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FINAL PHASE I RCRA FACILITY INVESTIGATION WORK PLAN SWMU 62 – FORMER BUNDY DISPOSAL AREA

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:

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Moon Township, PA

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

December 20, 2007

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

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Prepared for:

DEPARTMENT OF THE NAVY
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North Charleston, SC

Under:

Contract No. N62470-07-D-0502
DELIVERY ORDER 0002

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 _____

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Title: **BRAC Env. Coordinator**

Date: **December 20, 2007**

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LIST OF ACRONYMS AND ABBREVIATIONS

APA	Aerial Photo Analysis
Baker	Michael Baker Jr., Inc.
bgs	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
COPC	Contaminant of Potential Concern
CRQL	Contract Required Quantitation Limit
DI	Deionized
DO	Delivery Order
DPT	Direct Push Technology
DRO	Diesel Range Organics
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
GRO	Gasoline Range Organics
HM	Hazardous Materials
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
NAVFAC	Naval Facilities Engineering Command
NFESC	Naval Facilities Engineering Service Center
NSRR	Naval Station Roosevelt Roads
NTR	Naval Technical Representative

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

OP	Organophosphorus (pesticides)
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated biphenyls
PI	Photo Identified
PID	Photoionization Detector
PMO	Program Management Office
POL	Petroleum, oils, and lubricant
PRG	Preliminary Remediation Goal
PR LRA	Puerto Rico Local Reuse Authority
PSI	Physical Site Inspection
PVC	polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SE	Southeast
SOP	Standard Operating Procedures
SVOC	Semi-volatile Organic Compound
SWMU	Solid Waste Management Unit
TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence 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) 62 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 Closure (BRAC) Program Management Office (PMO) Southeast (SE) office under contract with the Naval Facilities Engineering Command (NAVFAC) SE under (Contract No. 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 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 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).

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 62 (formerly referred to as ECP 8) 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 requirement for a Phase I RFI Work Plan.

1.2 Site Location and History

The Draft Phase II Environmental Condition of Property Report concluded that SWMU 62 has been impacted by past and present operations at NAPR. The results of the ECP Phase II Investigation indicated that the SWMU was characterized as presenting a low potential risk to human health, the potential ecological risk was undetermined. SWMU 62 is located at the southeast end of the base in the Bundy area, as shown on Figure 1-2. The Aerial Photography Analysis (APA) conducted during the Phase I ECP identified this area as Photo Identified (PI) Site 12, due to the observation of a disposal or fill area with multi-toned, mounded materials from 1958-1961 (see Figure 1-3). The records review and interviews conducted during the Phase I ECP did not confirm or repudiate the area as a disposal area. However, the Phase I ECP indicated that the Physical Site Inspection (PSI) observed numerous piles of mounded gravel and charcoal, metal and building debris, and two empty 55-gallon drums. During the Phase II ECP investigation, the field crew observed the same type of site features as described above. There were no signs of any stressed vegetation observed during the Phase II ECP investigation. Appendix A provides photographs of the site from the ECP investigation. Figure 1-4 shows the SWMU boundary and ECP sample locations.

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 62. A Phase I RFI is required as outlined in the NAPR RCRA 7003 Order issued by 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 of follow-up actions necessary to ensure protection of human health and the environment.

A surface and subsurface soil sampling program is to be implemented to further characterize and delineate Volatile Organic Compounds (VOCs), pesticides and metals detected during the ECP Phase II Investigation in the surface soil and metals detected in the subsurface soil. Barium was detected in subsurface soil above the USEPA Region III Residential RBC, and above background values that were established for NAPR soils at that time.

Two empty 55-gallon drums were observed during both the Phase I and Phase II ECP Investigations. Since the previous contents of the drums are unknown, if located and accessible,

surface and subsurface soil samples will be collected near the abandoned drums. These soil samples will be analyzed for Appendix IX VOCs, Semi Volatile Organic Compounds (SVOCs,) Pesticides/Polychlorinated biphenyls (PCBs), and metals.

1.4 Organization of 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 includes soil 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 62 along with any previous investigations that may have been conducted.

2.1 Current Site Conditions/Usage

The Former Bundy Disposal Area is currently not utilized. Records review and historic maps indicate that the area was used as a landfill from the 1940s to the 1960s. The operational closure of Naval Station Roosevelt Roads occurred on March 31, 2004. During both the Phase I and II ECP Investigations, numerous piles of mounded gravel and charcoal, metal and building debris, and two empty 55-gallon drums were observed by the field crews. There were no signs of stressed vegetation observed during the Phase II ECP investigation. It is important to note that the topography and geology at this SWMU limited the field effort during the Phase II ECP Investigation as discussed in more detail below.

2.2 Previous Investigations

The Phase I/II ECP investigation performed in 2004 noted that there were no signs of any stains or stressed vegetation (NAVFAC Atlantic, 2005). As noted above, numerous piles of mounded gravel and charcoal, metal and building debris, and two empty 55-gallon drums were observed.

Three soil borings (8E-01, 8E-02, and 8E-03, see Figure 3-1 for previous sample locations) were advanced in the former Bundy Disposal Area. Three surface soil samples were collected at this site (sample locations 8E-01 through 8E-03) from a depth of 0 to 1 foot below ground surface (bgs). Subsurface soil samples were then collected from 8E-01 and 8E-03 using a hand auger, and/or mobile power tools because the track-mounted Geoprobe® rig was unable to traverse the topography at this site. A subsurface soil sample was not obtained from soil boring location 8E-02 due to auger refusal at 1 foot bgs. The depth of subsurface soil collection at other locations was limited by the shallow depth to suspected bedrock. Geology at the site was characterized as a thin residual sand and silt overlaying weathered bedrock (Gabbro). Groundwater was not encountered.

The surface and subsurface soil samples were analyzed for Appendix IX VOCs, SVOCs, Pesticides/ PCBs, organophosphorus (OP)-Pesticides, chlorinated herbicides, and metals. A summary of the analytical data from this investigation can be found in Appendix B. In the surface soil, a few VOCs and pesticides were detected. No organic compounds exceeded USEPA Region III Residential or Industrial RBCs at this SWMU. Organic compounds were not detected in the subsurface soil matrix.

Inorganic detections were representative of background concentrations of these metals found at NAPR with the exception of barium in the subsurface soil matrix. Three metals exceeded the USEPA Region III Residential RBCs, including arsenic and vanadium in the surface soil and barium and vanadium in the subsurface soil. At 8E-03 the barium concentration in the subsurface soil also exceeded twice the average detected background concentration, indicating possible contamination. It should be noted that barium also exceeded the background screening value in two of the three surface soil samples, although it did not exceed its RBC. The concentrations of arsenic and vanadium in the soil did not exceed the background concentrations established at NAPR.

Based on the occurrence of barium exceeding background and the USEPA Region III Residential RBC, it was concluded that site contamination has occurred from previous activities. Barium is associated with ignition equipment and acid batteries, and is a component of gray and ductile irons. These items could have been disposed of at the site as indicated by the past use of the site and as shown by a feature in the 1958 aerial photograph (LANTDIV, 2004a), where 8E-03 was located.

Additional sampling will further delineate the barium detected from 8E-03, and provide more data for characterization of areas where two empty 55-gallon drums were abandoned.

3.0 SCOPE OF INVESTIGATION

Surface and subsurface soil samples will be collected from SWMU 62 as part of the Phase I RFI. Sampling locations presented in this section were identified from the historical aerial photograph (1958) and the Phase I/II ECP findings. Consideration was given to site topography, site features, historical operational features of the facility, and the results from the ECP Phase II Investigation. The subsections that follow outline the specific sampling protocol.

The proposed sampling and analytical program for this investigation is summarized in Table 3-1. The proposed sampling locations for SWMU 62 are shown on Figure 3-1. The samples that will be collected as part of the Phase I RFI are as follows:

- Eight surface soil samples will be collected from eight boring locations as shown on Figure 3-1.

- Sixteen subsurface soil samples will be collected from the eight boring locations. Depending on site topography and accessibility, a minimum of two samples will be collected from different depths at each boring location, if possible. If site conditions allow, one sample will be collected from any area of suspected contamination and the other will be obtained just above the groundwater interface, if encountered. Since the ECP Phase II field investigation noted that site accessibility and topography were unfavorable for evaluating subsurface conditions, and groundwater was not encountered, the locations and depth of subsurface samples may vary from this work plan. If unfavorable site conditions are encountered during sampling, professional judgment will determine the location and collection of subsurface soil samples as well as the depths. If suspected contamination is observed across multiple samples, then additional samples will be obtained from the boring location.

- Two soil borings will be advanced and one surface soil sample and two subsurface soil samples (in the same manner as described above) will be collected from soil near the locations of the two empty 55-gallon drums that were noted as being abandoned at the SWMU. Collection of these samples is dependent on the ability of the field crew to locate the empty drums and the suitability of topography/geology to allow access and drilling for sample collection.

3.1 Soil Sampling and Analysis Program

Surface and subsurface soil samples will be collected from SWMU 62. The following outlines the specific sampling protocol.

As shown on Figure 3-1, four soil borings (62SB01-62SB04) are proposed to be advanced at various locations within the 1958 polygon surrounding sample 8E-03 from the Phase I/II ECP, where barium was detected in excess of the USEPA Region III Residential screening value and the background value used at that time. Four soil borings (62SB05 to 62SB08) will also be advanced around sample 8E-01, where the 1958 aerial noted disturbances to the soils in this location. If site topography allows, borings for this RFI will be advanced using a track-mounted 66DT Geoprobe rig capable of direct push and augering. If adverse site conditions (rocky conditions) do not allow for the Geoprobe rig to penetrate the subsurface adequately, then a hollow-stem auger rig will be utilized.

Subsurface samples will be collected from two-foot intervals until the depth of refusal (see SOP F102 in Baker, 1995). Care will be taken to achieve maximum recovery so that a good

stratigraphic profile can be developed, but it should be noted that this may not be realistic given the subsurface conditions at the upland locations. A boring log will be maintained indicating blow counts, lithology, and other observations.

One surface soil sample (0 to 1 foot bgs) and two subsurface soil samples [1-3 feet bgs and just above the water table interface] will be collected from each boring location, if site topography and terrain allow (see SOP F102 in Baker, 1995). If field observations such as staining or presence of waste materials are indicated in other sample depths, then additional subsurface soil samples may also be collected. The surface soil samples will be analyzed for Appendix IX VOCs, pesticides and metals. No SVOCs or PCBs were detected in the surface soil samples analyzed in the Phase II ECP. To provide a larger data set since there were only three surface soil samples analyzed in the Phase II ECP, samples collected from soil borings 62SB03, 62SB06 and 62SB08 will be analyzed for Appendix IX SVOC, low-level Polynuclear Aromatic Hydrocarbons (PAHs), and PCBs. No organic compounds were detected in the subsurface soil during the ECP investigation. However there were only two samples collected during the Phase II ECP Investigation. Therefore to obtain more data to provide a better characterization of the SWMU, subsurface samples collected form 62SB03, 62SB06 and 62SB08 will be analyzed for Appendix IX VOCs, SVOCs, low-level PAHs, Pesticides and PCBs in addition to metals. The inclusion of organic analytes will provide additional data to verify that contamination associated with organic compounds has not occurred at this site. In the event that the soil volume is limited because the material encountered is predominantly rocky, then Appendix IX VOCs and Pesticides/PCBs (which were previously detected at the site) will be prioritized over the other organic analytes. The remainder of the subsurface soil samples will be analyzed for Appendix IX metals only, as presented in Table 3-1.

Two empty 55-gallon drums were present during both the Phase I and Phase II ECP Investigations. Since the previous contents are unknown, if the field team is able to locate the drums and accessibility is favorable, surface and subsurface soil samples will be collected from soil in the near vicinity of each drum within a suspected area of contamination. These soil samples will be analyzed for Appendix IX VOCs, SVOCs, low level PAHs, Pesticides/PCBs, and Metals.

A boring log will be maintained indicating lithology, water occurrence (or lack thereof), flame ionization detector (FID)/photo ionization detector (PID) readings, and miscellaneous (visual and olfactory) observations.

The soil boring samples will be labeled consecutively (beginning with 62SB01) in a matter consistent with previous sample designations at NAPR. 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.

62SB01-00 -	SWMU 62 Sample
62SB01-00 -	Soil Boring Sample
62SB01-00 -	Soil boring location identifier
62SB01-00 -	0 to 1 foot bgs (surface soil) sampling interval

Subsurface soil samples will be identified as follows:

62SB01-01 -	First subsurface sampling interval, 1 to 3 feet bgs
62SB01-02 -	Second subsurface sampling interval, 3 to 5 feet bgs, and so on.

Sample identification extensions will follow the pattern shown above. However, the actual sample depth will be determined in the field.

Following sample collection, each borehole will be backfilled with the remaining soil 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.

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.

All analyses at the laboratory will be performed using current methodologies as presented in Table 3-2. All analytical work performed on the mainland of the United States 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. Standard Operating Procedures (SOPs) used by the analytical laboratory will be requested from the laboratory after selection.

3.2 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 QA/QC samples to be obtained during these investigations will include 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, etc. The results from the blanks will be used to verify that the decontamination of reusable equipment had 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 (DI), 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 volatile organic constituent samples scheduled for collection. One trip blank sample will accompany each cooler containing samples to be analyzed for VOCs.

Soil sample field duplicates will be homogenized and split and collected at a frequency of ten percent.

Analysis of duplicate and blanks associated with soil sampling will include Appendix IX VOCs, SVOCs, pesticides, PCBs, 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.

3.3 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

3.3.1 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. Although utilities are not identified on the Geographic Information System (GIS) utility layer, all proposed soil borings and temporary monitoring well locations will be cleared by the base utility department.

3.3.2 Investigation Derived Wastes

The generation of IDW associated with soil sampling, including soil cuttings and decontamination fluids, will be collected and stored temporarily in 55-gallon drums. However, the soil cuttings from the subsurface soil sampling will be placed back into the boring from which they came, unless contamination is present. As much as possible, soils last out of the hole will be returned first, thereby, approximating original stratigraphy.

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 drill rig), 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 3-1 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.

3.3.3 Decontamination

All reusable (non-dedicated and non-disposable) soil sampling equipment (i.e. augers, bits, split-spoon samplers, etc.), will be decontaminated between each sampling location in accordance with SOPs F501 and F502 (Baker, 1995). 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.

3.3.4 Surveying

All sampling locations will be surveyed. Traditional survey equipment or survey-grade GPS unit will be utilized to obtain vertical (+/- 0.01 foot) and horizontal (+/- 0.1 foot) locations.

3.3.5 Health and Safety Procedures

The health and safety procedures previously presented in the RFI Management Plans (Baker, 1995) will be employed during this investigation.

3.3.6 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.

To track sample custody transfers before ultimate disposition, sample custody will be documented using a similar chain-of-custody form as presented in the RFI Management Plans (Baker, 1995). 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.

3.4 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.

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 historical background of any investigations conducted at the SWMU. The introduction will also provide a regulatory framework for NAPR and the SWMU, as well as a discussion of current conditions.

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 and subsurface soil analytical data will be screened against USEPA Region IX Residential and Industrial Preliminary Remediation Goals (PRGs). 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/). Analytical data for 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]).

For a given medium (i.e., surface soil and subsurface soil), analytical data for inorganic chemicals exceeding one or more of the screening values (human health or ecological) will be statistically compared to background analytical data in accordance with Navy guidance (Naval Facilities

Engineering Service Center [NFESC], 2002). The background analytical data used in the statistical evaluations will be those contained in the Revised Final Summary Report for Environmental Background Concentrations of Inorganic Compounds (Baker, 2006c). The process that will be used to statistically evaluate the data is depicted in Figure 4-1. As shown by the figure, statistical evaluations will include descriptive summaries of each data set (range of detected values, range of non-detected values, maximum, mean, and 95 percent upper confidence limit [UCL] of the mean concentrations), statistical tests on the mean/median of the distributions (i.e., student's t-test, Gehan test, Satterthwaite's t-test, or Wilcoxon rank sum test), statistical tests on the right tail of the distributions (i.e., quantile test and slippage test), and proportional statistics (two-sample test of proportions). The significance level (the probability criteria for rejecting the null hypotheses that data sets were sampled from the same population) will be set at 0.05 for all statistical tests in accordance with Navy guidance (NFESC, 2002).

The results of the screening and statistical 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 the extent of the releases previously detected at the 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 62 is provided as Figure 5-1.

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, funding delays by the Navy, 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

Mr. Mark Kimes, P.E., Activity Coordinator for all work in Puerto Rico, will manage the Baker Project Team. His 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 will maintain communication with the BRAC PMO SE, Navy Technical Representative (NTR), Mr. Mark Davidson. Mr. John Mentz will administer overall QA/QC for this project.

The field activities of this project will consist of one field team managed by the Geologist, Mr. Joseph Burawa. Mr. Burawa's responsibilities include directing the field team and subcontractors. Mr. Rick Aschenbrenner, P.E. will direct the reporting effort associated with the field investigation, ensuring that all necessary staffing is utilized to assist in developing the Phase I RFI Reports for SWMU 62.

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). 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.

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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.

TABLES

TABLE 3-1

SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM
SWMU 62 - FORMER BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

		Fixed Based Analytical Lab Analysis						
Media	**Sample Depth (ft bgs)**	App IX VOCs	App IX SVOCs	Appendix IX Low-level PAHs	Appendix IX Pesticides	PCBs	App IX Metals	**Comment**
Surface Soil Samples								
62SB01-00	0.0 - 1.0	X			X		X	
62SB02-00	0.0 - 1.0	X			X		X	
62SB03-00	0.0 - 1.0	X	X	X	X	X	X	
62SB04-00	0.0 - 1.0	X			X		X	
62SB05-00	0.0 - 1.0	X			X		X	
62SB06-00	0.0 - 1.0	X	X	X	X	X	X	
62SB07-00	0.0 - 1.0	X			X		X	
62SB08-00	0.0 - 1.0	X			X		X	
62SB08-00D	0.0 - 1.0	X	X	X	X	X	X	Duplicate
62SB08-00MS/MSD	0.0 - 1.0	X	X	X	X	X	X	Matrix Spike/Matrix Spike Duplicate
62SB09-00	0.0 - 1.0	X	X	X	X	X	X	Soil near empty drum 1
62SB10-00	0.0 - 1.0	X	X	X	X	X	X	Soil near empty drum 2
Subsurface Soil Samples(2)								
62SB01-XX(1)	TBD						X	
62SB01-XX(1)	TBD						X	
62SB02-XX(1)	TBD						X	
62SB02-XX(1)	TBD						X	
62SB03-XX(1)	TBD	X	X	X	X	X	X	
62SB03-XX(1)	TBD	X	X	X	X	X	X	
62SB04-XX(1)	TBD						X	
62SB04-XXD(1)	TBD						X	Duplicate
62SB04-XX(1)	TBD						X	
62SB05-XX(1)	TBD						X	
62SB05-XX(1)	TBD						X	
62SB06-XX(1)	TBD	X	X	X	X	X	X	
62SB06-XX(1)	TBD	X	X	X	X	X	X	
62SB07-XX(1)	TBD						X	
62SB07-XX(1)	TBD						X	
62SB08-XX(1)	TBD	X	X	X	X	X	X	
62SB08-XX(1)	TBD	X	X	X	X	X	X	
62SB08-XXD(1)	TBD	X	X	X	X	X	X	Duplicate
62SB08-XXMS/MSD(1)	TBD	X	X	X	X	X	X	Matrix Spike/Matrix Spike Duplicate

TABLE 3-1

SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM
SWMU 62 - FORMER BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

		Fixed Based Analytical Lab Analysis						
Media	**Sample Depth (ft bgs)**	App IX VOCs	App IX SVOCs	Appendix IX Low-level PAHs	Appendix IX Pesticides	PCBs	App IX Metals	**Comment**
Subsurface Soil Samples[2] (continued)								
62SB09-XX[1]	TBD	X	X	X	X	X	X	Soil near empty drum 1
62SB09-XX[1]	TBD	X	X	X	X	X	X	Soil near empty drum 1
62SB10-XX[1]	TBD	X	X	X	X	X	X	Soil near empty drum 2
62SB10-XX[1]	TBD	X	X	X	X	X	X	Soil near empty drum 2

Notes:

[1] XX - The designator 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 per boring, additional subsurface soil will be collected if areas of staining or other indicators of contamination are encountered at multiple depths. Likewise, site topography may not allow the collection of subsurface soil samples at certain proposed locations. In this event, the number of QA/QC samples outlined in Section 3.2 and 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

Revised: December 20, 2007

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
PHASE I RFI WORK PLAN SWMU 62
NAVAL ACTIVITY PUERTO RICO

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

TABLE 3-2

Revised: December 20, 2007

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
PHASE I RFI WORK PLAN SWMU 62
NAVAL ACTIVITY PUERTO RICO

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

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
PHASE I RFI WORK PLAN SWMU 62
NAVAL ACTIVITY PUERTO RICO

Semivolatiles	Quantitation Limits*		Method Number
	Water (µg/L)	Low Soil (µg/kg)	
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)
PHASE I RFI WORK PLAN SWMU 62
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

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
PHASE I RFI WORK PLAN SWMU 62
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

TABLE 3-2

Revised: December 20, 2007

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
PHASE I RFI WORK PLAN SWMU 62
NAVAL ACTIVITY PUERTO RICO

Pesticides	Quantitation Limits*		Method Number
	Water (µg/L)	Low Soil (µg/kg)	
Aldrin	0.05	1.7	8081A
Alpha-BHC	0.05	1.7	8081A
beta-BHC	0.05	1.7	8081A
delta-BHC	0.05	1.7	8081A
gamma-BHC	0.05	1.7	8081A
Chlordane	0.5	17	8081A
Chlorobenzilate	0.5	17	8081A
4,4'-DDT	0.1	3.3	8081A
4,4'-DDE	0.1	3.3	8081A
4,4'-DDD	0.1	3.3	8081A
Dieldrin	0.1	3.3	8081A
Endosulfan I	0.05	1.7	8081A
Endosulfan II	0.1	3.3	8081A
Endosulfan sulfate	0.1	3.3	8081A
Endrin	0.1	3.3	8081A
Isodrin	0.05	3.3	8081A
Kepone	1.0	170	8081A
Toxaphene	5.0	170	8081A
Endrin Aldehyde	0.1	3.3	8081A
Heptachlor	0.05	1.7	8081A
Heptachlor epoxide	0.05	1.7	8081A
Methyoxychlor	0.5	17	8081A
PCBs	**Quantitation Limits***		**Method Number**
	Water (µg/L)	**Low Soil (µg/kg)**	
Aroclor-1016	1.0	33	8082
Aroclor-1221	2.0	67	8082
Aroclor-1232	1.0	33	8082
Aroclor-1242	1.0	33	8082
Aroclor-1248	1.0	33	8082
Aroclor-1254	1.0	33	8082
Aroclor-1260	1.0	33	8082

TABLE 3-2

METHOD PERFORMANCE LIMITS
APPENDIX IX COMPOUND LIST AND CONTRACT
REQUIRED QUANTITATION LIMITS (CRQL)
PHASE I RFI WORK PLAN SWMU 62
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Inorganics	Method Number	Quantitation Limits* Water (µg/L)	Quantitation Limits* 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
Cyanide	9012B	0.010	1.0	Colorimetric
Sulfide	9030B	1.0	25	Titrimetric, Iodine
Zinc	6010B	20	2.0	Inductively Coupled Plasma
RCRA Metals	**Method Number**	**Quantitation Limits* Soil (mg/kg)**	**Quantitation Limits* Water (µg/L)**	**Method Description**
Arsenic	6010B(3050A/3010A)	1.0	10	Inductively Coupled Plasma
Barium	6010B(3050A/3010A)	1.0	10	Inductively Coupled Plasma
Cadmium	6010B(3050A/3010A)	0.50	5	Inductively Coupled Plasma
Chromium	6010B(3050A/3010A)	1.0	10	Inductively Coupled Plasma
Lead	6010B(3050A/3010A)	0.50	5.0	Inductively Coupled Plasma
Mercury	7471A/7470A	0.020	0.20	Cold Vapor AA
Selenium	6010B(3050A/3010A)	1.0	10	Inductively Coupled Plasma
Silver	6010B(3050A/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.

Revised December 20, 2007

TABLE 3-3

SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM
QA/QC AND IDW SAMPLES
PHASE I RFI WORK PLAN SWMU 62
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

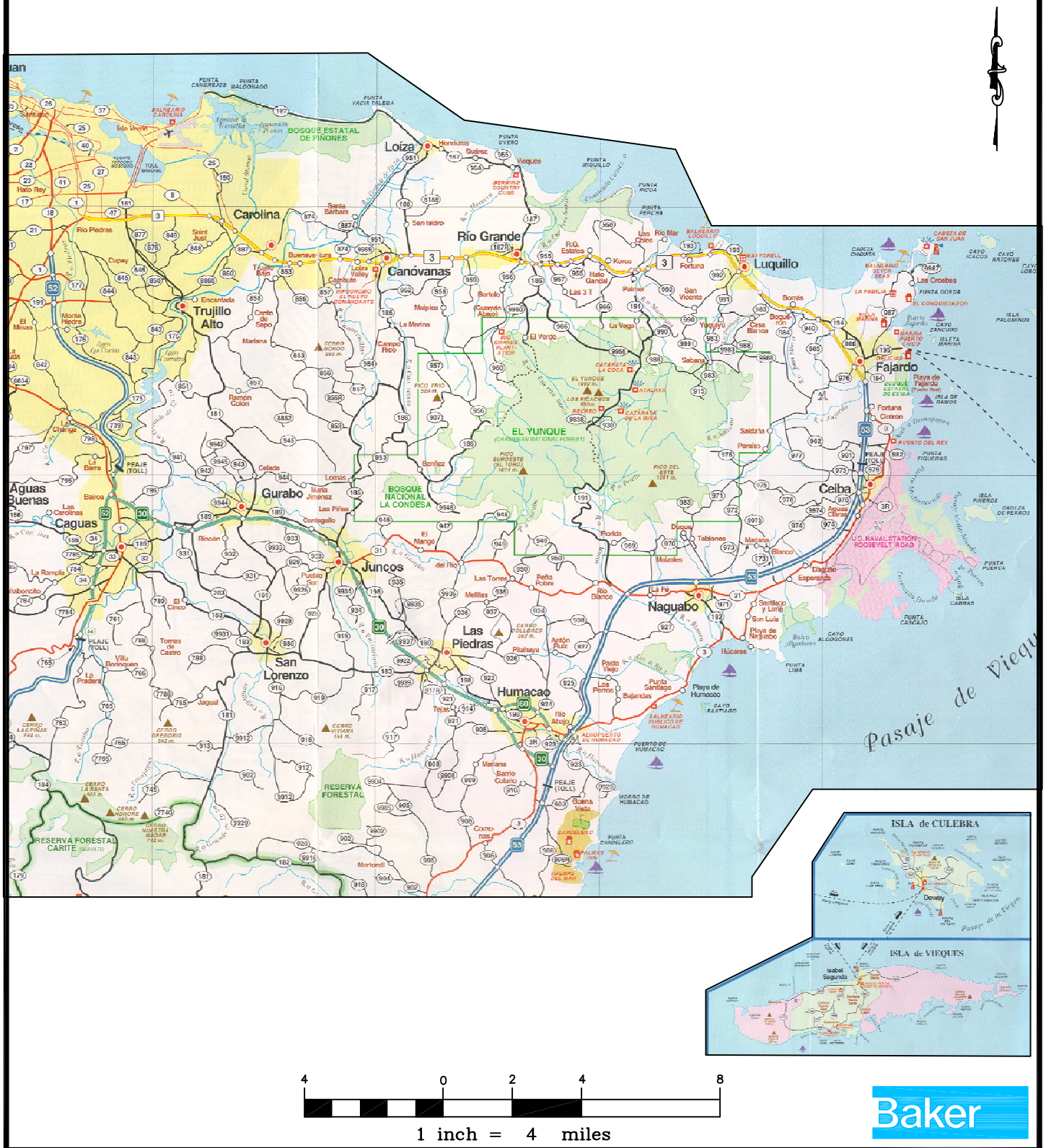
	Aqueous Samples Analysis Requested								Solid Samples Analysis Requested		
Media	App IX VOCs	App IX SVOCs	Appendix Ix low level PAHs	App IX Pesticides	App IX PCBs	App IX Metals (Total)	Benzene	RCRA Metals	Benzene	RCRA Metals	**Comment**
Trip Blank Samples											
62TB01	X(1)										
62TB02	X(1)										
62TB03	X(1)										
Equipment Rinsate Samples											
62ER01	X	X	X	X	X	X					Stainless Steel Spoon
62ER02	X	X	X	X	X	X					Split Spoon Sampler or Macro Core liner
62ER03	X	X	X	X	X	X					Hand Auger Bucket or mobile power tool auger
Field Blank Samples											
62FB01	X	X	X	X	X	X					Lab Grade Deionized Water
62FB02	X	X	X	X	X	X					Store Bought Distilled Warer
62FB03	X	X	X	X	X	X					NAPR Potable Water
IDW Samples											
62IDW01							X	X			Aqueous
62IDW02									X	X	Solid

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 62 RFI\CAD\ 111626_62_01.dwg



4 0 2 4 8

1 inch = 4 miles

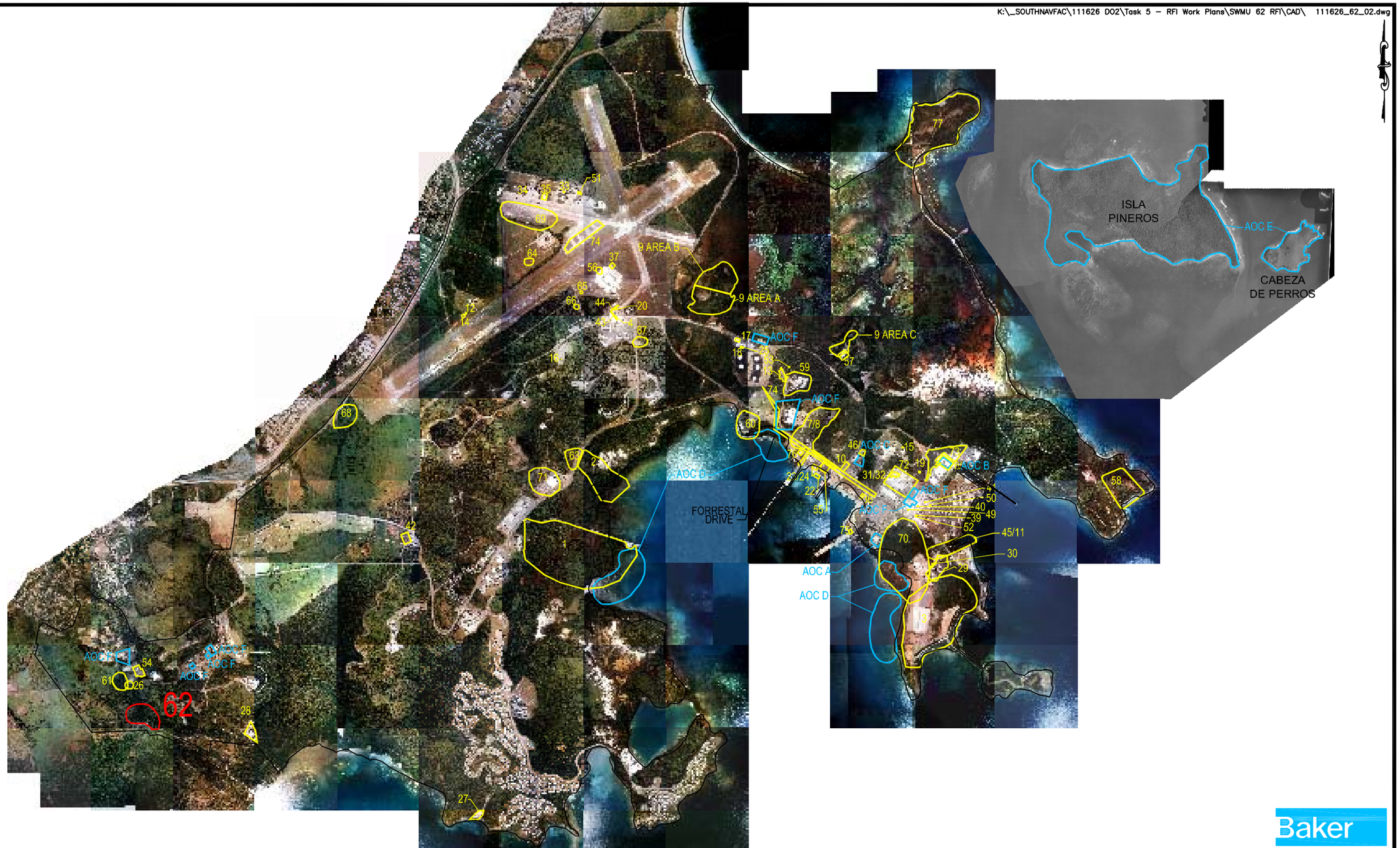
Baker

FIGURE 1-1
REGIONAL LOCATION MAP
SWMU 62-FORMER BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN

SOURCE: METRODATA, INC., 1999.

NAVAL ACTIVITY PUERTO RICO

K:_SOUTHNAVFAC\111626 DO2\Task 5 – RFI Work Plans\SWMU 62 RFI\CAD\ 111626_62_02.dwg



LEGEND

– SWMUs

62 – AREA PERTAINS TO THIS INVESTIGATION

AOC D – AOCs

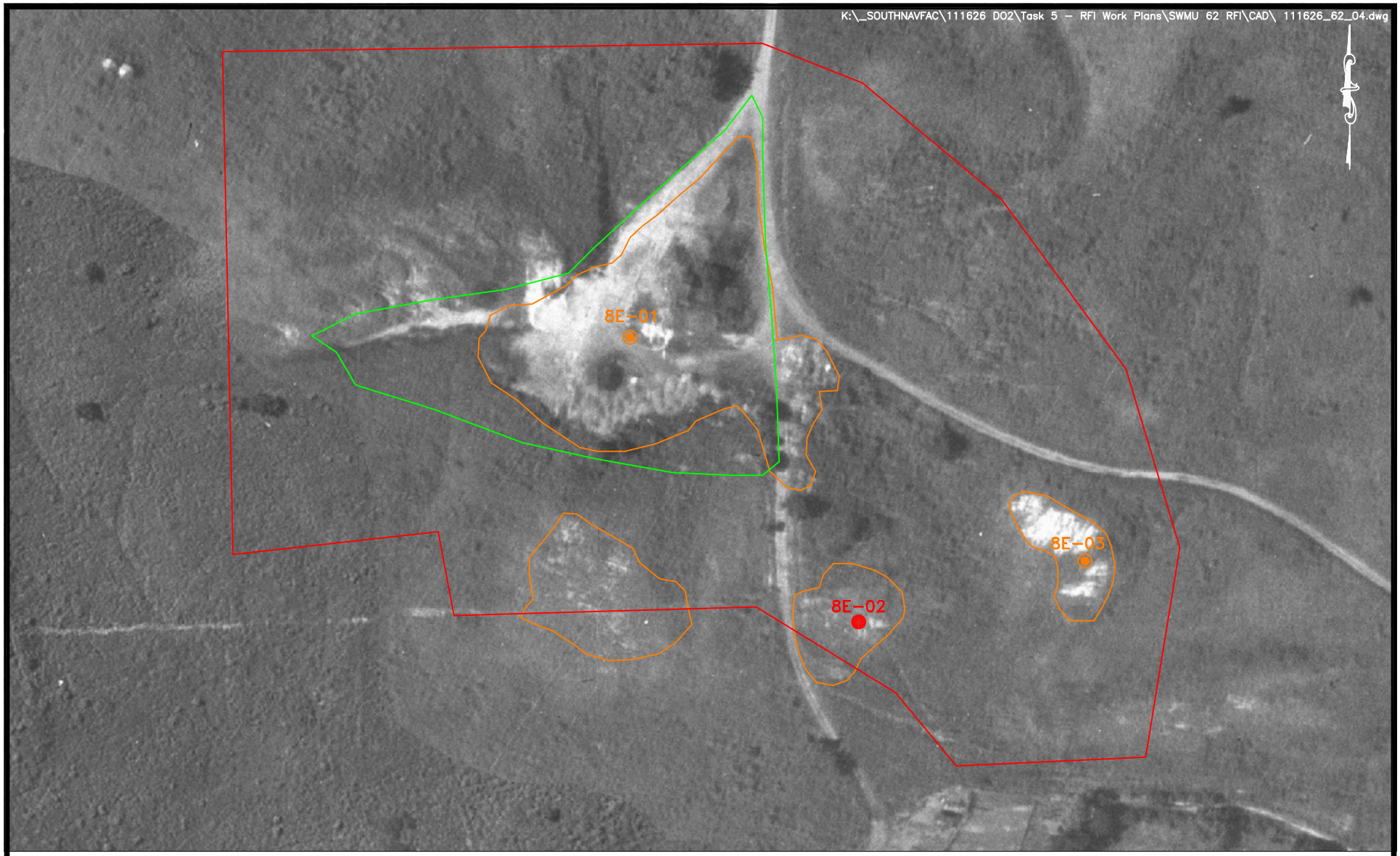
SOURCE: GEO–MARINE, INC., SEPTEMBER 6, 2000.

3000 0 1500 3000

1 inch = 3000 ft.

FIGURE 1–2
SWMU LOCATION MAP
SWMU 62–FORMER BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN

NAVAL ACTIVITY PUERTO RICO



Baker

150 0 75 150

1 inch = 150 ft.

LEGEND

- –1958 POLYGON FEATURE
- –1961 POLYGON FEATURE
- –EXISTING SURFACE AND SUBSURFACE SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- –EXISTING SURFACE SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- –SWMU BOUNDARY

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

FIGURE 1–3
1958 AERIAL PHOTOGRAPH
SWMU 62–FORMER
BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN

NAVAL ACTIVITY PUERTO RICO

Baker

150 0 75 150

1 inch = 150 ft.

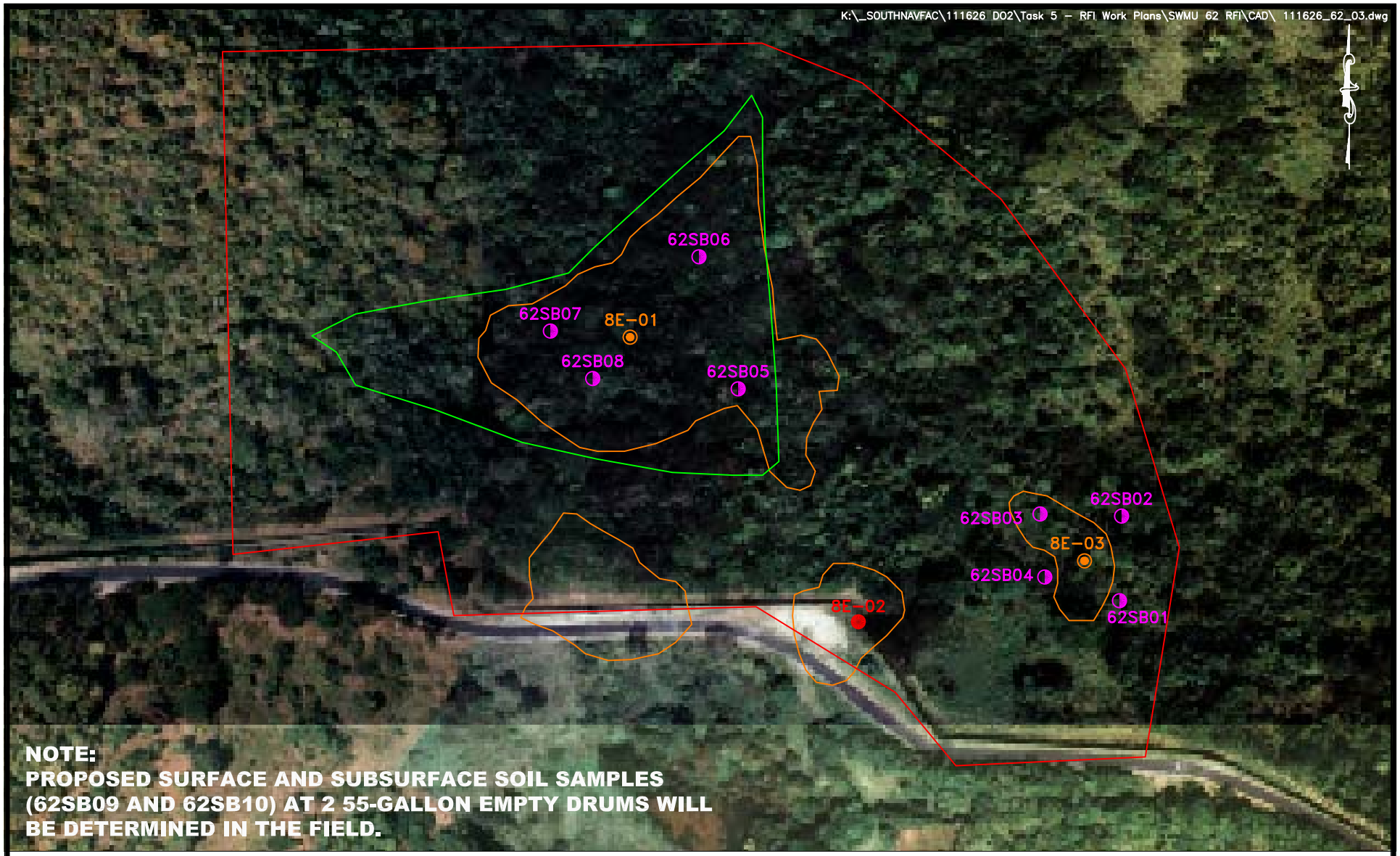
SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

LEGEND

- -1958 POLYGON FEATURE
- -1961 POLYGON FEATURE
- -EXISTING SUBSURFACE SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- -EXISTING SURFACE SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- -SWMU BOUNDARY

FIGURE 1-4
SITE LAYOUT AND ECP SAMPLE LOCATION MAP
SWMU 62-FORMER BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN

NAVAL ACTIVITY PUERTO RICO



Baker

150 0 75 150

1 inch = 150 ft.

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

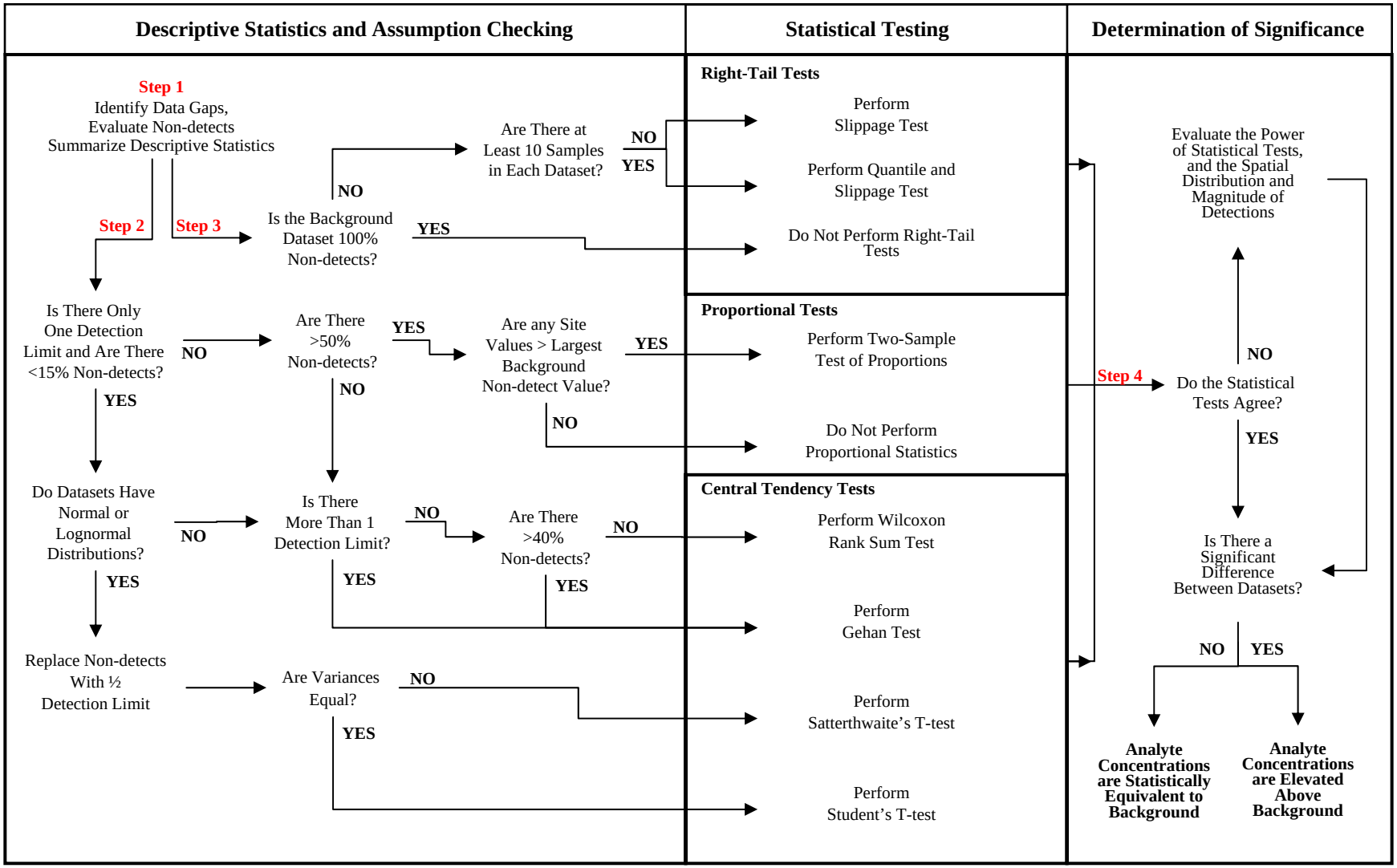
LEGEND

- -1958 POLYGON FEATURE
- -1961 POLYGON FEATURE
- -EXISTING SURFACE AND SUBSURFACE SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- -EXISTING SURFACE SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- -PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLING LOCATION
- -SWMU BOUNDARY

FIGURE 3-1
PROPOSED SAMPLE LOCATION MAP
SWMU 62-FORMER
BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN

NAVAL ACTIVITY PUERTO RICO

FIGURE 4-1
STATISTICAL ANALYSIS PROCESS
SWMU 62 – FORMER BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

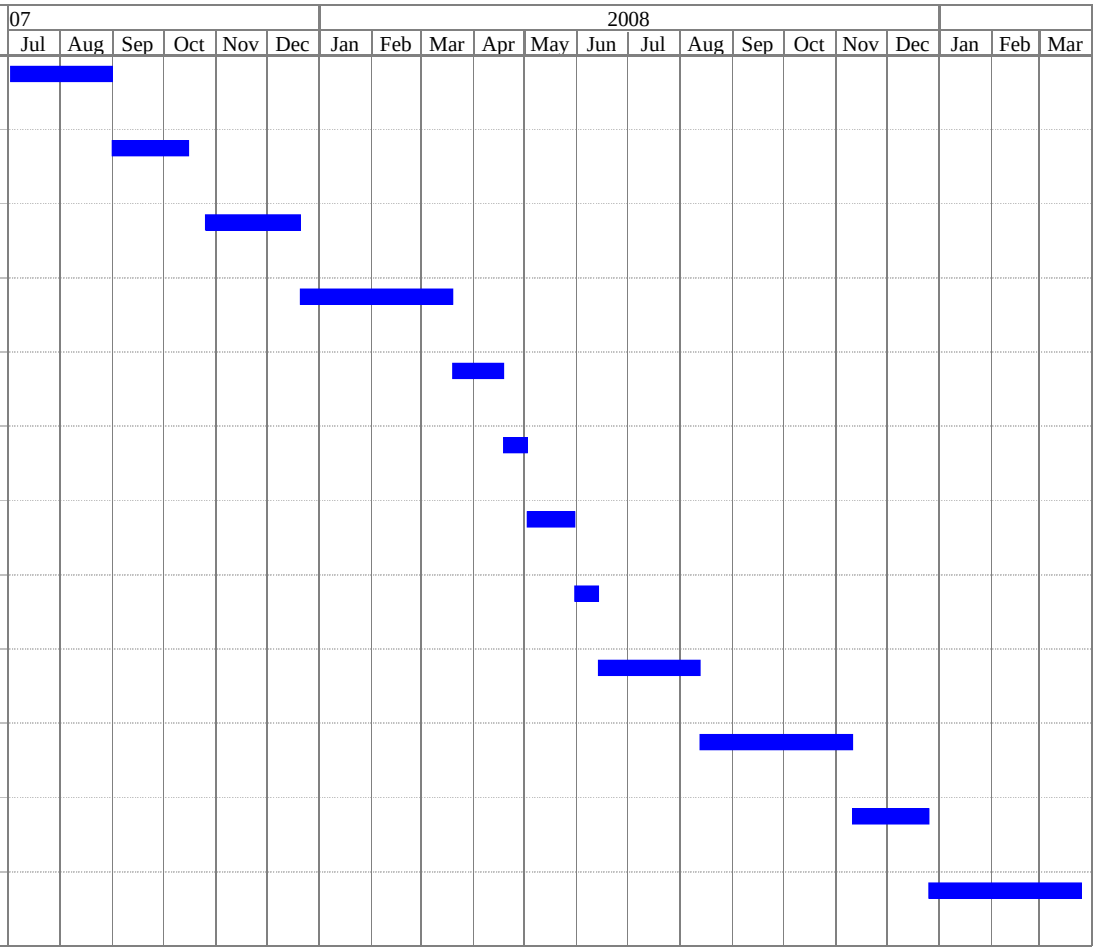


T-tests performed on log-transformed data if datasets have lognormal distributions.

Revised: December 20, 2007

FIGURE 5-1
PROPOSED PROJECT SCHEDULE
SWMU 62- FORMER BUNDY DISPOSAL AREA
PHASE I RFI WORK PLAN
NAVAL ACTIVITY PUERTO RICO

ID	Task Name	Duration	Start	Finish
1	Draft RFI Work Plan to the EPA	60 edays	7/2/07	8/31/07
2	EPA Review	48 edays	8/31/07	10/18/07
3	Final RFI Work Plan to the EPA	56 edays	10/25/07	12/20/07
4	EPA Review & Approval	90 edays	12/21/07	3/20/08
5	Initiate Field Work	30 edays	3/20/08	4/19/08
6	Field Investigation	14 edays	4/19/08	5/3/08
7	Laboratory Analysis	28 edays	5/3/08	5/31/08
8	Data Validation	14 edays	5/31/08	6/14/08
9	Draft Phase I RFI Report for SWMU 62 to EPA	60 edays	6/14/08	8/13/08
10	EPA Review	90 edays	8/13/08	11/11/08
11	Final Phase I RFI Report for SWMU 62 to EPA	45 edays	11/11/08	12/26/08
12	EPA Review & Approval	90 edays	12/26/08	3/26/09

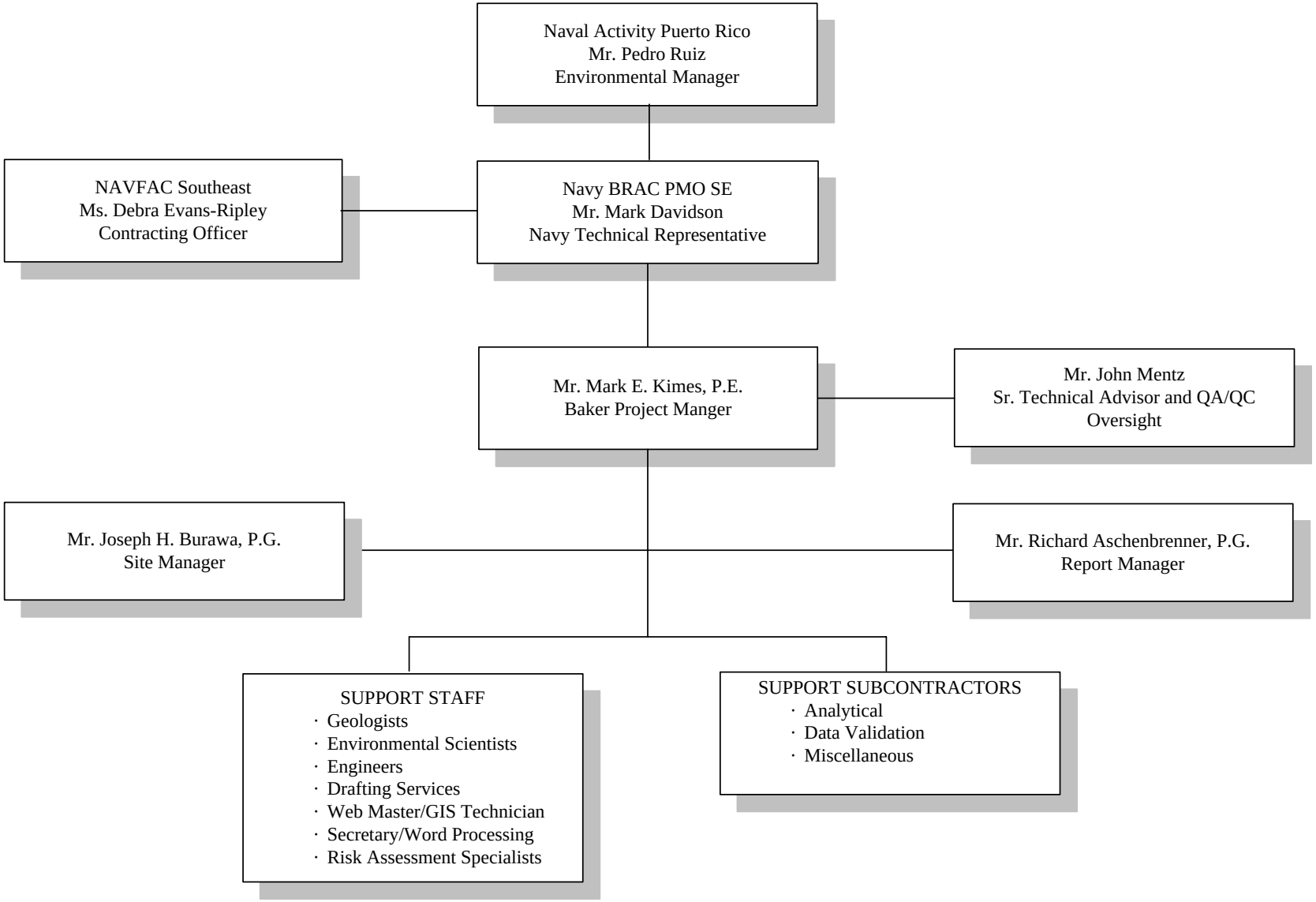


Project:Phase I RFI Work Plan
Date: 12/18/07

Task

Revised: December 20, 2007

FIGURE 6-1
PROJECT ORGANIZATION
PHASE I RFI WORK PLAN – SWMU 62
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO



APPENDIX A
Photographs of SWMU 62 - Former Bundy Disposal Area

SWMU 62 – Former Bundy Disposal Area

Photograph A-1: Miscellaneous Debris

Photograph A-2: Empty Drums

APPENDIX B
Summary of Analytical Results from Phase II ECP Study

TABLE B-1

Revised: December 20, 2007

SUMMARY OF INORGANIC DETECTIONS IN SUBSURFACE SOIL
SWMU 62 - FORMER BUNDY DISPOSAL AREA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO

Site ID Sample ID Sample Date Sample Depth (ft bgs)	EPA Region III Industrial RBCs (mg/kg)	**EPA Region III Residential RBCs** (mg/kg)	2x Average Detected Background (mg/kg)	8E-01 8E-SB01-01 05/14/04 1.00 - 3.00	8E-03 8E-SB03-01 05/14/04 1.00 - 3.00	Number Exceeding EPA Region III Industrial RBCs	Range Exceeding EPA Region III Industrial RBCs	**Number Exceeding EPA Region III Residential RBCs**	**Range Exceeding EPA Region III Residential RBCs**	Number Exceeding 2x Average Detected Background	Range Exceeding 2x Average Detected Background	Location of Maximum Detection
Appendix IX Inorganics (mg/kg)												
Barium	7,200	550	222	180 N	**590** N	0/2		1/2	590N	1/2	590N	8E-SB03-01
Beryllium	200	16	0.74	0.77	0.56	0/2		0/2		1/2	0.77	8E-SB01-01
Chromium	310	23	133	2.7	8.2	0/2		0/2		0/2		8E-SB03-01
Cobalt	2,000	160	30.0	11	5.4	0/2		0/2		0/2		8E-SB01-01
Copper	4,100	310	193	22 N	14 N	0/2		0/2		0/2		8E-SB01-01
Lead	400[(1)]	400[(1)]	8.68	0.93	0.91	0/2		0/2		0/2		8E-SB01-01
Nickel	2,000	160	31.9	1.6 B	2.8 B	0/2		0/2		0/2		8E-SB03-01
Tin	61,000	4,700	2.96	2.4 B	2.3 B	0/2		0/2		0/2		8E-SB01-01
Vanadium	100	7.8	462	**24**	**34**	0/2		2/2	24 - 34	0/2		8E-SB03-01
Zinc	31,000	2,300	88.6	14 E	11 E	0/2		0/2		0/2		8E-SB01-01

Notes:

B - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.
N - The matrix spike recovery is not within control limtis.
E- The reported value is an estimated because of the presence of matrix interference.
(1) - 1996 Soil Screening Guidance.
ft bgs - feet below ground surface.
mg/kg - milligrams per kilogram.

Bold indicates exceedance of EPA Region III Residential RBCs
Underline indicates exceedance of 2 x Average Detected Background

TABLE B-2

Revised: December 20, 2007

SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL
SWMU 62 - FORMER BUNDY DISPOSAL AREA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO

Site ID Sample ID Sample Date Sample Depth (ft bgs)	EPA Region III Industrial RBCs (mg/kg)	**EPA Region III Residential RBCs** (mg/kg)	2x Average Detected Background (mg/kg)	8E-01 8E-SS01 05/14/04 0.00 - 1.00	8E-02 8E-SS02 05/14/04 0.00 - 1.00	8E-02 8E-SS02D 05/14/04 0.00 - 1.00	8E-03 8E-SS03 05/14/04 0.00 - 1.00	Number Exceeding EPA Region III Industrial RBCs	Range Exceeding EPA Region III Industrial RBCs	**Number Exceeding EPA Region III Residential RBCs**	**Range Exceeding EPA Region III Residential RBCs**	Number Exceeding 2x Average Detected Background	Range Exceeding 2x Average Detected Background	Location of Maximum Detection
Appendix IX Inorganics (mg/kg)														
Arsenic	1.9	0.43	2.4	**1.3**	1.1 U	**0.91** B	1 U	0/4		2/4	0.91B - 1.3	0/4		8E-SS01
Barium	7,200	550	181	220 N	90 N	120 N	190 N	0/4		0/4		2/4	190N - 220N	8E-SS01
Beryllium	200	16	0.45	0.37 B	0.26 B	0.21 B	0.58	0/4		0/4		1/4	0.58	8E-SS03
Chromium	310	23	59.3	12	2.8	2.4	12	0/4		0/4		0/4		8E-SS01, 8E-SS03
Cobalt	2,000	160	44.0	12	1.9	2	11	0/4		0/4		0/4		8E-SS01
Copper	4,100	310	234	130 N	60 N	58 N	13 N	0/4		0/4		0/4		8E-SS01
Lead	400(1)	400(1)	125	18	1.3	0.91	2	0/4		0/4		0/4		8E-SS01
Mercury	31(2)	2.3(2)	0.11	0.039	0.02 U	0.021 U	0.038	0/4		0/4		0/4		8E-SS01
Nickel	2,000	160	16.6	6.4	1.1 B	1 B	3.4 B	0/4		0/4		0/4		8E-SS01
Sulfide	NE	NE	27.1	32 U	28 U	27 B	30 U	NE		NE		0/4		8E-SS02D
Tin	61,000	4,700	2.43	3.2 B	3.5 B	3 B	1.9 B	0/4		0/4		3/4	3B - 3.5B	8E-SS02
Vanadium	100	7.8	355	**82**	**34**	**36**	**35**	0/4		4/4	34 - 82	0/4		8E-SS01
Zinc	31,000	2,300	125	45 E	11 E	13 E	6.2 E	0/4		0/4		0/4		8E-SS01

Notes:

B - The reported result is an estimated concentration that is less than the PQL, greater than or equal to the MDL.
N - The matrix spike recovery is not within control limtis.
U - The compound was analyzed for, but was not detected at or above the MDL/PQL.
E- The reported value is an estimated because of the presence of matrix interference.
(1) - 1996 Soil Screening Guidance.
(2) - Value based on the RBC for Mercuric Chloride.
NE - Not Established.
ft bgs - feet below ground surface.
mg/kg - milligrams per kilogram.

Bold indicates exceedance of EPA Region III Residential RBCs
Underline indicates exceedance of 2 x Average Detected Background

TABLE B-3

SUMMARY OF ORGANIC DETECTIONS IN SURFACE SOIL
SWMU 62 - FORMER BUNDY DISPOSAL AREA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO

Site ID Sample ID Sample Date Sample Depth (ft bgs)	EPA Region III Industrial RBCs (ug/kg)	**EPA Region III Residential RBCs** (ug/kg)	8E-01 8E-SS01 05/14/04 0.00 - 1.00	8E-02 8E-SS02 05/14/04 0.00 - 1.00	8E-02 8E-SS02D 05/14/04 0.00 - 1.00	8E-03 8E-SS03 05/14/04 0.00 - 1.00	Number Exceeding EPA Region III Industrial RBCs	Range Exceeding EPA Region III Industrial RBCs	**Number Exceeding EPA Region III Residential RBCs**	**Range Exceeding EPA Region III Residential RBCs**	Location of Maximum Detection
Volatile Organic Compounds (ug/kg)											
Chlorobenzene	2,000,000	160,000	3.9 J	5.2 U	2.2 J	5.8 U	0/4		0/4		8E-SS01
Tetrachloroethene	5,300	1,200	11	1.8 J	3.6 J	2.7 J	0/4		0/4		8E-SS01
Semivolatile Organic Compounds (ug/kg)											
Not Detected											
Pesticides/PCBs (ug/kg)											
4,4'-DDT	8,400	1,900	0.64 J	3.7 U	3.6 U	4 U	0/4		0/4		8E-SS01
4,4'-DDE	8,400	1,900	1.5 J	3.7 U	3.6 U	4 U	0/4		0/4		8E-SS01
OP-Pesticides (ug/kg)											
Not Detected											
Chlorinated Herbicides (ug/kg)											
Not Detected											

Notes:

J - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.
U - The compound was analyzed for, but was not detected at or above the MDL/PQL.
ft bgs - feet below ground surface.
ug/kg - micrograms per kilogram.