	100	8260B (5030)(low level)
Acrylonitrile	20	100	8260B (5030)(low level)
Benzene	1.0	5.0	8260B (5030)(low level)
Bromodichloromethane	1.0	5.0	8260B (5030)(low level)
Bromoform	1.0	5.0	8260B (5030)(low level)
Bromomethane	1.0	10	8260B (5030)(low level)
Carbon Disulfide	1.0	5.0	8260B (5030)(low level)
Carbon Tetrachloride	1.0	5.0	8260B (5030)(low level)
Chlorobenzene	1.0	5.0	8260B (5030)(low level)
Chloroethane	1.0	10	8260B (5030)(low level)
Chloroform	1.0	5.0	8260B (5030)(low level)
Chloromethane	1.0	10	8260B (5030)(low level)
Chloroprene	1.0	5.0	8260B (5030)(low level)
3-Chloro-1-propene	1.0	5.0	8260B (5030)(low level)
1,2-Dibromo-3-chloropropane	1.0	10	8260B (5030)(low level)
Dibromochloromethane	1.0	5.0	8260B (5030)(low level)
1,2-Dibromoethane	1.0	5.0	8260B (5030)(low level)
Dibromomethane	1.0	5.0	8260B (5030)(low level)
trans-1,4-Dichloro-2-butene	2.0	10	8260B (5030)(low level)
Dichlorodifluoromethane	1.0	5.0	8260B (5030)(low level)
1,1-Dichloroethane	1.0	5.0	8260B (5030)(low level)
1,2-Dichloroethane	1.0	5.0	8260B (5030)(low level)
trans-1,2-dichloroethene	1.0	5.0	8260B (5030)(low level)
1,1-Dichloroethene	1.0	5.0	8260B (5030)(low level)
Methylene Chloride	5.0	5.0	8260B (5030)(low level)
1,2-Dichloropropane	1.0	5.0	8260B (5030)(low level)
cis-1,3-Dichloropropene	1.0	5.0	8260B (5030)(low level)
trans-1,3-Dichloropropene	1.0	5.0	8260B (5030)(low level)
Ethyl benzene	1.0	5.0	8260B (5030)(low level)
Ethyl methacrylate	1.0	5.0	8260B (5030)(low level)
2-Hexanone	10	25	8260B (5030)(low level)
Iodomethane	5.0	5.0	8260B (5030)(low level)
Isobutanol	40	200	8260B (5030)(low level)
Methacrylonitrile	20	100	8260B (5030)(low level)
2-Butanone	10	25	8260B (5030)(low level)
Methyl methacrylate	1.0	5.0	8260B (5030)(low level)
4-Methyl-2-pentanone	10	25	8260B (5030)(low level)

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 76 PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

	Quantitation Limits*		
Volatiles (Cont.)	**Water (μg/L)**	**Low Soil (μg/kg)**	**Method Number**
Pentachloroethane	5.0	25	8260B (5030)(low level)
Propionitrile	20	100	8260B (5030)(low level)
Stryene	1.0	5.0	8260B (5030)(low level)
1,1,1,2-Tetrachloroethane	1.0	5.0	8260B (5030)(low level)
1,1,2,2-Tetrachloroethane	1.0	5.0	8260B (5030)(low level)
Tetrachloroethene	1.0	5.0	8260B (5030)(low level)
Toluene	1.0	5.0	8260B (5030)(low level)
1,1,1-Trichloroethane	1.0	5.0	8260B (5030)(low level)
1,1,2-Trichloroethane	1.0	5.0	8260B (5030)(low level)
Trichloroethene	1.0	5.0	8260B (5030)(low level)
Trichlorofluoromethane	1.0	5.0	8260B (5030)(low level)
1,2,3-Trichloropropane	1.0	5.0	8260B (5030)(low level)
Vinyl Acetate	2.0	10	8260B (5030)(low level)
Vinyl Chloride	1.0	10	8260B (5030)(low level)
Xylene	2.0	10	8260B (5030)(low level)

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 76 PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

Semivolatiles	Quantitation Limits* Water (µg/L)	Quantitation Limits* Low Soil (µg/kg)	Method Number
Acenaphthene	10	330	8270C
Acenaphthylene	10	330	8270C
Acetophenone	10	330	8270C
2-Acetylaminofluorene	10	330	8270C
4-Aminobiphenyl	20	330	8270C
Aniline	20	660	8270C
Anthracene	10	330	8270C
Aramite	10	330	8270C
Benzo(a)anthracene	10	330	8270C
Benzo(b)fluoranthene	10	330	8270C
Benzo(k)fluoranthene	10	330	8270C
Benzo(g,h,i)perylene	10	330	8270C
Benzo(a)pyrene	10	330	8270C
Benzyl alcohol	10	330	8270C
Bis(2-chloroethoxyl)methane	10	330	8270C
Bis(2-chloroethyl)ether	10	330	8270C
Bis(2-ethylhexyl)phthalate	10	330	8270C
4-Bromophenyl phenyl ether	10	330	8270C
Butylbenzylphthalate	10	330	8270C
4-Chloroaniline	20	660	8270C
4-Chloro-3-methylphenol	10	330	8270C
2-Chloronaphthalene	10	330	8270C
2-Chlorophenol	10	330	8270C
4-Chlorophenyl phenyl ether	10	330	8270C
Chrysene	10	330	8270C
3&4 Methylphenol	10	330	8270C
2-Methylphenol	10	330	8270C
Diallate	10	330	8270C
Dibenzofuran	10	330	8270C
Di-n-butyl phthalate	10	330	8270C
Dibenzo(a,h)anthracene	10	330	8270C
o-Dichlorobenzene	10	330	8270C
m-Dichlorobenzene	10	330	8270C
p-Dichlorobenzene	10	330	8270C
3,3'-Dichlorobenzidine	20	660	8270C
2,4-Dichlorophenol	10	330	8270C
2,6-Dichlorophenol	10	330	8270C
Diethylphthalate	10	330	8270C
p-(Dimethylamino)azobenzene	10	330	8270C
7,12-Dimethyl benz(a)anthracene	10	330	8270C
3,3-Dimethyl benzidine	20	1,700	8270C
2,4-Dimethylphenol	10	330	8270C
alpha, alpha-Dimethylphenethylamine	2,000	67,000	8270C
Dimethyl phthalate	10	330	8270C

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 76 PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

Semivolatiles (Cont.)	Quantitation Limits*		Method Number
	Water (μg/L)	Low Soil (μg/kg)	
m-Dinitrobenzene	10	330	8270C
4,6-Dinitro-2-methylphenol	50	1,700	8270C
2,4-Dinitrophenol	50	1,700	8270C
2,4-Dinitrotoluene	10	330	8270C
2,6-Dinitrotoluene	10	330	8270C
Di-n-octylphthalate	10	330	8270C
1,4-Dioxane	10	330	8270C
Dinoseb	10	330	8270C
Ethylmethanesulfonate	10	330	8270C
Fluoranthene	10	330	8270C
Fluorene	10	330	8270C
Hexachlorobenzene	10	330	8270C
Hexachlorobutadiene	10	330	8270C
Hexachlorocyclopentadiene	10	330	8270C
Hexachloroethane	10	330	8270C
Hexachlorophene	5,000	170,000	8270C
Hexachloropropene	10	330	8270C
Indeno(1,2,3-cd)pyrene	10	330	8270C
Isophorone	10	330	8270C
Isosafrole	10	330	8270C
Methapyrilene	2,000	67,000	8270C
3-Methylcholanthrene	10	330	8270C
Methyl methanesulfonate	10	330	8270C
2-Methylnaphthalene	10	330	8270C
Naphthalene	10	330	8270C
1,4-Naphthoquinone	10	330	8270C
1-Naphthylamine	10	330	8270C
2-Naphthylamine	10	330	8270C
2-Nitroaniline	50	1,700	8270C
3-Nitroaniline	50	1,700	8270C
4-Nitroaniline	50	1,700	8270C
Nitrobenzene	10	330	8270C
2-Nitrophenol	10	330	8270C
4-Nitrophenol	50	1,700	8270C
4-Nitroquinoline-1-oxide	20	3,300	8270C
n-Nitrosodi-n-butylamine	10	330	8270C
n-Nitrosodiethylamine	10	330	8270C
n-Nitrosodimethylamine	10	330	8270C
n-Nitrosodiphenylamine	10	330	8270C
n-Nitrosodi-n-propylamine	10	330	8270C
n-Nitrosomethylethylamine	10	330	8270C
n-Nitrosomorpholine	10	330	8270C
n-Nitrosopiperidine	10	330	8270C
n-Nitrosopyrrolidine	10	330	8270C

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 76 PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

Semivolatiles (Cont.)	Quantitation Limits* Water (µg/L)	Quantitation Limits* Low Soil (µg/kg)	Method Number
5-Nitro-o-toluidine	10	330	8270C
bis-(2-chloroisopropyl)ether	10	330	8270C
Pentachlorobenzene	10	330	8270C
Pentachloronitrobenzene	10	330	8270C
Pentachlorophenol	50	1,700	8270C
Phenacetin	10	330	8270C
Phenanthrene	10	330	8270C
Phenol	10	330	8270C
1,4-Phenylenediamine	2,000	1,700	8270C
2-Picolin	10	330	8270C
Pronamide	10	330	8270C
Pyrene	10	330	8270C
Pyridine	50	330	8270C
Safrole	10	330	8270C
1,2,4,5-Tetrachlorobenzene	10	330	8270C
2,3,4,6-Tetrachlorophenol	10	330	8270C
o-Toluidine	20	330	8270C
1,2,4-Trichlorobenzene	10	330	8270C
2,4,5-Trichlorophenol	10	330	8270C
2,4,6-Trichlorophenol	10	330	8270C
1,3,5-Trinitrobenzene	10	330	8270C
Low Level PAHs	**Quantitation Limits* Water (µg/L)**	**Quantitation Limits* Low Soil (µg/kg)**	**Method Number**
Acenaphthene	0.2	6.7	8270C
Acenaphthylene	0.2	6.7	8270C
Anthracene	0.2	6.7	8270C
Benzo(a)anthracene	0.2	6.7	8270C
Benzo(b)fluoranthene	0.2	6.7	8270C
Benzo(k)fluoranthene	0.2	6.7	8270C
Benzo(g,h,i)perylene	0.2	6.7	8270C
Benzo(a)pyrene	0.2	6.7	8270C
Chrysene	0.2	6.7	8270C
Dibenzo(a,h)anthracene	0.2	6.7	8270C
Fluoranthene	0.2	6.7	8270C
Fluorene	0.2	6.7	8270C
Indeno(1,2,3-cd)pyrene	0.2	6.7	8270C
1-Methylnaphthalene	0.2	6.7	8270C
2-Methylnaphthalene	0.2	6.7	8270C
Naphthalene	0.2	6.7	8270C
Phenanthrene	0.2	6.7	8270C
Pyrene	0.2	6.7	8270C

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.
µg/L - micrograms per liter.
µg/kg - micrograms per kilogram.

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 76 PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Inorganics	Method Number	Water (μg/L)	Low Soil (mg/kg)	Method Description
Antimony	6010B	20	2.0	Inductively Coupled Plasma
Arsenic	6010B	10	1.0	Inductively Coupled Plasma
Barium	6010B	10	1.0	Inductively Coupled Plasma
Beryllium	6010B	4.0	0.4	Inductively Coupled Plasma
Cadmium	6010B	5.0	0.5	Inductively Coupled Plasma
Chromium	6010B	10	1.0	Inductively Coupled Plasma
Cobalt	6010B	10	1.0	Inductively Coupled Plasma
Copper	6010B	20	2.0	Inductively Coupled Plasma
Lead	6010B	5.0	0.5	Inductively Coupled Plasma
Mercury	7470A/7471A	0.2	0.02	Cold Vapor AA
Nickel	6010B	40	4.0	Inductively Coupled Plasma
Selenium	6010B	10	1.0	Inductively Coupled Plasma
Silver	6010B	10	1.0	Inductively Coupled Plasma
Thallium	6010B	10	1.0	Inductively Coupled Plasma
Tin	6010B	10	5.0	Inductively Coupled Plasma
Vanadium	6010B	10	1.0	Inductively Coupled Plasma
Zinc	6010B	20	2.0	Inductively Coupled Plasma

RCRA Metals	Method Number	Quantitation Limits*		Method Description
		Soil (mg/kg)	Water (μg/L)	
Arsenic	6010B(3050B/3010A)	1.0	10	Inductively Coupled Plasma
Barium	6010B(3050B/3010A)	1.0	10	Inductively Coupled Plasma
Cadmium	6010B(3050B/3010A)	0.50	5	Inductively Coupled Plasma
Chromium	6010B(3050B/3010A)	1.0	10	Inductively Coupled Plasma
Lead	6010B(3050B/3010A)	0.50	5.0	Inductively Coupled Plasma
Mercury	7471A/7470A	0.020	0.20	Cold Vapor AA
Selenium	6010B(3050B/3010A)	1.0	10	Inductively Coupled Plasma
Silver	6010B(3050B/3010A)	1.0	10	Inductively Coupled Plasma

Notes:
* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.
μg/L - micrograms per liter.
mg/kg - milligrams per kilogram.

TABLE 3-3

SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM
QA/QC AND IDW SAMPLES
SWMU 76 PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

	Aqueous Samples Analysis Requested						Solid Samples Analysis Requested		
Media	App IX VOCs	App IX SVOCs	Low Level PAHs	App IX Metals (Total)	Benzene	RCRA Metals	Benzene	RCRA Metals	**Comment**
Trip Blank Samples									
2009TB01	X[(1)]								
2009TB02	X[(1)]								
Equipment Rinsate Samples									
2009ER01	X	X	X	X					Stainless Steel Spoon
2009ER02	X	X	X	X					Split Spoon Sampler or Macro Core Liner
2009ER03	X	X	X	X					Polyethylene and Silicon Tubing
Field Blank Samples									
2009FB01	X	X	X	X					Lab Grade Deionized Water
2009FB02	X	X	X	X					Store Bought Distilled Warer
2009FB03	X	X	X	X					NAPR Potable Water
IDW Samples									
2009IDW01					X	X			Aqueous waste
2009IDW02							X	X	Solid waste

Note:

(1) - The analysis required for this sample will be dependent on which samples are being accompanied in the cooler.

FIGURES

K:_SOUTHNAVFAC\111626 DO2\Task 5 – RFI Work Plans\SWMU 76 RFI\CAD\ 111626_76_01.dwg

4 0 2 4 8

1 inch = 4 miles

FIGURE 1–1
REGIONAL LOCATION MAP
SWMU 76–BUILDING 2300
PHASE I RFI WORK PLAN

SOURCE: METRODATA, INC., 1999.

NAVAL ACTIVITY PUERTO RICO

K:_SOUTHNAVFAC\111626 DO2\Task 5 – RFI Work Plans\SWMU 76 RFI\CAD\ 111626_76_02.dwg

Baker

LEGEND

– SWMUs

76 – AREA TO WHICH THIS INVESTIGATION PERTAINS

AOC D – AOCs

SOURCE: GEO–MARINE, INC., SEPTEMBER 6, 2000.

3000 0 1500 3000

1 inch = 3000 ft.

FIGURE 1–2
SWMU/AOC LOCATION MAP
SWMU 76–BUILDING 2300
PHASE I RFI WORK PLAN

NAVAL ACTIVITY PUERTO RICO

LEGEND

- SWMU BOUNDARY
- DITCH
- INLET
- OUTFALL
- 24" STORM SEWER AND SIZE
- DRAINAGE BOUNDARY
- SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION, 2002)
- SURFACE WATER SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION, 2002)
- EXISTING MONITORING WELL LOCATION (SWMU 7/8 TOW WAY REPORT)

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

FIGURE 1-3
SITE LAYOUT AND PREVIOUS SURFACE WATER/SEDIMENT SAMPLE LOCATION MAP
SWMU 76-BUILDING 2300
PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

SOURCE: GEO–MARINE, INC., SEPTEMBER 6, 2000.

Baker

LEGEND

- –SWMU BOUNDARY
- –DITCH
- –INLET
- –OUTFALL
- 24" –STORM SEWER AND SIZE
- –DRAINAGE BOUNDARY
- –PROPOSED SURFACE SOIL SAMPLING LOCATION
- –PROPOSED SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATION TO BE LOCATED IN THE FIELD BASED ON OIL/WATER SEPARATOR LOCATION
- –SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION, 2002)
- –SURFACE WATER SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION, 2002)

FIGURE 3–1
PROPOSED SAMPLE LOCATION MAP
SWMU 76–BUILDING 2300
PHASE I RFI WORK PLAN

NAVAL ACTIVITY PUERTO RICO

Revised: March 31, 2009

FIGURE 5-1
PROPOSED PROJECT SCHEDULE
SWMU 76 - BUILDING 2300
PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

ID	Task Name	TBD	Duration	Start	2009 Jan	Feb	Mar	Apr	May	Jun
1	Final Phase I RFI Work Plan for SWMU 76 to the EPA		45 edays	2/14/09						
2	EPA Review & Approval		90 edays	3/31/09						
3	Initiate Field Work	TBD	0 days	6/29/09						
4	Field Investigation	TBD	0 days	6/29/09						
5	Laboratory Analysis	TBD	0 days	6/29/09						
6	Data Validation	TBD	0 days	6/29/09						
7	Draft Phase I RFI Report for SWMU 76 to the EPA	TBD	0 days	6/29/09						
8	EPA Review	TBD	0 days	6/29/09						
9	Final Phase I RFI Report for SWMU 76 to the EPA	TBD	0 days	6/29/09						
10	EPA Review & Approval	TBD	0 days	6/29/09						

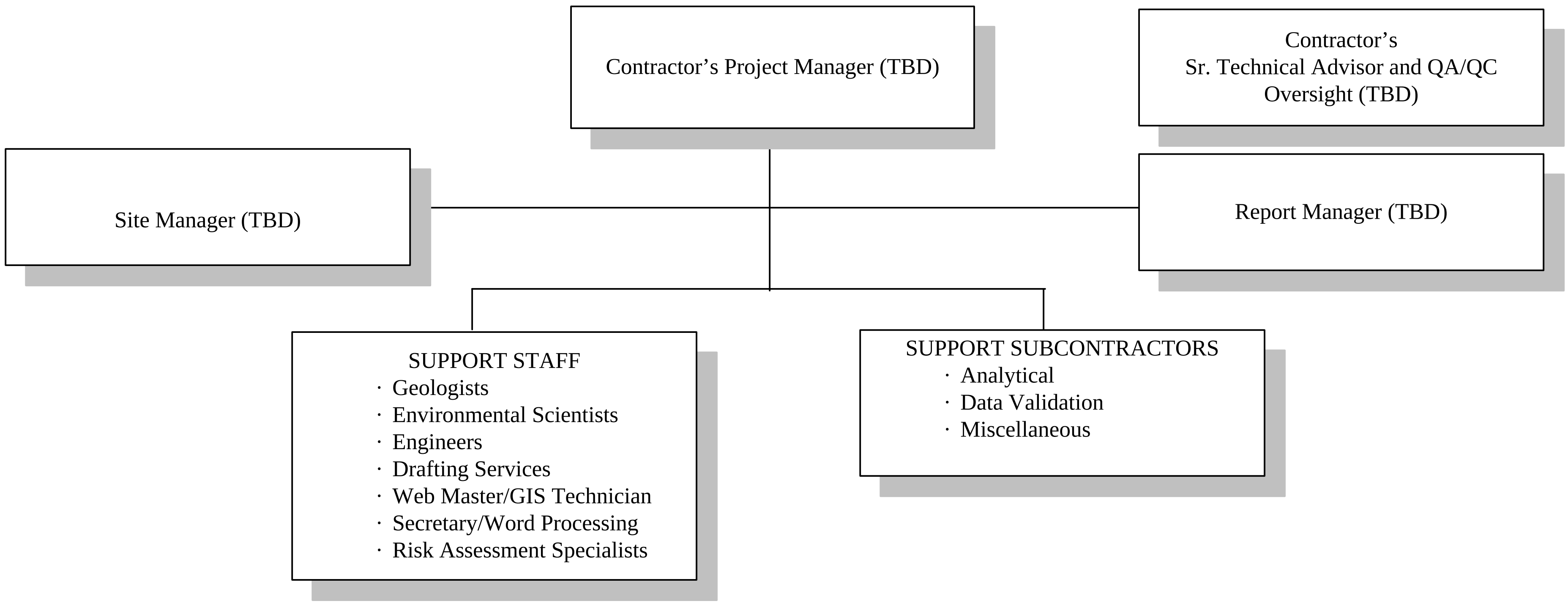
Project: Phase I RFI Work Plan
Date: 3/31/09

Task

TBD - To Be Determined by 3rd Party

FIGURE 6-1
PROJECT ORGANIZATION
SWMU 76 – BUILDING 2300
PHASE 1 RFI WORK PLAN

NAVAL ACTIVITY PUERTO RICO, PUERTO RICO



APPENDIX A
Photographs of SWMU 76, Building 2300

SWMU 76 – Building 2300

Photograph A-1. U.S. Army Reserve Boat Maintenance Facility-Viewed Towards the Southwest

APPENDIX B
USEPA Region II – Groundwater Sampling Procedure
Low Stress (Low Flow) Purging and Sampling

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II

GROUND WATER SAMPLING PROCEDURE
LOW STRESS (Low Flow) PURGING AND SAMPLING

I. SCOPE & APPLICATION

This Low Stress (or Low-Flow) Purging and Sampling Procedure is the EPA Region II standard method for collecting low stress (low flow) ground water samples from monitoring wells. Low stress Purging and Sampling results in collection of ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by minimizing stress on the geological formation and minimizing disturbance of sediment that has collected in the well. The procedure applies to monitoring wells that have an inner casing with a diameter of 2.0 inches or greater, and maximum screened intervals of ten feet unless multiple intervals are sampled. The procedure is appropriate for collection of ground water samples that will be analyzed for volatile and semi-volatile organic compounds (VOCs and SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and microbiological and other contaminants in association with all EPA programs.

This procedure does not address the collection of light or dense non-aqueous phase liquids (LNAPL or DNAPL) samples, and should be used for aqueous samples only. For sampling NAPLs, the reader is referred to the following EPA publications: DNAPL Site Evaluation (Cohen & Mercer, 1993) and the RCRA Ground-Water Monitoring: Draft Technical Guidance (EPA/530-R-93-001), and references therein.

II. METHOD SUMMARY

The purpose of the low stress purging and sampling procedure is to collect ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing.

Sampling at the prescribed (low) flow rate has three primary benefits. First, it minimizes disturbance of sediment in the bottom of the well, thereby producing a sample with low turbidity (i.e., low concentration of suspended particles). Typically, this saves time and analytical costs by eliminating the need for collecting and analyzing an additional filtered sample from the same well. Second, this procedure minimizes aeration of the ground water during sample collection, which improves the sample quality for VOC analysis. Third, in most cases the procedure significantly reduces the volume of ground water purged from a well and the costs associated with its proper treatment and disposal.

III. ADDRESSING POTENTIAL PROBLEMS

Problems that may be encountered using this technique include a) difficulty in sampling wells with insufficient yield; b) failure of one or more key indicator parameters to stabilize; c) cascading of water and/or formation of air bubbles in the tubing; and d) cross-contamination between wells.

Insufficient Yield

Wells with insufficient yield (i.e., low recharge rate of the well) may dewater during purging. Care should be taken to avoid loss of pressure in the tubing line due to dewatering of the well below the level of the pump=s intake. Purging should be interrupted before the water level in the well drops below the top of the pump, as this may induce cascading of the sand pack. Pumping the well dry should therefore be avoided to the extent possible in all cases. Sampling should commence as soon as the volume in the well has recovered sufficiently to allow collection of samples. Alternatively, ground water samples may be obtained with techniques designed for the unsaturated zone, such as lysimeters.

Failure to Stabilize Key Indicator Parameters

If one or more key indicator parameters fails to stabilize after 4 hours, one of four options should be considered: a) continue purging in an attempt to achieve stabilization; b) discontinue purging, do not collect samples, and document attempts to reach stabilization in the log book; c) discontinue purging, collect samples, and document attempts to reach stabilization in the log book; or d) Secure the well, purge and collect samples the next day (preferred). The key indicator parameter for samples to be analyzed for VOCs is dissolved oxygen. The key indicator parameter for all other samples is turbidity.

Cascading

To prevent cascading and/or air bubble formation in the tubing, care should be taken to ensure that the flow rate is sufficient to maintain pump suction. Minimize the length and diameter of tubing (i.e., 1/4 or 3/8 inch ID) to ensure that the tubing remains filled with ground water during sampling.

Cross-Contamination

To prevent cross-contamination between wells, it is strongly recommended that dedicated, in-place pumps be used. As an alternative, the potential for cross-contamination can be reduced by performing the more thorough Adaily@ decontamination procedures between sampling of each well in addition to the start of each sampling day (see Section VII, below).

Equipment Failure

Adequate equipment should be on-hand so that equipment failures do not adversely impact sampling activities.

IV. PLANNING DOCUMENTATION AND EQUIPMENT

< Approved site-specific Field Sampling Plan/Quality Assurance Project Plan (QAPP). This plan must specify the type of pump and other equipment to be used. The QAPP must also specify the depth to which the pump intake should be lowered in each well. Generally, the target depth will correspond to the mid-point of the most permeable zone in the screened interval. Borehole geologic and geophysical logs can be used to help select the most permeable zone. However, in some cases, other criteria may be used to select the target depth for the pump

intake. In all cases, the target depth must be approved by the EPA hydrogeologist or EPA project scientist.

< Well construction data, location map, field data from last sampling event.

< Polyethylene sheeting.

< Flame Ionization Detector (FID) and Photo Ionization Detector (PID).

< Adjustable rate, positive displacement ground water sampling pump (e.g., centrifugal or bladder pumps constructed of stainless steel or Teflon). A peristaltic pump may only be used for inorganic sample collection.

< Interface probe or equivalent device for determining the presence or absence of NAPL.

< Teflon or Teflon-lined polyethylene tubing to collect samples for organic analysis. Teflon or Teflon-lined polyethylene, PVC, Tygon or polyethylene tubing to collect samples for inorganic analysis. Sufficient tubing of the appropriate material must be available so that each well has dedicated tubing.

< Water level measuring device, minimum 0.01 foot accuracy, (electronic preferred for tracking water level drawdown during all pumping operations).

< Flow measurement supplies (e.g., graduated cylinder and stop watch or in-line flow meter).

< Power source (generator, nitrogen tank, etc.).

< Monitoring instruments for indicator parameters. Eh and dissolved oxygen must be monitored in-line using an instrument with a continuous readout display. Specific conductance, pH, and temperature may be monitored either in-line or using separate probes. A nephalometer is used to measure turbidity.

- Decontamination supplies (see Section VII, below).
- Logbook (see Section VIII, below).
- Sample bottles.
- Sample preservation supplies (as required by the analytical methods).
- Sample tags or labels, chain of custody.

V. SAMPLING PROCEDURES

Pre-Sampling Activities

1. Start at the well known or believed to have the least contaminated ground water and proceed systematically to the well with the most contaminated ground water. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations.

2. Lay out sheet of polyethylene for placement of monitoring and sampling equipment.

3. Measure VOCs at the rim of the unopened well with a PID and FID instrument and record the reading in the field log book.

4. Remove well cap.

5. Measure VOCs at the rim of the opened well with a PID and an FID instrument and record the reading in the field log book.
6. If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one. Note that the reference point should be surveyed for correction of ground water elevations to the mean geodesic datum (MSL).

7. Measure and record the depth to water (to 0.01 ft) in all wells to be sampled prior to purging. Care should be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well.

8. If desired, measure and record the depth of any NAPLs using an interface probe. Care should be taken to minimize disturbance of any sediment that has accumulated at the bottom of the well. Record the observations in the log book. If LNAPLs and/or DNAPLs are detected, install the pump at this time, as described in step 9, below. Allow the well to sit for several days between the measurement or sampling of any DNAPLs and the low-stress purging and sampling of the ground water.

Sampling Procedures

9. Install Pump: Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well in the EPA-approved QAPP or a depth otherwise approved by the EPA hydrogeologist or EPA project scientist. The pump intake must be kept at least two (2) feet above the bottom of the well to prevent disturbance and resuspension of any sediment or NAPL present in the bottom of the well. Record the depth to which the pump is lowered.

10. Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

11. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

12. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO)

approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

±0.1 for pH
±3% for specific conductance (conductivity)
±10 mv for redox potential
±10% for DO and turbidity

Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

13. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.

    Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 ml). Ground water purged from the well prior to sampling can be used for this purpose.

14. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.

15. Measure and record well depth.

16. Close and lock the well.

VI. FIELD QUALITY CONTROL SAMPLES

Quality control samples must be collected to determine if sample collection and handling procedures have adversely affected the quality of the ground water samples. The appropriate EPA Program Guidance should be consulted in preparing the field QC sample requirements of the site-specific QAPP.

All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples should be collected during the sampling event:

< Field duplicates
< Trip blanks for VOCs only
< Equipment blank (not necessary if equipment is dedicated to the well)

As noted above, ground water samples should be collected systematically from wells with the lowest level of contamination through to wells with highest level of contamination. The equipment blank should be collected after sampling from the most contaminated well.

VII. DECONTAMINATION

Non-disposable sampling equipment, including the pump and support cable and electrical wires which contact the sample, must be decontaminated thoroughly each day before use (Adaily decon@) and after each well is sampled (Abetween-well decon@). Dedicated, in-place pumps and tubing must be thoroughly decontaminated using Adaily decon@ procedures (see #17, below) prior to their initial use. For centrifugal pumps, it is strongly recommended that non-disposable sampling equipment, including the pump and support cable and electrical wires in contact with the sample, be decontaminated thoroughly each day before use (Adaily decon@).

EPA=s field experience indicates that the life of centrifugal pumps may be extended by removing entrained grit. This also permits inspection and replacement of the cooling water in centrifugal pumps. All non-dedicated sampling equipment (pumps, tubing, etc.)

must be decontaminated after each well is sampled (Abetween-well decon,@ see #18 below).

17. **Daily Decon**

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Disassemble pump.

E) Wash pump parts: Place the disassembled parts of the pump into a deep basin containing 8 to 10 gallons of non-phosphate detergent solution. Scrub all pump parts with a test tube brush.

F) Rinse pump parts with potable water.

G) Rinse the following pump parts with distilled/ deionized water: inlet screen, the shaft, the suction interconnector, the motor lead assembly, and the stator housing.

H) Place impeller assembly in a large glass beaker and rinse with 1% nitric acid (HNO_3).

I) Rinse impeller assembly with potable water.

J) Place impeller assembly in a large glass bleaker and rinse with isopropanol.

K) Rinse impeller assembly with distilled/deionized water.

18. **<u>Between-Well Decon</u>**

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.
B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Final Rinse: Operate pump in a deep basin of distilled/deionized water to pump out 1 to 2 gallons of this final rinse water.

VIII. FIELD LOG BOOK

A field log book must be kept each time ground water monitoring activities are conducted in the field. The field log book should document the following:

< Well identification number and physical condition.
< Well depth, and measurement technique.
< Static water level depth, date, time, and measurement technique.
< Presence and thickness of immiscible liquid layers and detection method.
< Collection method for immiscible liquid layers.
< Pumping rate, drawdown, indicator parameters values, and clock time, at three to five minute intervals; calculate or measure total volume pumped.
< Well sampling sequence and time of sample collection.
< Types of sample bottles used and sample identification numbers.
< Preservatives used.
< Parameters requested for analysis.

< Field observations of sampling event.
< Name of sample collector(s).
< Weather conditions.
< QA/QC data for field instruments.

IX. REFERENCES

Cohen, R.M. and J.W. Mercer, 1993, DNAPL Site Evaluation, C.K. Smoley Press, Boca Raton, Florida.

Puls, R.W. and M.J. Barcelona, 1996, Low-Flow (Minimal Drawdown) Ground-water Sampling Procedures, EPA/540/S-95/504.

U.S. EPA, 1993, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001.

U.S. EPA Region II, 1989, CERCLA Quality Assurance Manual.