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FINAL CORRECTIVE MEASURES STUDY FINAL REPORT SWMU 68

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:

Right Way Environmental Contractors, Inc.
Navanjito, Puerto Rico

and

Michael Baker Jr., Inc.
Moon Township, PA

Contract No. N69450-08-R-0093

June 12, 2009

Corrective Action for SWMUs 14, 56, 68 and 69,
Naval Activity Puerto Rico, Ceiba, Puerto Rico

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RIGHT WAY ENVIRONMENTAL CONTRACTORS, INC.
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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.

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Title: **BRAC Env. Coordinator**

Date: **June 12, 2009**

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LIST OF ACRONYMS AND ABBREVIATIONS

AUF	Area Use Factor
BAF	Bioaccumulation Factors
Baker	Michael Baker Jr., Inc.
BCF	Bioconcentration Factors
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BRAC	Base Realignment and Closure
BW	Body Weight
CAOs	Corrective Action Objectives
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
CNO	Chief of Naval Operations
CNRSE	Commander Navy Region Southeast
COCs	Contaminants of Concern
COPC	Chemical of Potential Concern
CY	Cubic Yards
DPT	Direct Push Technology
DRO	Diesel Range Organics
ECP	Environmental Condition of Property
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESCP	Erosion and Sediment Control Plan
FID	Flame Ionization Detector
FIR	Food Ingestion Rate
FSAP	Field Sampling and Analysis Plan
GRO	Gasoline-Range Organics
HASP	Health and Safety Plan
HQ	Hazard Quotient
LANTDIV	Naval Facilities Engineering Command, Atlantic Division
mg/kg	Milligrams per Kilogram
MSDS	Material Safety Data Sheet

LIST OF ACRONYMS AND ABBREVIATIONS
(continued)

NAPR	Naval Activity Puerto Rico
NAVFAC	Naval Facilities Engineering Command Atlantic Division
NFPA	National Fire Protection Act
NOAEL	No Observed Adverse Effects Level
NSRR	Naval Station Roosevelt Roads
PCBs	Polychlorinated Biphenyls
PDF	Proportion of Diet from Food
PDS	Proportion of Diet from Soil
PEM1	Palustrine Emergent Persistent
PID	Photoionization Detector
PMO	Program Management Office
PREQB	Puerto Rico Environmental Quality Board
PRGs	Preliminary Remediation Goals
QA/QC	Quality Assurance/Quality Control
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RWEC	Right Way Environmental Contractors, Inc.
SE	Southeast
SERA	Screening-level Ecological Risk Assessment
SF	Square Feet
SSSV	Surface Soil Screening Value
SVOCs	Semi-Volatile Organic Compounds
SV	Ingestion-Based Screening Value
SWMU	Solid Waste Management Unit
TPH	Total Petroleum Hydrocarbons
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This document presents the Corrective Measures Study (CMS) Final Report for Solid Waste Management Unit (SWMU) 68 (Former Southern Fire Training Area) at Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico to mitigate potential human health and ecological risks at the SWMU. This report has been prepared by Michael Baker Jr., Inc. (Baker) under contract to Right Way Environmental Contractors, Inc (RWEC), 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 N69450-08-R-0093).

The United States Environmental Protection Agency (USEPA) issued a Resource Conservation and Recovery Act (RCRA) 7003 Administrative Order (Environmental Protection Agency [EPA] Docket No. RCRA-02-2007-7301) (USEPA, 2007), which identified SWMU 68 (formerly referred to as ECP 14) as having documented releases of solid and/or hazardous waste and hazardous constituents. The Administrative Order required additional investigation equivalent to a Phase I RCRA Facility Investigation (RFI). The Phase I RFI field investigation was conducted in November 2006, as documented in the Revised Final Phase I RCRA Facility Investigation for SWMU 68 (Baker, 2008). The Phase I RFI delineated the extent of lead, copper and zinc contamination in the surface soil at the SWMU and recommended conducting a removal action.

1.1 Purpose of Report

The purpose of a CMS is typically;

- To identify and evaluate remedial alternatives that may be used to address a release at a facility
- To justify the recommended corrective action based upon technical, human health and environmental considerations
- To determine cleanup levels
- To provide a system for reporting compliance requirements and use this system to document remediation activities
- To provide information pertinent to the remedial design

A highly focused or streamlined CMS is appropriate for facilities that have “straightforward remedial solutions” where standard engineering solutions can be applied that have proved effective in similar situations (USEPA, 1994). The impacted environmental medium at SMWU 68 consists of surface soil. Because the SWMU is located on the island of Puerto Rico, there are limited technologies that are time and cost effective in treating the impacted medium. Also, the extent of contamination at SWMU 68 has been fully characterized and was found to be limited. Therefore, the screening of cleanup technologies normally conducted in a CMS will not occur. The remedy selected and documented in this CMS will provide the quickest remediation of SWMU 68.

1.2 Objectives

The objective of this CMS is to identify the appropriate technical approach to address releases to surface soil at SWMU 68. The contaminant levels in the soil will be reduced to levels at or below

the cleanup goals, presented as Corrective Action Objectives (CAOs), established in this CMS. This CMS establishes the framework for the remediation of SWMU 68 by providing remediation goals (i.e., CAOs), a selected remediation method and other information that is pertinent for the preparation of the remedial design and ultimately for SWMU 68 cleanup.

This CMS Final Report was designed, along with the Revised Final Phase I RFI for SWMU 68 (Baker, 2008) to meet the minimum requirements for a CMS Final as specified in Attachment IV of the Administrative Order on Consent (USEPA, 2007), as indicated below:

1. A description of the facility to include a site topographic map and preliminary layouts.

This can be found in the Revised Final Phase I RFI Report (Baker, 2008) and in Section 5.0 of this report.

2. Summary of corrective measures:
   - Description of the corrective measure or measures and rationale for selection
   - Performance expectations
   - Preliminary design criteria and rationale
   - General operation and maintenance requirements
   - Long-term monitoring requirements

This can be found in Section 4.0 of this report.

3. A summary of the RCRA Facility Investigation and impact on the selected corrective measure or measures
   - Field Studies (groundwater, surface water, soil, air)
   - Laboratory studies (bench scale, pick scale)

This can be found in the Revised Final Phase I RFI Report (Baker, 2008).

4. Design and Implementation Precautions
   - Special technical problems
   - Additional engineering data required
   - Permits and regulatory requirements
   - Access, easements, right-of-way
   - Health and safety requirements
   - Community relations activities

This can be found in Section 5.0 of this report.

5. Cost Estimates and Schedules
   - Capital cost estimates
   - Operation and maintenance cost estimates
   - Project Schedule (design, construction operation)

This can be found in Section 5.0 of this report.

1.3 Organization of the CMS Report

This CMS report is organized into five sections. Sections 1.0 and 2.0 present the purpose and objectives of the CMS Report and provide a brief summary of the background of NAPR and the history and previous investigations at SWMU 68. A comprehensive set of Contaminants of Concern (COCs) for ecological and human health protection and a spatial

depiction of the extent of contamination associated with these COCs are provided in Section 3.0. Section 4.0 provides justification for a recommended corrective action. Finally, Section 5.0 discusses the technical approach to implementing the corrective measure at SWMU 68.

1.4 References

Michael Baker Jr., Inc. (Baker), 2008. Revised Final Phase I RCRA Facility Investigation for SWMU 68. Naval Activity Puerto Rico, Ceiba, Puerto Rico. July 11, 2008.

USEPA, 2007. RCRA § 7003 Administrative Order on Consent. In the Matter of: United States The Department of the Navy, Naval Activity Puerto Rico formerly Naval Station Roosevelt Roads, Puerto Rico. Environmental Protection Agency, EPA Docket No. RCRA-02-2007-7301. January 29, 2007.

USEPA, 1994. RCRA Corrective Action Plan. Office of Solid Waste and Emergency Response. OSWER Directive 9902.3-2A. May 1994.

2.0 BACKGROUND

This section discusses the history and description of NAPR and SWMU 68. This section also includes a summary of the results of previous investigations conducted at SWMU 68.

2.1 NAPR Description and History

NAPR occupies over 8,800 acres on the northern side of the east coast of Puerto Rico; along Vieques Passage with Vieques Island lying to the east about 10 miles off the harbor entrance (see Figure 2-1). NAPR also occupies the immediately adjacent islands of Piñeros and Cabeza de Perro, as presented on Figure 2-2. 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 2-1).

The facility was commissioned in 1943 as a Naval Operations Base, and re-designated a Naval Station in 1957. Naval Station Roosevelt Roads (NSRR) operated as a Naval Station from 1957 until March 31, 2004. NSRR was one of the largest naval facilities in the world with more than 100 miles of paved roads, approximately 1,300 buildings, a large scale airfield (Ofstie Field), a deep water port and over 30 tenant commands. NSRR played a major role in providing communication support to the Atlantic and Caribbean areas and also served as a major training site for fleet exercises.

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 required 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). NSRR has undergone operational closure as of March 31, 2004 and has been designated as Naval Activity Puerto Rico. 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. NAPR will continue until the real estate disposal/transfer is completed.

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. The Draft Phase I Environmental Condition of Property 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 performed in 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 or the environment was present. The Final Phase II Environmental Condition of Property 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 USEPA issued a RCRA 7003 Administrative Order (EPA Docket No. RCRA-02-2007-7301) (USEPA, 2007), which identifies SWMU 68 (formerly referred to as ECP Site 14) as having documented releases of solid and/or hazardous waste and hazardous constituents and requires additional investigation in the form of a Phase I RFI. Following a public comment period the Consent Order became effective on January 29, 2007.

Ownership of the airfield parcel (Ofstie Airfield) was transferred from the United States Navy to the Puerto Rico Ports Authority on February 7, 2008. The Ports authority has developed the Ofstie airfield into a regional airport (operation as a regional airport began in December 2008). However, in accordance with the Administrative Order, the Covenant Deferral request and Quitclaim Deed of transfer, the United States Navy maintains responsibility for the investigation and cleanup of SWMU 68.

2.2 SWMU 68 Description and History

SWMU 68 (Former Southern Fire Training Area [(also known as ECP Site 14)] is located at the southwest end of the Ofstie Airfield (see Figure 2-3). SWMU 68 covers approximately 18 acres and includes portions of a freshwater wetland classified as Palustrine Emergent Persistent (PEM1) by the Cowardin Wetland Classification System (Cowardin et al., 1979). The wetland boundary shown on Figure 2-3 was delineated by Geo-marine, Inc. in December 1999 from 1993 color infrared and 1998 true color aerial photography.

The Aerial Photography Analysis presented in the Phase I ECP Report (LANTDIV, 2004) identified this area as photo identified Site 19, due to the observation of a circular, graded area with an aircraft fuselage and two stained areas consistent with a fire training area from 1961-1964. The circular area was bisected by an east-west running road. An aerial photograph from 1961 showing areas of historical soil disturbance (i.e., polygon features), the aircraft fuselage, and east-west running road is shown on Figure 2-4. The Phase I ECP records review did not identify a fire training area at this location. However, interviews conducted during the Phase I ECP confirmed former use of the area for fire training; dates of usage and fuel used are unknown but were suspected to be in the 1950s and 1960s. The physical site inspection conducted during the Phase I ECP identified a disturbed circular area consistent with that of a fire training area, but no stressed vegetation or stained soils were observed.

2.3 Previous Investigations

Previous investigations conducted at SWMU 68 include the Phase I ECP (LANTDIV, 2004), the Phase II ECP investigation (NAVFAC Atlantic, 2005) and the Revised Final Phase I RFI (Baker, 2008). The results of the Phase II ECP and the Phase I RFI are discussed in the following paragraphs. The surface and subsurface soil analytical data from the Phase II ECP investigation are provided in Appendix A. The surface soil, subsurface soil, and groundwater data from the Revised Final Phase I RFI are provided in Appendix B.

The Phase I/II ECP investigation performed in 2004 noted several depressed areas at SWMU 68 containing different types of vegetation than the remaining portions of the site (NAVFAC, 2005). The depressed areas contained vegetation that appeared in vines, rather than the remaining areas that contained mostly dense tall grass. Also noted within the area were trees around the perimeter of the site.

Three soil borings were advanced at SWMU 68 during the Phase II ECP investigation to profile surface and subsurface conditions (see Figure 2-4). Three surface soil and three subsurface soil samples were collected and analyzed for Appendix IX volatile organic compounds (VOCs), semi-

volatile organic compounds (SVOCs), metals, and total petroleum hydrocarbon (TPH) gasoline range organics (GRO) and diesel range organics (DRO). Groundwater samples were not collected at SWMU 68 during the ECP investigation based on the photoionization detector (PID)/flame ionization detector (FID) levels in soil; the levels did not indicate potential impact to groundwater (NAVFAC Atlantic, 2005).

The results indicated areas of SWMU 68 containing soil concentrations of metals in excess of the background screening values, consistent with a fire training area, and a small amount of DRO.

On November 10, 2006 the Phase I RFI Work Plans (Baker, 2006) were submitted with verbal approval from USEPA and later approved in writing by the USEPA on December 13, 2006. Mobilization for the RFI field activities occurred November 12, 2006 with demobilization on November 20, 2006.

During the November 2006 field event, surface and subsurface soil samples were collected using direct-push technology (DPT) through the use of a Geoprobe® Macro Core Sampler in conjunction with a Geoprobe® 6620 DT track-mounted rig. A total of ten soil borings (68SB01 through 68SB10) were advanced at SWMU 68 (see Figure 2-5) resulting in the collection of 10 surface soil samples and 20 subsurface soil samples. Three soil borings (68SB01 through 68SB03) were advanced from the north side of the former roadway and seven borings (68SB04 through 68SB10) were advanced south of the former roadway as shown on Figures 2-5 and 2-6. The soil samples were analyzed for Appendix IX VOCs, SVOCs, polychlorinated biphenyls (PCBs), metals, sulfide, cyanide, TPH GRO and DRO. Temporary monitoring wells were installed in nine of the ten borings. Soil boring 68SB03 was not used as a temporary monitoring well because water was not encountered. Groundwater samples were collected from each of the nine monitoring wells for analysis of Appendix IX VOCs, SVOCs, PCBs, total and dissolved metals, sulfide, cyanide, TPH GRO and DRO.

In September 2007, surface soil samples were collected at five locations (68SS01 through 68SS05) in the northeast portion of the site to address concerns regarding elevated levels of arsenic. Arsenic exceeded human health screening levels in several locations and NAPR base-wide background at one location. These additional surface soil samples were analyzed for arsenic and included in the Phase I RFI (see Figure 2-5).

Based on a Navy initiative to delineate lead contamination at two locations indicated as a result of the review of ECP data, two additional areas were also investigated in the central portion of the site in October 2007 (see areas of enlargement around 14E-01 and 14E-03 on Figure 2-5) through collection of surface soil samples. The areas investigated surround two ECP sample locations where Ecological Food-Web based cleanup goals for lead were exceeded in surface soil; and therefore, the Navy determined the need to estimate the extent of contamination to support a removal action. The analytical results from these two sample locations (14E-01 and 14E-03) also contained copper and/or zinc exceeding their ecological screening levels or Ecological Food-Web based cleanup goals. Sixteen additional samples (68SS06 through 68SS21) were collected from these areas for lead, copper and zinc analyses for inclusion in the Phase I RFI.

The results of the Phase II ECP investigation and all Phase I RFI sampling events show that there has been very little impact to the environment due to organic contaminants from Navy activities at SWMU 68. Only a few organic compounds were detected in any of the media, and all organic concentrations were well below any screening criteria for human health and ecological receptors.

One surface soil sample, 68SB02-00, exceeded the surface soil ecological screening level and background screening level for cobalt. However, it was determined not to be of concern because the exceedance was not much above the background level, and would likely be eliminated as a contaminant of potential concern (COPC) during a baseline ecological risk assessment (ERA).

During the ECP investigation (NAVFAC Atlantic, 2005), lead was found in the surface soil at three locations at concentrations ranging from 17 to 230 milligram per kilogram (mg/kg). These

concentrations were at locations within the areas of distressed vegetation noted on the historical aerial photographs. The RFI investigation delineated these three areas with the lower lead concentrations seen in the RFI results. The extent of lead contamination around ECP sample locations 14E-01 and 14E-03 was determined using the Phase I RFI data. Concentrations of copper and zinc that were detected at elevated concentrations in the ECP samples were further investigated and the extents of their contamination around ECP sample locations 14E-01 and 14E-03 were also determined using the RFI data.

Arsenic exceeded the USEPA Region IX Preliminary Remediation Goals (PRGs) (residential and industrial) (USEPA, 2004) and background only once in surface soil (3.4 mg/kg at location 68SB02) (see Figure 2-6). Additionally, arsenic exceeded the PRGs and background at three locations in subsurface soil (2.7 mg/kg at 68SB01-01, 3.2 mg/kg at 68SB02-02, and 3.6 mg/kg at 68SB04-02) (see Figure 2-7). Exceedances of both the PRGs and background indicated the potential for unacceptable human health risk to arsenic concentrations in soil at SWMU 68. Preliminary risk calculations were performed to evaluate potential risk to future adult and child residential receptors upon exposure to arsenic in SWMU 68 soil. The calculations were performed using standard carcinogenic and noncarcinogenic risk equations found in USEPA's Risk Assessment Guidance for Superfund (RAGS) (USEPA, 1989) and USEPA-promulgated exposure parameters. The specific equations and exposure parameters are presented in Appendix C. The future residential exposure scenario was evaluated to provide an upper bound for potential human health risk to site-specific media. Arsenic concentrations in surface and subsurface soil were evaluated together by combining surface and subsurface soil analytical data from the Phase II ECP Report and the Phase I RFI Report to form a total soil data set. However, analytical results for samples collected from depths greater than 10 feet below ground surface (bgs) were eliminated from this combined data set because residential exposures beyond this depth are not likely. The preliminary risk calculations showed that there are no unacceptable carcinogenic or noncarcinogenic risks from potential exposure to arsenic in soil at SWMU 68 (i.e., results were below USEPA acceptable risk levels). Furthermore, the low carcinogenic and noncarcinogenic risk levels demonstrate that arsenic in soil would not be a risk driver if a baseline human health risk assessment was conducted. The results of the preliminary risk calculations are presented in Appendix C.

Based on concentrations found in temporary wells during the investigation, it was concluded in the Phase I RFI that no impact to the groundwater is present due to past Navy operations. The naturally occurring geology, including very tight clay formations, would likely serve to contain any contamination that may have migrated downward to the water table, if it had been present.

Overall, very little impact on the environment was found during the extensive Phase I RFI at SWMU 68. However, because concentrations of lead, copper and zinc from the ECP investigation indicated the presence of contamination in the surface soil above their ecological screening values and respective background levels, and nearby surface soil samples from the Phase I RFI had relatively low concentrations with no exceedances for these metals, a very limited remedial action for surface soil (excavation and disposal) was recommended in the Phase I RFI to address potential ecological risks at this site. CAOs for these compounds were developed in the Phase I RFI and will be discussed in more detail in Section 3.0.

2.4 References

Baker, 2008. Revised Final Phase I RCRA Facility Investigation Report for SWMU 68. Naval Activity Puerto Rico. Ceiba, Puerto Rico. July 11, 2008.

Baker Environmental, Inc. (Baker), 2006. RCRA Facility Investigation Work Plan, SWMU 68, Naval Activity Puerto Rico, Ceiba, Puerto Rico.

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LANTDIV, 2004. Phase I Environmental Condition of Property Report, U.S. Naval Station Roosevelt Roads, Ceiba, Puerto Rico. Prepared for Commander, Navy Region Southeast (CNRSE), U.S. Navy, by Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia. March 31, 2004.

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USEPA, 2007. RCRA § 7003 Administrative Order on Consent. In the Matter of: United States The Department of the Navy, Naval Activity Puerto Rico formerly Naval Station Roosevelt Roads, Puerto Rico. Environmental Protection Agency, EPA Docket No. RCRA-02-2007-7301. January 29, 2007.

USEPA, 2004. United States Environmental Protection Agency, Region IX Preliminary Remediation Goals. http://www.epa.gov/region09/waste/sfund/prg/index.htm. October 2004.

USEPA, 1989. Risk Assessment Guidance for Superfund Volume I. Human Health Evaluation Manual (Part A) Interim Final. Office of Solid Waste and Emergency Response. Washington, D.C. December 1989. EPA/540/1-89-002.

3.0 SUMMARY OF COCs AND CAOs

The COCs and CAOs for surface soil, subsurface soil and groundwater for SWMU 68 are summarized in the following sections. The extent of contamination in each media requiring cleanup, based on the CAOs, is also established.

3.1 Surface Soil

A summary of CAOs for surface soil protective of human and ecological receptors is presented in the following sections.

3.1.1 CAO Development for Human Receptors

Potential human exposure to arsenic concentrations in soil at SWMU 68 was evaluated in the Phase I RFI (Baker, 2008a) due to exceedances of both residential and industrial PRGs (USEPA, 2004) and background. Preliminary risk calculations were performed under a future residential exposure scenario in order to more fully evaluate potential human health risks from arsenic in soil. Furthermore, evaluation of a future residential exposure scenario provides an upper bound for potential human health risk to site-specific media. The calculations were performed using standard carcinogenic and noncarcinogenic risk equations found in USEPA's RAGS (USEPA, 1989) and USEPA-promulgated exposure parameters. To present a complete soil exposure scenario, arsenic concentrations in surface and subsurface soil were evaluated together by combining surface and subsurface soil analytical data from the Phase II ECP Report (NAVFAC Atlantic, 2005) and the Phase I RFI Report (Baker, 2008a) to form a total soil data set. However, analytical results for samples collected from depths greater than 10 feet bgs were eliminated from this combined data set because residential exposures beyond this depth are not likely. Residential exposure to total soil was selected for the preliminary risk calculations to present a complete soil exposure scenario. This is because the hypothetical development of this SWMU for residential use would require disturbing the soil, which would result in the incorporation of subsurface contamination into the surface interval. However, in order to ensure that potential risks would not be underestimated from evaluating only total soil, 95% UCL values were calculated for arsenic concentrations found in both surface soil (0-1 bgs) and total soil (0-10 bgs). USEPA ProUCL Version 4.00.02 software (USEPA, 2007a and 2007b) was used to determine the distributions of the data sets and calculate the 95% UCL values that would be used as exposure point concentrations (EPCs). The distributions for both data sets were determined to be non-parametric. The 95% UCL calculated for arsenic in surface soil was 1.55 mg/kg, while the 95% UCL calculated for total soil was 1.78 mg/kg. These values do not differ significantly from each other. Consequently, the risk and hazard results resulting from surface soil exposure evaluation would not differ significantly from those of total soil. These results are presented in Appendix C.

The results of the preliminary risk calculations are presented in Appendix C. The results of the preliminary risk calculations showed that a carcinogenic risk of 1.2×10^{-06} and a hazard index of less than 0.01 were calculated for the future adult resident. A carcinogenic risk of 2.8×10^{-06} and a hazard index of 0.07 were calculated for the future child resident. These results are within the USEPA acceptable carcinogenic risk range of 1×10^{-06} to 1×10^{-04} and below the noncarcinogenic hazard level of 1.0, indicating there are no unacceptable carcinogenic or noncarcinogenic risks calculated from potential exposure to arsenic in soil at SWMU 68. Furthermore, the low carcinogenic and noncarcinogenic risk levels calculated under the conservative residential exposure scenario demonstrate that arsenic in soil would not be a risk driver if a baseline human health risk assessment was conducted. (It should be noted that analytical results from surface soil samples 68SB01-00, 68SB02-00, and 68SB03-00 were inadvertently omitted from the preliminary risk calculations presented in the Phase I RFI Report [Baker, 2008a]. The

calculations were revised to include the three aforementioned samples and the results are presented herein. The inclusion of these analytical results did not impact the outcome of the preliminary risk calculations.) Therefore, because the preliminary risk calculations did not indicate an adverse risk to human health from exposure to site contaminants, human health CAOs were not developed for SWMU 68.

As noted above, a baseline human health risk assessment was not performed for SWMU 68. However, the results of the evaluation of the conservative residential (or upper bound) exposure scenario did not exceed USEPA's acceptable risk levels, indicating a baseline human health risk assessment would also result in no unacceptable risk. Additionally, it is known that the Puerto Rico Ports Authority plans to use the property as an airfield (i.e., continued industrial use). As such, specific land use controls have been enacted for SWMU 68. A Naval Activity Puerto Rico, Airfield Transfer Quitclaim Deed (Deed) between the United States of America (acting by and through the Secretary of the Navy, Navy BRAC Program Management Office) and the Puerto Rico Ports Authority was signed on February 7, 2008. This Deed puts forth land use controls strictly prohibiting residential land use. Specifically, Section XXI of the Deed states that the use of the property is restricted to industrial and commercial purposes and that residential and residential-like uses (i.e., housing, child pre-school, day care or nurseries, adult convalescent or nursing home facilities) are strictly prohibited. Recreational uses such as parks or playgrounds and any agricultural uses are also strictly prohibited. Furthermore, Section XXIII of the Deed states that extraction, utilization and/or consumption of any water from the aquifer below the surface of the ground is prohibited within those individual SWMUs with land use controls listed in the Deed.

3.1.2 CAO Development for Ecological Receptors

As discussed in the Revised Final Phase I RFI (Baker, 2008a) copper, lead, and zinc were detected in SWMU 68 surface soil at concentrations greater than terrestrial plant/invertebrate-based surface soil screening values and NAPR background screening values. Lead also was detected in SWMU 68 surface soil at concentrations that result in a modeled dietary intake for the American robin greater than the No Observed Adverse Effect Level (NOAEL)-based screening value. The sections that follow present the method used to develop surface soil CAOs for these chemical-receptor combinations, as well as the method used to develop CAOs based on background concentrations.

3.1.2.1 Risk-Based CAOs for Terrestrial Plants and Invertebrates

Copper, lead, and zinc surface soil CAOs protective of terrestrial plants and invertebrates were established by multiplying surface soil screening values by 0.99:

$$CAO_x = SSSV_x(0.99)$$

Where CAO_x is the Corrective Action Objective for chemical x, $SSSV_x$ is the surface soil screening value for chemical x, and *0.99* represents a default hazard quotient (HQ) for the derivation of CAOs. CAOs calculated using this default value correspond to surface soil concentrations that result in risk estimates equal to 0.99 (HQ values less than 1.0 indicate that risks are unlikely).

3.1.2.2 Risk-Based CAOs for Terrestrial Avian Receptors

A surface soil CAO for lead protective of terrestrial avian omnivores (i.e., American robin) was established by modifying the dietary intake equation presented in Section 5.2.1.3.2 of the Revised Final Phase I RFI Report for SWMU 68 (Baker, 2008a):

$$CAO_x = \frac{(0.99)(SV)(BW)}{[[\sum_i (FIR)(BAF_i or BCF_i)(PDF_i)] + [(FIR)(PDS)]][AUF]}$$

where:

CAO	=	Corrective Action Objective (mg/kg, dry weight)
SV	=	Ingestion-based screening value (mg chemical/kg body weight/day)
BW	=	Body weight (kg, wet weight)
FIR	=	Food ingestion rate (kg/day, dry-weight)
BAF_i	=	Surface soil-to-biota bioaccumulation factor for food item i (dry weight basis)
BCF_i	=	Surface soil-to-biota bioconcentration factor for food item i (dry weight basis)
PDF_i	=	Proportion of diet composed of food item i (dry weight basis)
PDS	=	Proportion of diet composed of surface soil (dry weight basis)
AUF	=	Area Use Factor (unitless)
0.99	=	Default HQ

Input parameters applied to the equation are summarized in Table 3-1. These values were previously developed and presented within the screening-level ERA (SERA) and Step 3a of the baseline ERA (BERA) (Baker, 2008a).

3.1.2.3 Background-Based Surface Soil CAOs

Upper limit of the mean concentrations presented in the document entitled Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds (Baker, 2008b) were used as background-based CAOs for copper, lead, and zinc (168 mg/kg, 22 mg/kg, and 115 mg/kg, respectively).

3.1.2.4 Identification of Final Ecological Surface Soil CAOs

A summary of the copper, lead, and zinc CAOs developed for terrestrial plants and invertebrates, terrestrial avian receptors (i.e., American robin), and background are presented in Table 3-2. As evidenced by Table 3-2, the background-based CAO for copper exceeds the risk-based CAO derived for terrestrial plants and invertebrates. For this metal, the background-based CAO (168 mg/kg) was selected as the final CAO. This approach is consistent with Navy Policy on the Use of Background Chemical Levels (Chief of Naval Operations [CNO], 2004; available at http://web.ead.anl.gov/ecorisk/policy/), which states that "*The action level for the remediation of sites should be risk-based, should not be below background levels, and should target the risk associated with the COC or contaminant concentration exceeding background chemical levels.*"

The risk-based CAOs developed for lead and zinc exceed their respective background-based CAOs (see Table 3-2). For these two metals, minimum risk-based CAOs (87 mg/kg for lead [established for the American robin] and 120 mg/kg for zinc [established for terrestrial plants and invertebrates] were selected as final CAOs.

3.1.3 Corrective Action Objectives for Surface Soil

A summary of the final CAOs for surface soil, as well as for the other media of concern at SWMU 68, based on the human health and ecological risk evaluations is presented in Table 3-2.

3.1.4 Extent of Surface Soil Contamination

Surface soil contamination is centered around two hot spots: sample locations 14E-01 and 14E-03:

- Location 14E-01: The Phase II ECP sample 14E-01 exhibited concentrations of lead and zinc at levels in excess of the CAOs (see Figure 3-1). Lead was detected at a concentration of 230 mg/kg, in excess of the CAO for lead in surface soil of 87 mg/kg and zinc was detected at a concentration of 130 mg/kg, in excess of the CAO for zinc in surface soil of 120 mg/kg. Four samples (68SS06 through 68SS09) were collected at a distance of approximately 25 feet from 14E-01 during the Phase I RFI, and four additional samples (68SS14 through 68SS17) were collected at a distance of approximately 50 feet from 14E-01, as shown on Figure 3-1. Detected zinc concentrations in samples 68SS06 through 68SS09 were less than the CAO for zinc; these four samples represent the maximum extent of zinc contamination in the vicinity of 14E-01. Detected lead concentrations in samples 68SS06 and 68SS08 were less than the CAO for lead; these two samples represent the maximum north-south extent of lead contamination in the vicinity of 14E-01. Lead was detected in excess of the CAO in samples 68SS07 and 68SS09; however, it was not detected at concentrations greater than the CAO in samples 68SS15 and 68SS17; these later two samples represent the maximum east-west extent of lead contamination in the vicinity of 14E-01.

- Location 14E-03: The Phase II ECP sample 14E-03 exhibited concentrations of copper and lead at levels in excess of the CAOs (see Figure 3-2). Copper was detected at a concentration of 250 mg/kg, in excess of the CAO for copper in surface soil of 168 mg/kg and lead was detected at a concentration of 150 mg/kg, in excess of the CAO for lead in surface soil of 87 mg/kg. Four samples (68SS10 through 68SS13) were collected at a distance of approximately 25 feet from 14E-03 during the Phase I RFI, and four additional samples (68SS18 through 68SS21) were collected at a distance of approximately 50 feet from 14E-03, as shown on Figure 3-2. Detected copper and lead concentrations in samples 68SS10 through 68SS13 were less than the respective CAOs for copper and lead; these four samples represent the maximum extent of both copper and lead contamination in the vicinity of 14E-03.

3.2 <u>Subsurface Soil</u>

A summary of CAOs for subsurface soil protective of human and ecological receptors is presented in the following sections.

3.2.1 CAO Development for Human Receptors

As previously discussed in Section 3.1.1, potential human exposure to arsenic concentrations in soil (surface and subsurface) at SWMU 68 was evaluated in the Phase I RFI due to exceedances of both the PRGs and background. Preliminary risk calculations were performed under a future residential exposure scenario in order to more fully evaluate potential human health risks from arsenic in soil and provide an upper bound for potential human health risk to site-specific media.

The calculations were performed using standard carcinogenic and noncarcinogenic risk equations found in USEPA's RAGS (USEPA, 1989) and USEPA-promulgated exposure parameters. Arsenic concentrations in surface and subsurface soil were evaluated together by combining surface and subsurface soil analytical data from the Phase II ECP Report and the Phase I RFI Report to form a total soil data set. Analytical results for subsurface soil samples collected from depths greater than 10 feet bgs were eliminated from this combined data set because residential exposures beyond this depth are not likely.

The results of the preliminary risk calculations are presented in Appendix C and discussed in Section 3.1.1. The results of the preliminary risk calculations indicated that there are no unacceptable carcinogenic or noncarcinogenic risks calculated from potential exposure to arsenic in surface or subsurface soil at SWMU 68. Furthermore, the low carcinogenic and noncarcinogenic risk levels calculated under the conservative residential exposure scenario demonstrate that arsenic in soil would not be a risk driver if a baseline human health risk assessment was conducted. Consequently, CAOs protective of human health for subsurface soil were not developed.

As noted above, a baseline human health risk assessment was not performed for SWMU 68. However, the results of the evaluation of the conservative residential (or upper bound) exposure scenario did not exceed USEPA's acceptable risk levels, indicating a baseline human health risk assessment would also result in no unacceptable risk. Additionally, it is known that the Puerto Rico Ports Authority plans to use the property as an airfield (i.e., continued industrial use). As previously mentioned, specific land use controls have been enacted for SWMU 68 through a Naval Activity Puerto Rico, Airfield Transfer Quitclaim Deed signed on February 7, 2008. This Deed puts forth land use controls strictly prohibiting residential land use and utilization/consumption of groundwater.

3.2.2 CAO Development for Ecological Receptors

As evidenced by Appendix B, subsurface soil was collected from depths greater than 2.0 feet bgs. The Final Phase I RFI Report did not contain an evaluation of the available subsurface soil analytical data since depths greater than 2.0 feet bgs do not represent significant exposure points for ecological receptors. While this is a reasonable assumption, maximum copper, lead, and zinc concentrations in subsurface soil (66 mg/kg, 4.9 mg/kg, and 75J mg/kg, respectively) were compared to the soil screening values listed in Table 3-2 (70 mg/kg for copper and 120 mg/kg for lead and zinc) and upper limit of the mean background concentrations for subsurface clay soils (246 mg/kg, 6.3 mg/kg, and 88 mg/kg, respectively [Baker, 2008b]). This comparison shows that maximum concentrations of each metal (66 mg/kg for copper, 4.9 mg/kg for lead, and 75J mg/kg for zinc) are less than ecological CAOs developed for surface soil. However, based on the lack of analytical data for the 1.0 to 2.0 foot depth interval, mitigation of surface soil contamination at sample locations at 14E-01 and 14E-03 will extend to a depth of 2.0 feet.

3.2.3 Corrective Action Objectives for Subsurface Soil

Based on a lack of unacceptable risk to human receptors or ecological receptors (at depths greater than 2.0 feet bgs, no CAOs were developed for subsurface soil. However, as discussed in Section 3.2.2, analytical data for the 1.0 to 2.0 foot depth interval are not available. Therefore, mitigation of surface soil contamination at 14E-01 and 14E-03 will extend to a depth of 2.0 feet using the CAOs developed for surface soil.

3.2.4 Extent of Subsurface Soil Contamination

Based on a lack of analytical data for subsurface soil within the 1.0 to 2.0-foot depth interval, mitigation of surface soil contamination at 14E-01 and 14E-03 will extend to a depth of 2.0 feet.

3.3 Groundwater

Detected constituents in groundwater were either below screening criteria or were below the established background screening values. Consequently, no CAOs were developed for protection of human or ecological receptors for groundwater; groundwater was not identified as a media requiring cleanup at SWMU 68.

3.4 References

Baker, 2008a. Revised Final Phase I RCRA Facility Investgiation Report for SWMU 68. Naval Activity Puerto Rico. Ceiba, Puerto Rico. July 11, 2008.

Baker, 2008b. Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds, Naval Activity Puerto Rico, Ceiba, Puerto Rico. February 29, 2008.

Chief of Naval Operations (CNO), 2004. Navy Policy on the Use of Background Chemical Levels. Memorandum from the Chief of Naval Operations to Commander, Naval Facilities Engineering Command. Seer. N45C/N4U732212. January 30, 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.

USEPA, 2007a. ProUCLVersion 4.00.02. http://www.epa.gov/esd/tsc/software.htm April 2007.

USEPA, 2007b. ProUCLVersion 4.00.02 User Guide. EPA/600/R-07/038. http://www.epa.gov/esd/tsc/images/proucl-4-0-02-user.pdf April 2007.

USEPA, 2004. United States Environmental Protection Agency, Region IX Preliminary Remediation Goals. http://www.epa.gov/region09/waste/sfund/prg/index.htm. October 2004.

USEPA, 1989. Risk Assessment Guidance for Superfund Volume I. Human Health Evaluation Manual (Part A) Interim Final. Office of Solid Waste and Emergency Response. Washington, D.C. December 1989. EPA/540/1-89-002.

4.0 JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURE

Site contaminants for which CAOs have been established through ecological and human health risk evaluations include copper, lead and zinc for surface soil. Surface soil contamination is limited to two areas in the vicinity of locations 14E-01 and 14E-03. Because of the limited nature of the contamination at this SWMU (i.e., metals contamination limited to areas of surface soil) as well as the easy accessibility to the site by typical construction equipment, a presumptive remedy of excavation and off-site disposal was selected for evaluation as a corrective measure. Use of a presumptive remedy such as excavation and off-site disposal bypasses several steps of the CMS process including the screening of corrective measures technologies, identification and formulation of corrective measures alternatives (Task I from Attachment IV of the Administrative Order [USEPA, 2007]) and evaluation of the corrective measures alternatives (Task II from Attachment IV of the Administrative Order). This results in a Streamlined CMS that focuses on the description and evaluation of the selected remedy. The selected remedy is described in more detail in this section and technical, human health and environmental considerations are discussed as required in Task III of the Administrative Order (USPEA, 2007). The technical approach to implementing the corrective measure is discussed in more detail in Section 5.0.

4.1 Description of the Remedy

The selected remedy for the surface soil contamination at SWMU 68 is excavation and off-site disposal. The volume of soil requiring excavation and a brief discussion of the excavation and off-site disposal corrective measure is given in the following sections.

4.1.1 Surface Soil

Surface soil will be removed from areas where metals contaminant concentrations exceed the established CAOs, as determined in Section 3.0 of this document. The proposed cleanup levels are the following:

- Copper 168 mg/kg
- Lead 87 mg/kg
- Zinc 120 mg/kg

The extent of surface soil contamination in excess of the CAOs is limited to two areas, as shown on Figures 3-1 and 3-2. As indicated in Section 3.1.4, the lateral extent of each of the areas has been fully defined. For the purpose of the CMS, the extent of contamination for each area was assumed as follows:

- Lead and zinc were detected at location 14E-01 at concentrations in excess of the CAO. Lead was also detected at locations 68SB07 and 68SB09 at concentrations in excess of the CAO. Lead and zinc did not exceed the CAOs in the surrounding samples (68SS06, 68SS08, 68SS15 and 68SS17) thereby providing a maximum lateral extent of contamination at this location (see Figure 3-1). Note that the larger area of lead contamination completely overlays the smaller area of zinc contamination, as shown on Figure 3-1. This results in an approximate 50 by 100 foot area requiring excavation (5,000 square feet [SF]). An excavation depth of two feet below the ground surface was selected as this is the depth below which soil quality has not been impacted by historical site activities. Using the two foot depth

along with the assumed horizontal extent of 5,000 SF yields a volume of soil for excavation of 10,000 cubic feet (approximately 370 cubic yards [CY]).

- Copper and lead were detected at location 14E-03 at concentrations in excess of the CAO. However, copper and lead did not exceed the CAOs in the surrounding samples (68SS10, 68SS11, 68SS12 and 68SS13) thereby providing a maximum lateral extent of contamination at this location (see Figure 3-2). Note that the copper and lead contamination is co-located. This results in an approximate 50 by 50 foot area requiring excavation (2,500 SF). An excavation depth of two foot below the ground surface was selected as this is the depth below which soil quality has not been impacted by historical site activities. Using the two foot depth along with the assumed horizontal extent of 2,500 SF yields a volume of soil for excavation of 5,000 cubic feet (approximately 185 CY).

Based on the above, the total volume of soil requiring excavation at SWMU 68 is approximately 15,000 cubic feet (approximately 555 cubic yards).

The outermost extent of contamination of the combined COCs above the proposed remediation levels will govern the extent of the surface soil excavation. The contaminated soil will be transported to an on-island, permitted, disposal facility, unless confirmatory testing indicates levels exceeding landfill acceptance criteria. The on-island disposal facilities are located in Ponce and Penuelas. Licensed waste haulers are available and will be used to transport the soil to the disposal facility. Finally, the excavation area will be backfilled with clean soil, graded and revegetated. There are no long term restrictions, controls or chemical monitoring associated with the surface soil excavation and off-site disposal portion of this alternative. However, monitoring will be conducted to ensure stabilization of replacement soils and restoration of a native plant community will be conducted.

4.2 Justification of the Corrective Measure

Justification for the selection of excavation and disposal as the corrective measure for SWMU 68 is provided in this section. The corrective measure is evaluated based upon technical, human health and environmental considerations.

4.2.1 Technical Considerations

Excavation and off-site disposal is proven and is commonly used at general construction and remediation sites. Because the contamination will be removed from SWMU 68, it is a permanent corrective measure. In terms of reliability, the contaminated media will be disposed in a permitted landfill, which is considered a commonly accepted treatment alternative. With respect to implementability, this corrective measure requires commonly used earth moving equipment and disposal facilities. If characterization testing conducted during the excavation yields contaminant concentrations exceeding local landfill acceptance criteria, the media will require off-island transportation (i.e., barged to the United States) and disposal. In general, SWMU 68 is easily accessible and has limited site features that would interfere with the excavation. Safety concerns while implementing the corrective measure are anticipated to be minimal due to limited areas of excavation, the shallow depths of excavation, and the low population density adjacent to the sites. In general, this technology will be effective, reliable, and easily implementable.

4.2.2 Human Health Considerations

The preliminary risk evaluation performed in the Revised Final Phase I RFI Report (Baker, 2008) did not indicate potential adverse risk to human health from exposure to site contaminants detected in the soil. Additionally, the Ports Authority plans to develop the airfield into a regional airport. As such, future property use of this site is expected to remain industrial, and potential human exposure is limited to industrial or commercial property use. Furthermore, specific land use controls have been enacted for SWMU 68 through a Naval Activity Puerto Rico, Airfield Transfer Quitclaim Deed signed on February 7, 2008. This Deed puts forth land use controls strictly prohibiting residential land use and utilization/consumption of groundwater. Consequently, the proposed corrective measure will be protective of human health. Workers will be exposed to typical construction site risks; these will be addressed through preparation and implementation of a site-specific health and safety plan, as discussed in Section 5.1.1.

4.2.3 Environmental Considerations

Removing the contaminated media from the SWMU 68 will provide an immediate benefit to the environment. Potential terrestrial receptors will no longer be in contact with the environmental media containing levels of hazardous constituents that exceed the CAOs.

4.3 References

Baker, 2008. Revised Final Phase I RCRA Facility Investgiation Report for SWMU 68. Naval Activity Puerto Rico. Ceiba, Puerto Rico. July 11, 2008.

USEPA, 2007. RCRA § 7003 Administrative Order on Consent. In the Matter of: United States The Department of the Navy, Naval Activity Puerto Rico formerly Naval Station Roosevelt Roads, Puerto Rico. Environmental Protection Agency, EPA Docket No. RCRA-02-2007-7301. January 29, 2007.

5.0 TECHNICAL APPROACH TO THE CORRECTIVE MEASURE IMPLEMENTATION

This section details the selected remedy for mitigation of impacted soil at SWMU 68. The layout of the conceptual design, design considerations, planning documents and confirmatory sampling are presented in Section 5.1. The reporting requirements are presented in Section 5.2

5.1 Conceptual Design

The ecological risk evaluations identified copper, lead and zinc as the COCs in surface soil at SWMU 68 requiring cleanup and established the cleanup objectives (i.e., CAOs) of 168 mg/kg for copper, 87 mg/kg for lead and 120 mg/kg for zinc. As discussed in the previous section, excavation and off-site disposal of approximately 555 CY of contaminated surface soil was selected as the cleanup alternative or corrective measure.

Two areas of contaminated soil were established by using the analytical results from the Phase I RFI (see Figures 3-1 and 3-2). Since the limits of the excavation will extend to a "clean" sample location, it is anticipated that the need for post-excavation confirmatory sampling is minimal.

Figure 5-1 shows the conceptual design plan for the areas at this site where the excavation will be implemented. All remedial waste generated as part of the cleanup of SWMU 68 will be managed in accordance with applicable federal, commonwealth and local guidelines.

The processes to be followed for implementation of this surface soil excavation and disposal corrective measure include:

- Mobilization of a small backhoe or gradeall, small front end loader, and roll-off boxes
- Construction of a decontamination pad and equipment laydown areas
- Installation of erosion controls
- Location by survey of excavation limits
- Excavation of surface soil from the two delineated areas to a depth of two feet
- Transportation of the excavated surface soil to lined roll-off boxes. (The roll-off boxes will be placed so that they slope to drain to one corner of the box).
- Collection and analysis of representative soil samples for toxicity characteristics in accordance with 40 Code of Federal Regulations (CFR) Part 261.24
- Collection, analysis and disposal of water from the roll-off boxes
- Transportation and disposal of soil to an approved on-island disposal facility
- Backfill existing excavated areas with clean fill to match existing grade
- Revegetation of any disturbed areas
- Demobilization of all equipment, etc.
- Removal of erosion and sediment control structures

Confirmation samples will be collected from the side walls and bottom of each excavation before backfilling to confirm contamination has been removed. Prior to mobilization, the PEM1 wetland boundary that entends into SWMU 68 also will be field delineated to ensure that no wetland resourcesare impacted as a result of soil removal activities. The field delineation will be conducted in accordance with the 1987 Corps of Engineers delineation manual (United States Army Corps of Engineers [USACE], 1987). Furthermore, upland and wetland habitats at SWMU 68 will be described, including identification of dominant tree, shrub, and herbaceous plants in areas that will be impacted by soil removal activities.

5.1.1 Required Planning Documents

An initial step in the corrective action process will be preparation of a Corrective Action Project Plan by the remedial contractor. This is a planning document that will outline the approach and requirements for completing the corrective action and the actions the contractor will take to meet the project objectives. The Corrective Action Project Plan will consist of a Work Plan, Health and Safety Plan, Field Sampling and Analysis Plan and an Erosion and Sediment Control Plan. A brief description of each of these elements is provided below. It is noted that the Corrective Action Project Plan will be used in conjunction with the EPA-approved Master Project Management Plan, Master Data Collection Quality Assurance Plan, Data Management Plan, and Master Health and Safety Plan for NAPR (Baker, 1995).

- Corrective Action Work Plan – The Corrective Action Work Plan for the removal action will discuss the overall objective of the work, the basis for evaluating the work, site background and biological/physical setting, remediation operations and activities, habitat restoration and monitoring requirements to ensure the re-establishment of a native plant community, organization and schedule. Also included in the Work Plan will be a listing of the hazardous materials that may be brought onto the site. The Material Safety Data Sheets (MSDS) for each material will be included. The contractor will also include employee training documentation, a hazardous waste storage plan, and a listing of hazardous waste to be generated on site. The Work Plan will detail all permits that will be required for implementing the remedial action, including excavation, transportation of hazardous materials, disposal of hazardous materials and an air permit for fugitive dust emissions, if required.

- Site-Specific Health and Safety Plan (HASP) - The remedial contractor will prepare a HASP presenting the mechanism and procedures to establish safe working conditions at SWMU 68. The HASP will include specific hazard control methods to minimize the potential for accident or injury. The HASP also will include the names of the health and safety officer and alternates and will meet the requirements of 29 CFR 1910 and 1926; and the National Fire Protection Act (NFPA) 241.

- Site-Specific Field Sampling and Analysis Plan (FSAP) – The remedial contractor will prepare a FSAP outlining the procedures for pre-excavation contaminant delineation, contaminant removal verification and disposal characterization sampling. The FSAP will identify sampling location, rationale, and logistics (including laboratory information, sample handling and analysis requirements and Quality Assurance/Quality Control (QA/QC) requirements).

- Erosion and Sediment Control Plan (ESCP) – The remedial contractor will prepare an ESCP presenting, at a minimum, the information required for the erosion and sediment controls as required by the Puerto Rico Environmental Quality Board (PREQB).

5.1.2 Design Considerations for Corrective Measures Implementation

Many factors affect the ease with which a corrective measure can be performed at a site. Some of these items include site access, existing structures, disruption of adjacent facilities, available utilities, utility clearance, determination of extent of contamination, adequate space for staging areas, availability of off-site waste disposal, and assuring that aquatic resources (i.e., wetlands)

are properly identified and located in the field to limit any inadvertent impacts to those sensitive resources. Each of these design considerations with respect to SWMU 68 are presented on Table 5-1.

5.2 Reporting

To implement the corrective measure for SWMU 68, documents are required to report the progression of the sites from investigation to remediation. These documents include the CMS, the Corrective Measures Implementation (CMI) Design and the CMI Final Report. This document is the CMS. The CMI Design and CMI Final Report are discussed in the following sections.

5.2.1 Presumptive Remedy CMI Design

Designs must be prepared for SWMU 68 to detail the proposed corrective measure. Because the corrective measure is an accepted construction practice (dig and haul), it is anticipated that the design will not be complicated. The CMI Design will consist of a Basis of Design, and Plans and Specifications.

The contractor will prepare a Draft and Final Basis of Design report for implementation of the corrective measure at SWMU 68. The Basis of Design will follow the US Navy's most recent Remedial Action Construction Guidance. The Basis of Design will provide site background data for the removal action, describe the primary elements of the remedial design, recommend criteria and present assumptions and any special requirements that may affect the design. The Basis of Design will also present the pertinent corrective measures implementation work breakdown structure and a construction schedule.

The contractor will prepare a 100% and Final Design Package (Plans and Specifications) for the removal action at SWMU 68. The following items are typically submitted with the 100% design package:

- Applicable SPECSINTACT specification sections
- Submittal Status Log
- 100% Drawings
- Cover Sheet and General Notes
- Existing Conditions Plans
- Removal Action Plans
- Grading and Revegetation Plans
- Civil Details

Final Design submittals typically consist of:

- Marked-up SPECSINTACT sections
- Final Submittal Approval and Distribution Chart for Specifications
- Final Drawings
- Final Cost Estimate
- Final Construction Schedule
- Written Responses to comments on the 100% design

5.2.2 CMI Final Report

The CMI Final report will be provided at the completion of the corrective measure. The report will include an introduction, summary of action, final health and safety report, summary of record documents, summary of field changes and contract modifications, final documents, a complete set of analytical laboratory results, a complete set of validation reports, documentation of offsite transportation and disposal of soil, a quality control summary report and final cost data. The CMI Final Report will also include an evaluation of the corrective measure including the quantities of impacted media removed, problems encountered and solutions implemented. As-built drawings will be included as an appendix to the CMI Final Report.

5.3 Cost

An order of magnitude cost estimate for implementation of the excavation and off-site disposal corrective measure is provided in Table 5-2. The cost estimate considers capital costs for some of the principle components of the alternative. Note that since contamination will be removed from the site, long-term or operation and maintenance costs are not required. Also, since this corrective measure is a presumptive remedy, costs for other potential cleanup alternatives were not developed. The overall estimated capital cost for implementation of the excavation of contaminated soil and off-site disposal corrective measure is $297,579.

5.4 Schedule

A schedule for implementation of this corrective measure is provided in Figure 5-2.

5.5 References

Baker. 1995. *Final RCRA Facility Investigation, Naval Station Roosevelt Roads, Ceiba, Puerto Rico*. Coraopolis, Pennsylvania. September 14, 1995.

United States Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

TABLES

TABLE 3-1
INPUT PARAMETERS FOR DERIVATION OF ECOLOGICAL CORRECTIVE ACTION OBJECTIVES FOR TERRESTRIAL AVIAN FOOD WEB EXPOSURES TO CHEMICALS IN SURFACE SOIL
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Input Parameter	Value	Reference
Ingestion-based screening value for lead	1.63 mg/kg-BW/day	USEPA, 2005
Mean body weight	0.0773 kg (wet weight)	USEPA, 1993
Mean food ingestion rate	0.00426 kg/day (dry weight)	Levey and Karasov, 1989
Soil-to-earthworm bioaccumulation factor for lead	0.307 (unitless, dry weight basis)	Sample et al., 1998
Soil-to-plant bioconcentration factor for lead	0.0377 (unitless, dry weight basis)	Bechtel Jacobs, 1998
Proportion of diet composed of earthworms	78.9 (unitless, dry weight basis)	Martin et al., 1951
Proportion of diet composed of plants	12.0 (unitless, dry weight basis)	Martin et al., 1951
Proportion of diet composed of surface soil	9.1 (unitless, dry weight basis)	Sample and Sutter II, 1994
Area use factor	1.0 (unitless)	Assumed

Notes:

USEPA = United States Environmental Protection Agency
mg/kg-BW/day = milligram per kilogram-body weight per day
kg/day = kilogram per day
kg = kilogram

Table references:

Bechtel Jacobs. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Prepared for U.S. Department of Energy. BJC/OR-133. September 1998.

Levey, D.J. and W.H. Karasov. 1989. Digestive Responses of Temperate Birds Switched to Fruit or Insect Diets. Auk. 106:675-686.

Martin, A.C., H.S. Zim, and A.L. Nelson. 1951. American Wildlife and Plants: A Guide to Wildlife Food Habits. Dover Publications, Inc. New York, NY. 500 pp.

TABLE 3-1 (Continued)
INPUT PARAMETERS FOR DERIVATION OF ECOLOGICAL CORRECTIVE ACTION OBJECTIVES FOR TERRESTRIAL AVIAN FOOD WEB EXPOSURES TO CHEMICALS IN SURFACE SOIL
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Table references (continued):

Sample, B.E. and G.W. Suter II. 1994. Estimating Exposure of Terrestrial Wildlife to Contaminants . Environmental Restoration Division, ORNL Environmental Restoration Program. ES/ER/TM-125.

USEPA. 2005. Ecological Soil Screening Levels for Lead (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-70.

USEPA. 1993. Wildlife Exposure Factors Handbook. Office of Research and Development, Washington, D.C. EPA/600/R-93/187a.

Revised: March 5, 2009

TABLE 3-2
CORRECTIVE ACTION OBJECTIVES FOR COPPER, LEAD, AND ZINC IN SURFACE SOIL
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Chemcial	Corrective Action Objective (mg/kg)			Final Corrective Action Objective (mg/kg)
	Terrestrial Invertebrates and Plants	American Robin (Avian Omnivore)	Background [1]	
Copper	70 [2]	NA	168	168
Lead	120 [3]	87 [5]	22	87
Zinc	120 [4]	NA	115	120

Notes:

NA = Not applicable (chemical does not present an unacceptable risk to terrestrial avian omnivore populations)

[1] NAPR background surface soil screening value (upper limit of the means) present in Baker (2008)
[2] The value shown is an Ecological Soil Screening Level for plants (USEPA, 2007a).
[3] The value shown is an Ecological Soil Screening Level for terrestrial plants (USEPA, 2005).
[4] The value shown is an Ecological Soil Screening Level for terrestrial invertebrates. (USEPA, 2007b).
[5] The value shown is the surface soil concentration that results in a hazard quotient value of 0.99.

Table references:

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

United States Environmental Protection Agency. 2007a. Ecological Soil Screening Levels for Copper (Interim Final). Office of Solid Waste and Emergency Response. OSWER Directive 9285.7-68.

USEPA. 2007b. Ecological Soil Screening Levels for Zinc (Interim Final). Office of Solid Waste and Emergency Response. OSWER Directive 9285.7-73.

USEPA. 2005. Ecological Soil Screening Levels for Lead (Interim Final). Office of Solid Waste and Emergeny Response, Washington, D.C. OSWER Directive 9285.7-70

TABLE 5-1

DESIGN CONSIDERATIONS
SWMU 68 – FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Design Consideration	Applicability
Site Ownership	Ownership of the Air Field parcel (Ofstie Airfield) was transferred from the United States Navy to the Puerto Rico Ports Authority on February 7, 2008. However, in accordance with the Administrative Order, the Covenant Deferral Request and the Quitclaim Deed of transfer, the United States Navy maintains responsibility for the investigation and cleanup of SWMU 68. The Ports Authority has developed the airfield into a regional airport (operations began in December 2008). The quitclaim deed requires the Ports Authority to allow access to the Navy and its contractors for the remedial action or corrective action found to be necessary after the date of the conveyance of the property. This access is guaranteed through 42 U.S.C. §9620(h)(3)(A)(iii), which also prohibits the Ports Authority from taking action to interfere with future necessary remedial and investigative actions. The deed also says that remedial and investigative actions shall take priority in all cases where a conflict may exist with Port's and any lessee's or sub lessee's activities.
Site Access	Site is located in a vacant area off the end of a runway. Site access is off of Boxer Drive, which does not require access to the airfield and taxiways. Coordinate site access with the Puerto Rico Ports Authority.
Existing Structures	There are no existing structures in the immediate vicinity of the SWMU.
Disruption of Adjacent Facilities	Ofstie Field is currently operating as a regional airport. Other contractors may be working at the Airfield. There will be no disruption of adjacent facilities or operations.
Available Utilities	Utilities are not available in the immediate vicinity of the site; utilities may be available at other areas of the airfield.
Utility Clearance	The remedial contractor will be responsible for clearing all sampling and excavation areas of utilities.
Extent of Contamination	The maximum extent of copper, lead and zinc contamination in the surface soil has been fully defined by the Phase I RFI Investigation.
Aquatic Resources	Freshwater wetlands are located within the SWMU 68 boundary. Prior to soil excavation activities, wetland boundaries within the SWMU will be field-delineated to ensure protection. Identification of wetland boundaries also will assure that habitats being remediated will be restored to their original condition (e.g., soil characteristics, flora composition, etc.).
Staging and Decontamination Areas	Staging and decontamination areas may be placed within the SWMU 68 boundary, as indicated on Figure 5-1.
Off-Site Disposal	Off-site disposal at a permitted on-island facility is anticipated; however, if the waste characterization sampling so indicates, disposal at a permitted facility in the continental United States may be required.

Revised: March 5, 2009

TABLE 5-2

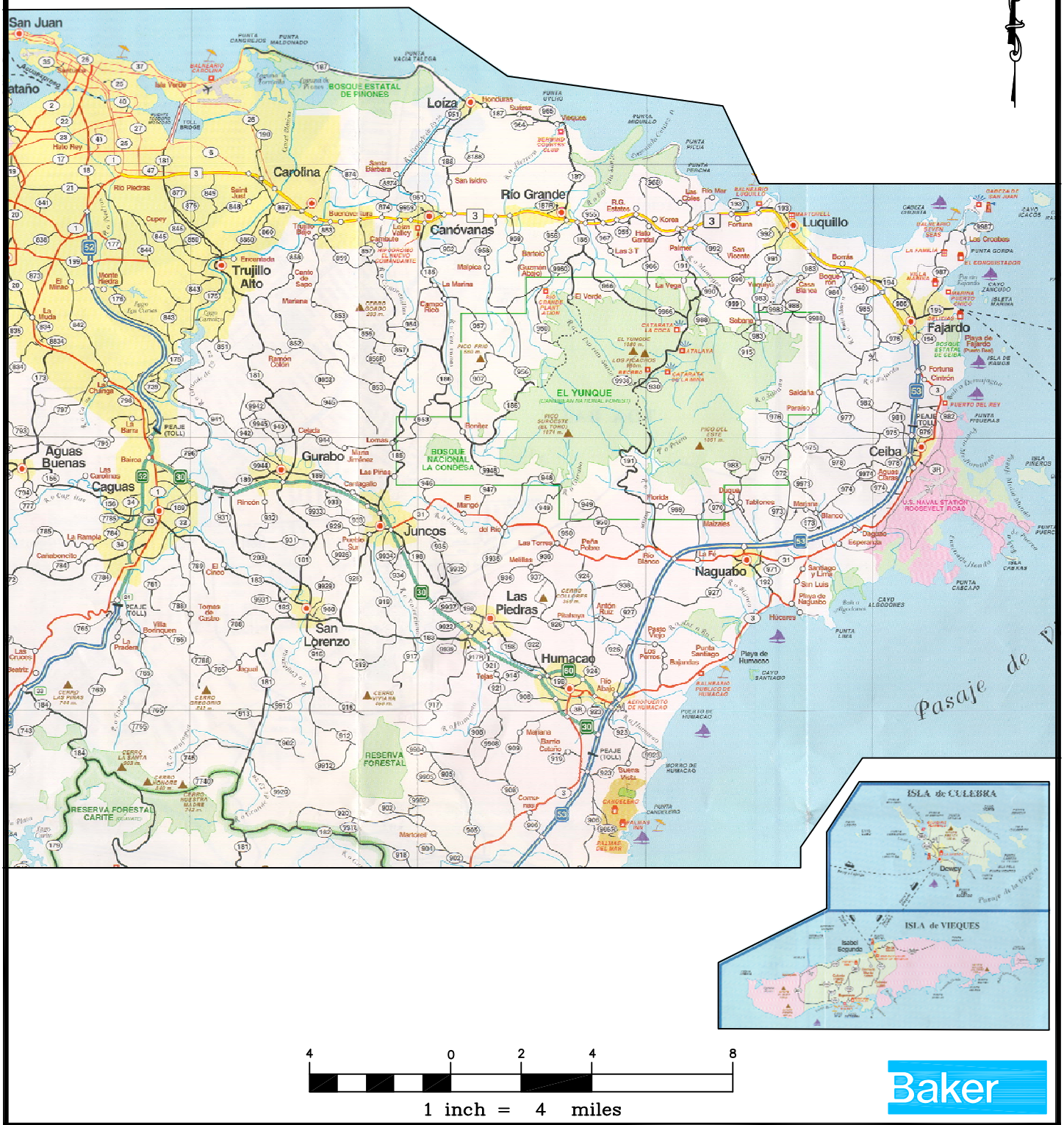
EXCAVATION AND DISPOSAL COST ESTIMATE
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

ITEM	QTY.	UNIT	UNIT PRICE	ITEM PRICE	NOTES
Direct Capital Costs					
Mobilization/Demobilization	1	LS	$5,000.00	$5,000.00	Professional Judgement
Excavation Cu/Pb/Zn Contaminated Soil	555	CY	$105.00	$58,275.00	Professional Judgement
Backfilling with clean fill, including delivery, spreading and compaction in 6" lifts (excavation volume plus 20%)	666	CY	$41.00	$27,306.00	Professional Judgement
Vegetative Cover	7,500	SF	$0.60	$4,500.00	Professional Judgement
Transportation	834	ton	$67.00	$55,878.00	Professional Judgement
Disposal	834	ton	$42.00	$35,028.00	Professional Judgement
Subtotal - Direct Capital Costs				$185,987.00	
Scope and bid Contingency				$37,197.40	20% total contingency (10% scope and 10% bid contingencies)
Total Direct Capital Costs				$223,184.40	
Professional Services					
Project Management				$18,598.70	Assume 10% of total direct capital cost
Remedial Design/EngineeringSupport				$27,898.05	Assume 15% of total direct capital cost
Construction Oversight and Startup				$27,898.05	Assume 15% of total direct capital cost
Total Professional Services				$74,394.80	
TOTAL				$297,579.20	

Notes:
LS - Lump Sum
CY - cubic yards
SF - square feet

FIGURES

K:_Right Way Enviro\115354 CORR ACT FOR SWMU\3.0 Deliverables\3.1 Deliverables\68 CMS Final Report\Draft\cad\115354_68CMS_01



4 0 2 4 8

1 inch = 4 miles

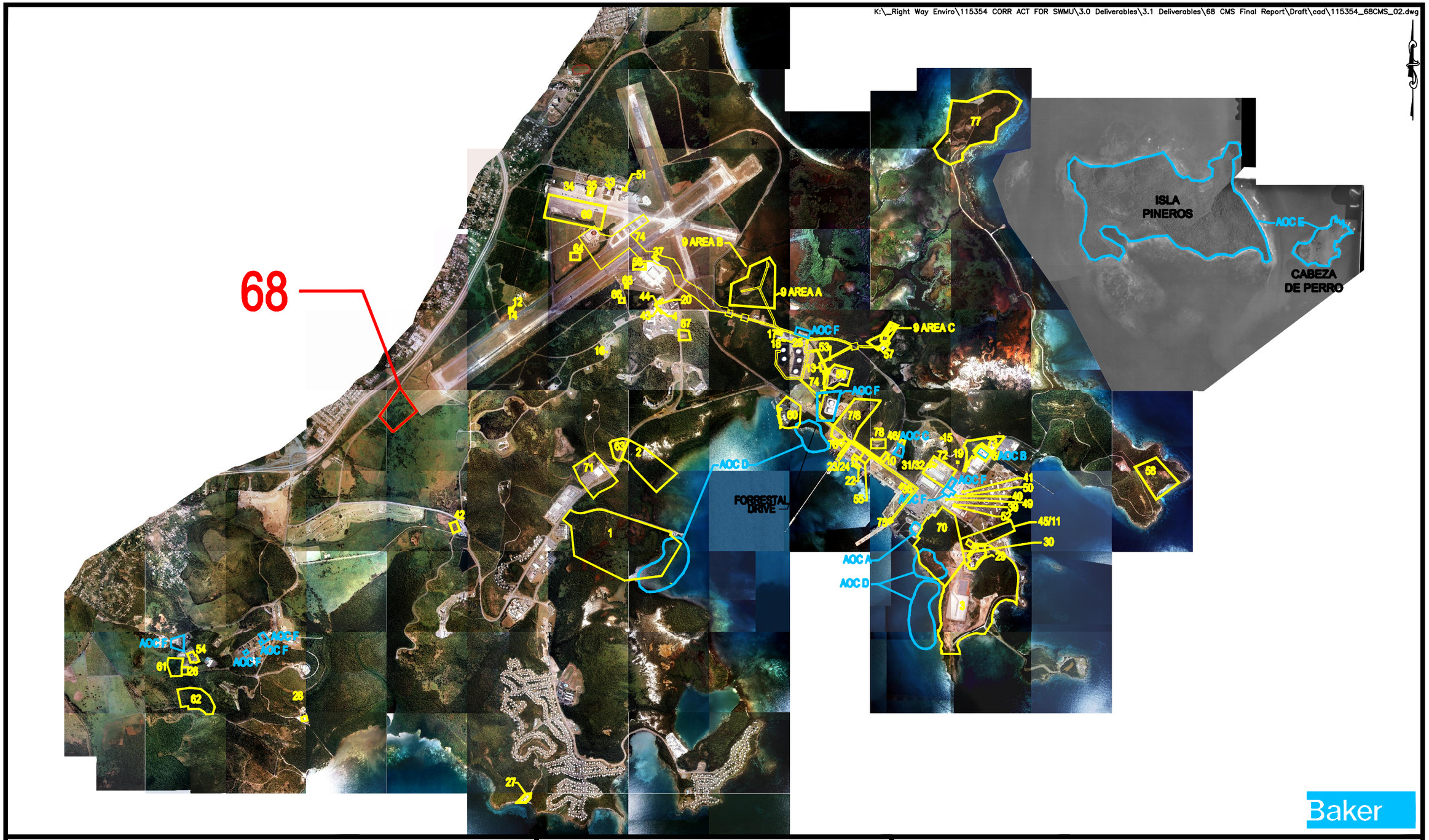
Baker

FIGURE 2-1
NAPR LOCATION MAP
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT

NAVAL ACTIVITY PUERTO RICO
PUERTO RICO

SOURCE: METRODATA, INC., 1999.

K:_Right Way Enviro\115354 CORR ACT FOR SWMU\3.0 Deliverables\3.1 Deliverables\68 CMS Final Report\Draft\cad\115354_68CMS_02.dwg



LEGEND

1 – SWMUs

– 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 2-2
SWMU/AOC LOCATION MAP
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY
FINAL REPORT
NAVAL ACTIVITY PUERTO RICO

LEGEND

- SWMU 68
- COWARDIN WETLAND BOUNDARY
- PEM1 – COWARDIN WETLAND CLASSIFICATION

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

500 0 250 500

1 inch = 500 ft.

FIGURE 2-3
SWMU 68 LOCATION MAP
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY
FINAL REPORT
NAVAL ACTIVITY PUERTO RICO

200 0 100 200

1 inch = 200 ft.

Baker

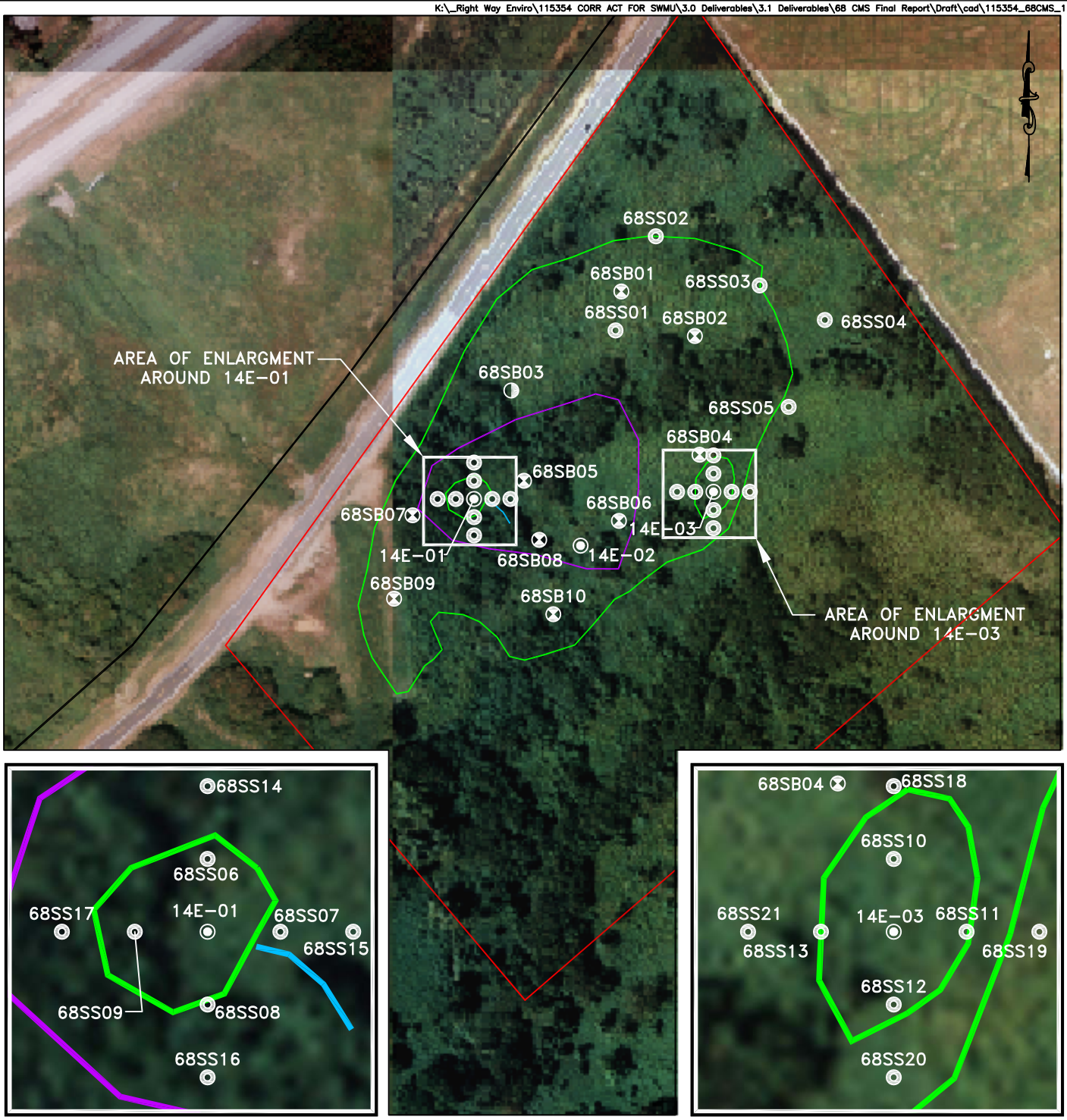
LEGEND

- 1961 POLYGON FEATURE
- 1961 DRAINAGE
- 1964 POLYGON FEATURE
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP INVESTIGATION)
- ECP SITE BOUNDARY

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

FIGURE 2-4
1961 AERIAL PHOTOGRAPH
WITH ECP SAMPLE LOCATIONS
SWMU 68-FORMER SOUTHERN
FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY
FINAL REPORT
NAVAL ACTIVITY PUERTO RICO

K:_Right Way Enviro\115354 CORR ACT FOR SWMU\3.0 Deliverables\3.1 Deliverables\68 CMS Final Report\Draft\cad\115354_68CMS_11



200 0 100 200

1 inch = 200 ft.

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

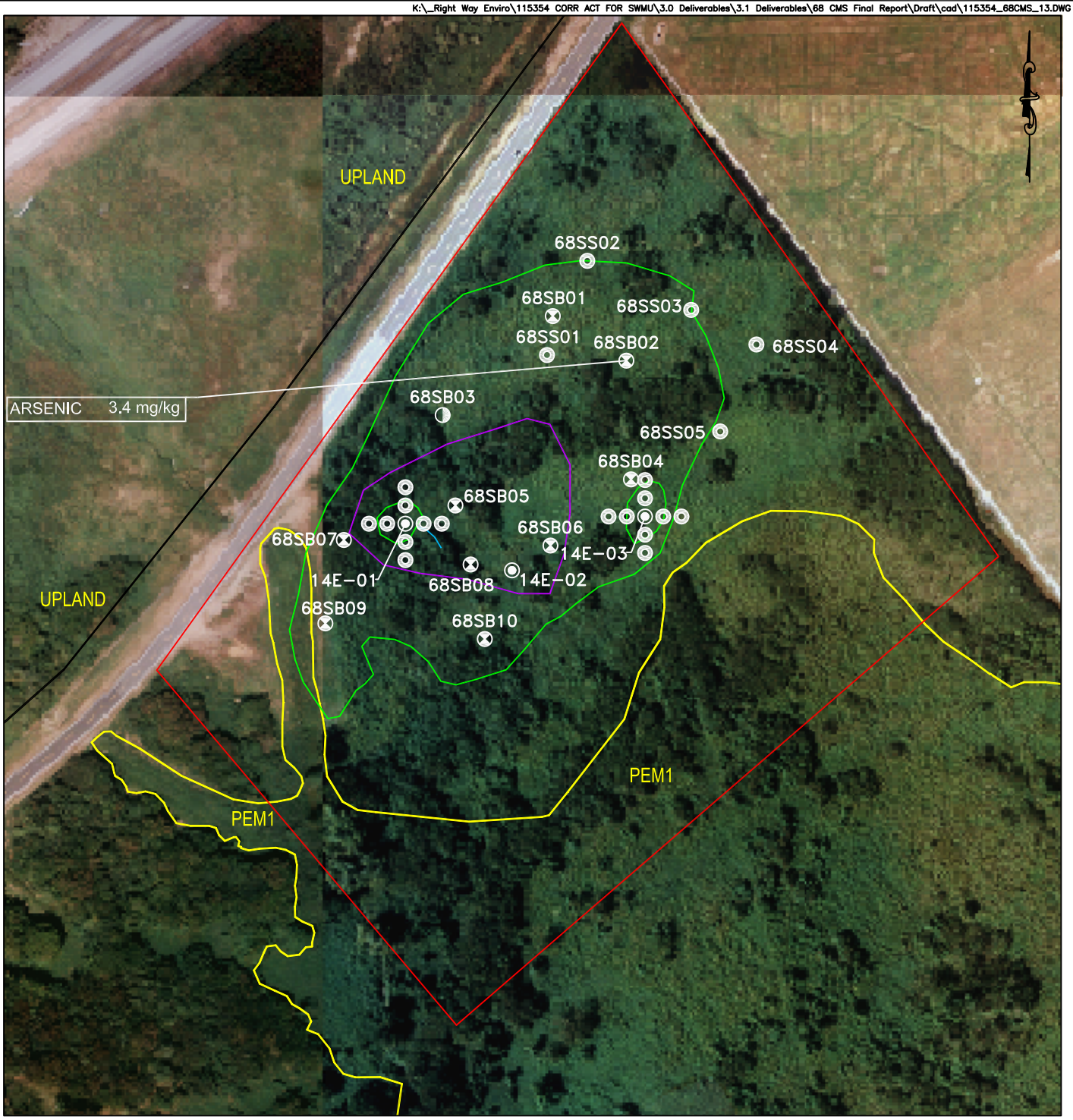
Baker

LEGEND

- 1961 POLYGON FEATURE
- 1961 DRAINAGE
- 1964 POLYGON FEATURE
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP INVESTIGATION)
- SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE SOIL (PHASE I RFI SEPT. AND OCT. 07)
- ECP SITE BOUNDARY

FIGURE 2-5
PHASE I RFI SAMPLE LOCATION MAP
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY
FINAL REPORT
NAVAL ACTIVITY PUERTO RICO

K:_Right Way Enviro\115354 CORR ACT FOR SWMU\3.0 Deliverables\3.1 Deliverables\68 CMS Final Report\Draft\cad\115354_68CMS_13.DWG



200 0 100 200

1 inch = 200 ft.

Baker

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

LEGEND

- 1961 POLYGON FEATURE
- 1964 POLYGON FEATURE
- 1961 DRAINAGE
- ECP SITE BOUNDARY
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP INVESTIGATION)
- SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE SOIL (PHASE I RFI SEPT. AND OCT. 07)
- WETLANDS DELINEATION
- PEM1 – WETLANDS DELINEATION IDENTIFICATION CODES

FIGURE 2-6
ARSENIC CONCENTRATION IN SURFACE SOIL GREATER THAN SOIL SCREENING VALUES AND BACKGROUND SURFACE SOIL SCREENING VALUES
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO

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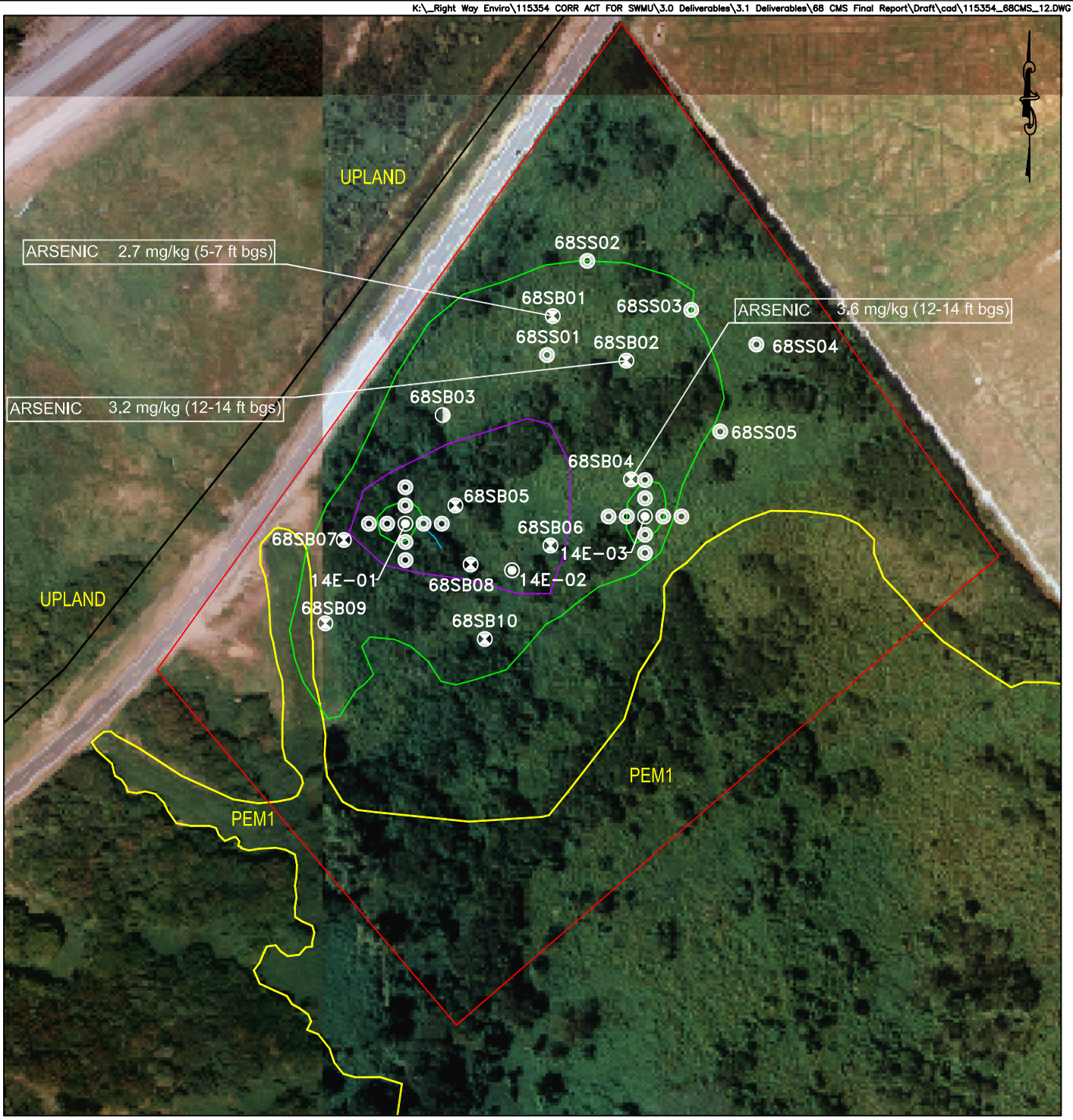

200 0 100 200

1 inch = 200 ft.

Baker

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

LEGEND

- 1961 POLYGON FEATURE
- 1964 POLYGON FEATURE
- 1961 DRAINAGE
- ECP SITE BOUNDARY
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP INVESTIGATION)
- SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE SOIL (PHASE I RFI SEPT. AND OCT. 07)
- WETLANDS DELINEATION
- PEM1 – WETLANDS DELINEATION IDENTIFICATION CODES
- ft bgs – FEET BELOW GROUND SURFACE

FIGURE 2-7
ARSENIC CONCENTRATIONS IN SUBSURFACE SOIL GREATER THAN SOIL SCREENING VALUES AND BACKGROUND SUBSURFACE SOIL SCREENING VALUES
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO

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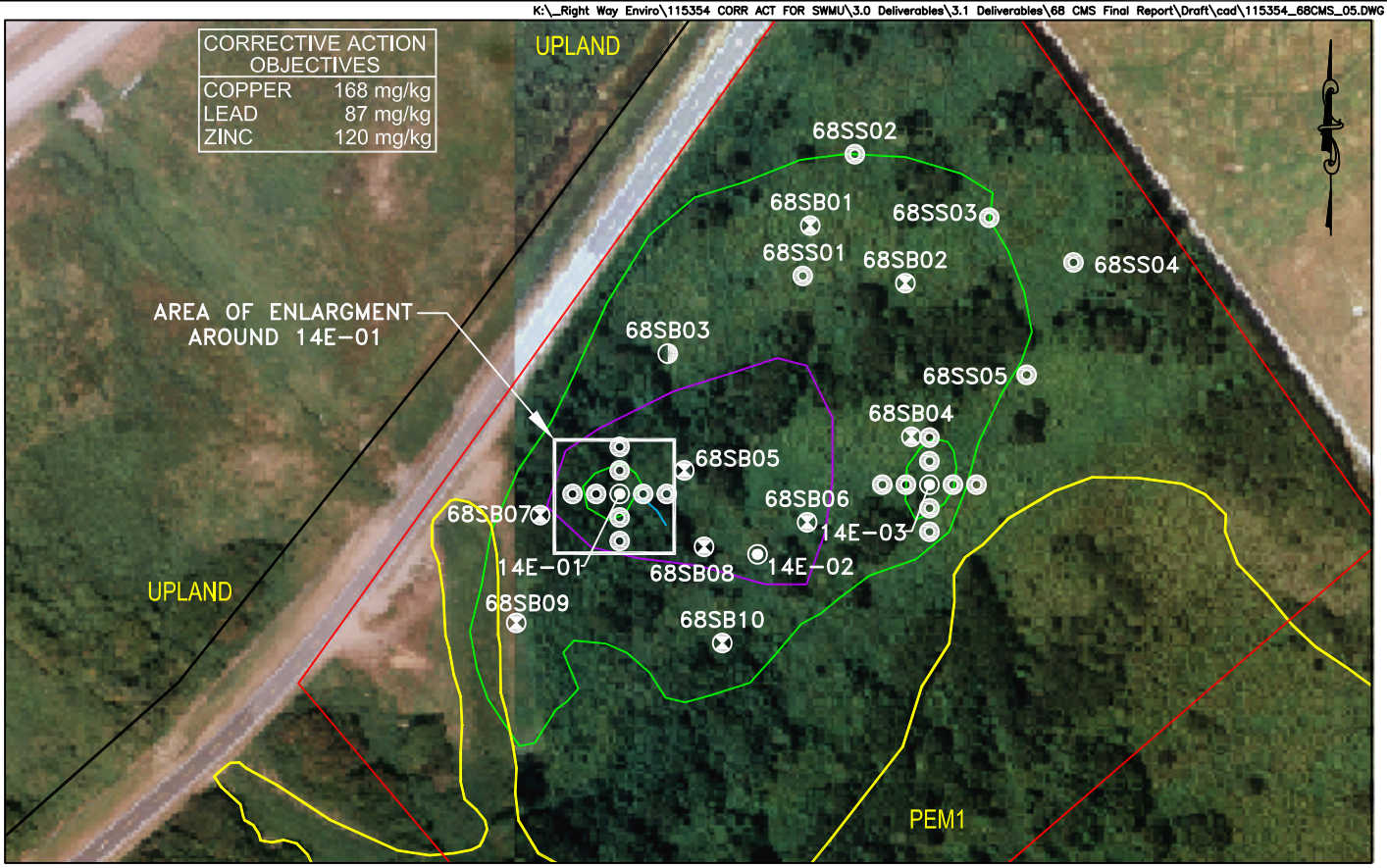
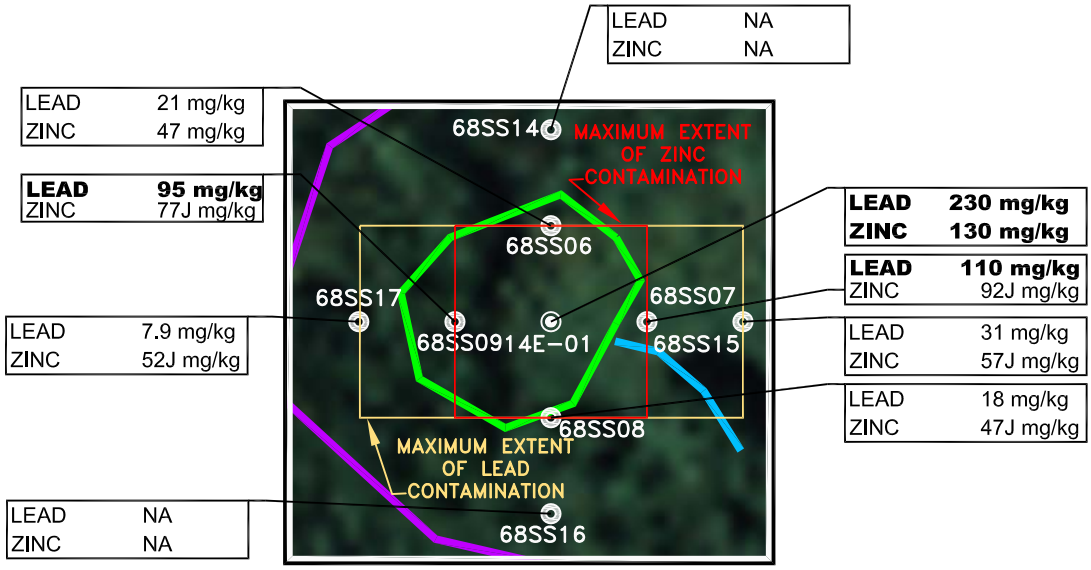




200 0 100 200
1 inch = 200 ft.

AREA OF ENLARGMENT AROUND 14E-01

AREA OF ENLARGMENT SCALE
0 25 50
1 inch = 50 ft.

Baker

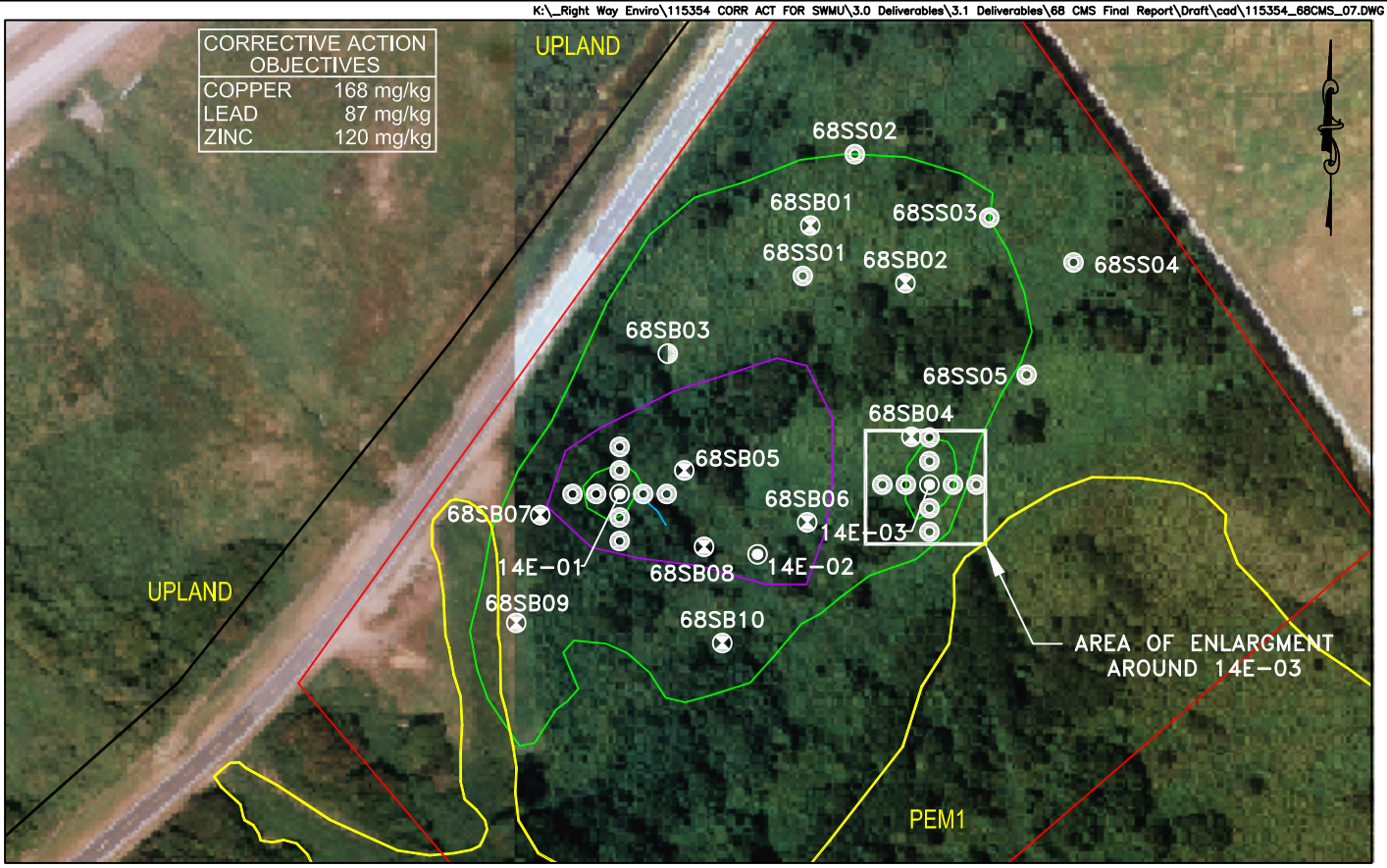
SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

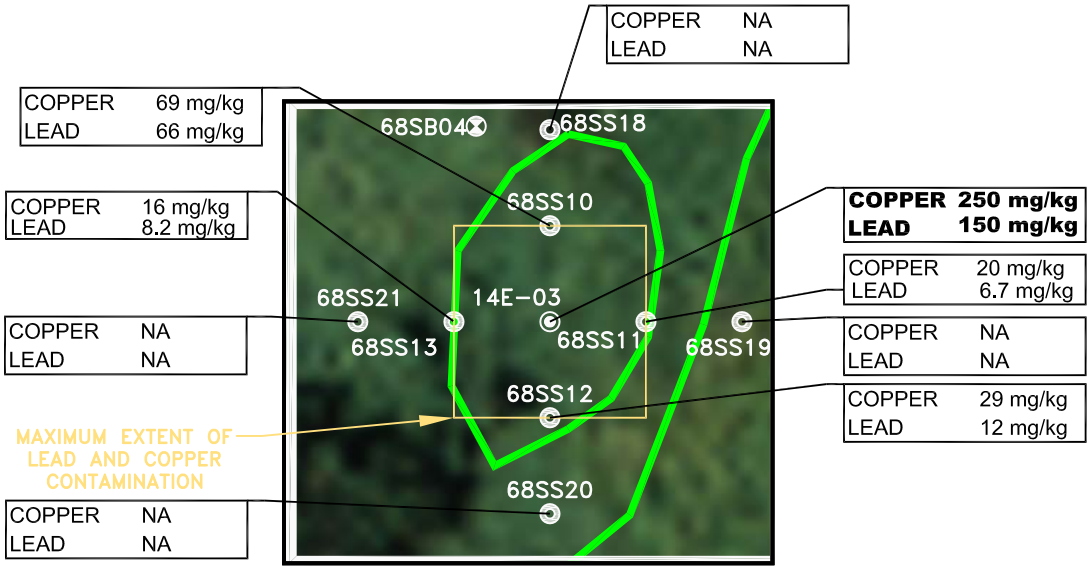
LEGEND
- 1961 POLYGON FEATURE
- 1964 POLYGON FEATURE
- 1961 DRAINAGE
- ECP SITE BOUNDARY
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP INVESTIGATION)
- SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE SOIL (PHASE I RFI SEPT. AND OCT. 07)
- WETLANDS DELINEATION
- PEM1 – WETLANDS DELINEATION IDENTIFICATION CODES

FIGURE 3-1
LEAD, AND ZINC CONCENTRATIONS IN SURFACE SOIL AROUND 14E-01
CORRECTIVE ACTION OBJECTIVES
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT

NAVAL ACTIVITY PUERTO RICO

K:_Right Way Enviro\115354 CORR ACT FOR SWMU\3.0 Deliverables\3.1 Deliverables\68 CMS Final Report\Draft\cad\115354_68CMS_07.DWG





AREA OF ENLARGMENT AROUND 14E-03

200 0 100 200
1 inch = 200 ft.

AREA OF ENLARGMENT SCALE
0 25 50
1 inch = 50 ft.

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

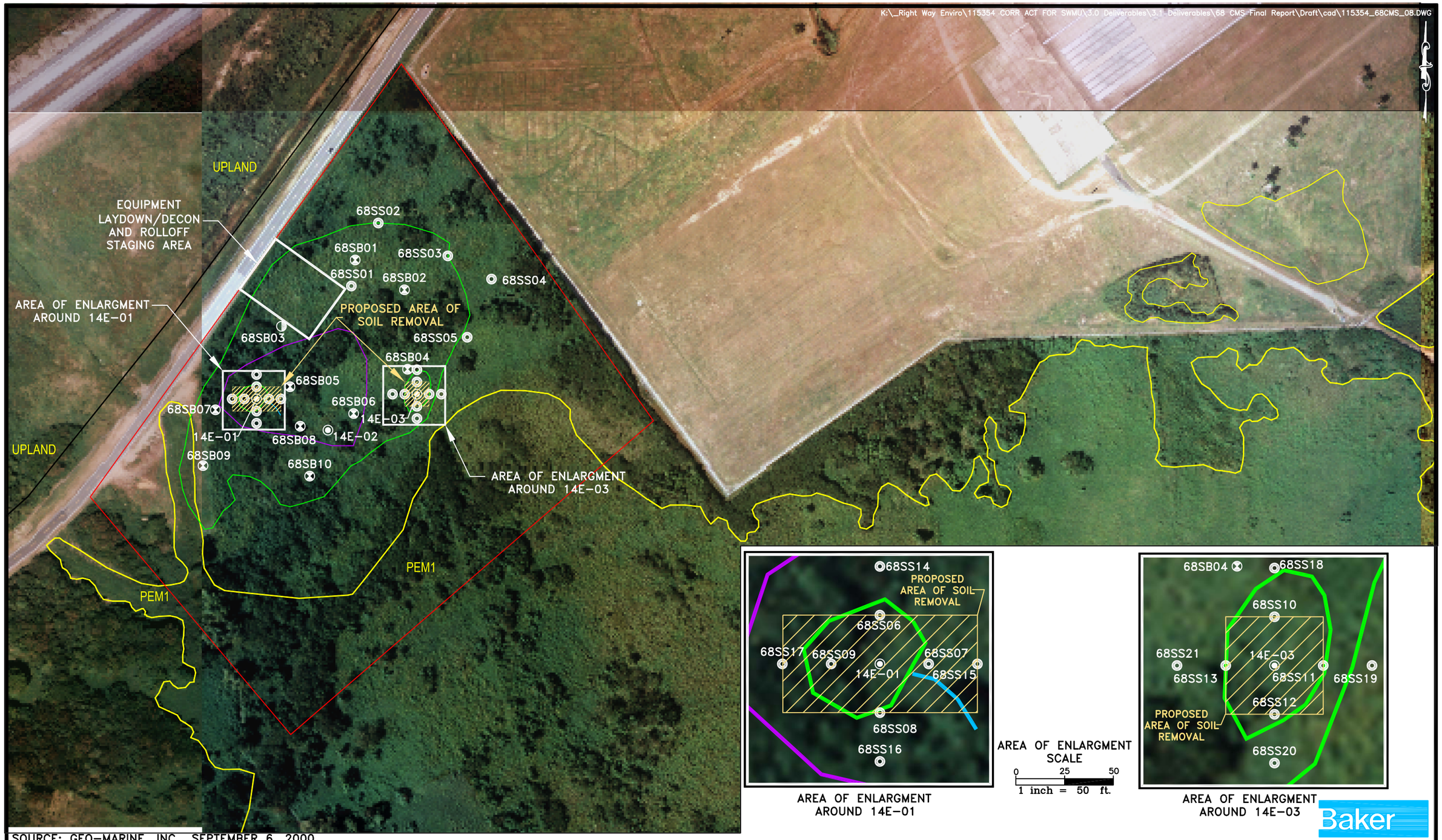
Baker

LEGEND

- 1961 POLYGON FEATURE
- 1964 POLYGON FEATURE
- 1961 DRAINAGE
- ECP SITE BOUNDARY
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP INVESTIGATION)
- SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE SOIL (PHASE I RFI SEPT. AND OCT. 07)
- WETLANDS DELINEATION
- PEM1 – WETLANDS DELINEATION IDENTIFICATION CODES

FIGURE 3-2
COPER AND LEAD CONCENTRATIONS IN SURFACE SOIL AROUND 14E-03
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT

NAVAL ACTIVITY PUERTO RICO



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

LEGEND

- 1961 POLYGON FEATURE
- 1964 POLYGON FEATURE
- 1961 DRAINAGE
- ECP SITE BOUNDARY
- WETLANDS DELINEATION
- PEM1 – WETLANDS DELINEATION IDENTIFICATION CODES
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP INVESTIGATION)
- SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE I RFI NOV. 06)
- SURFACE SOIL (PHASE I RFI SEPT. AND OCT. 07)

200 0 100 200
1 inch = 200 ft.

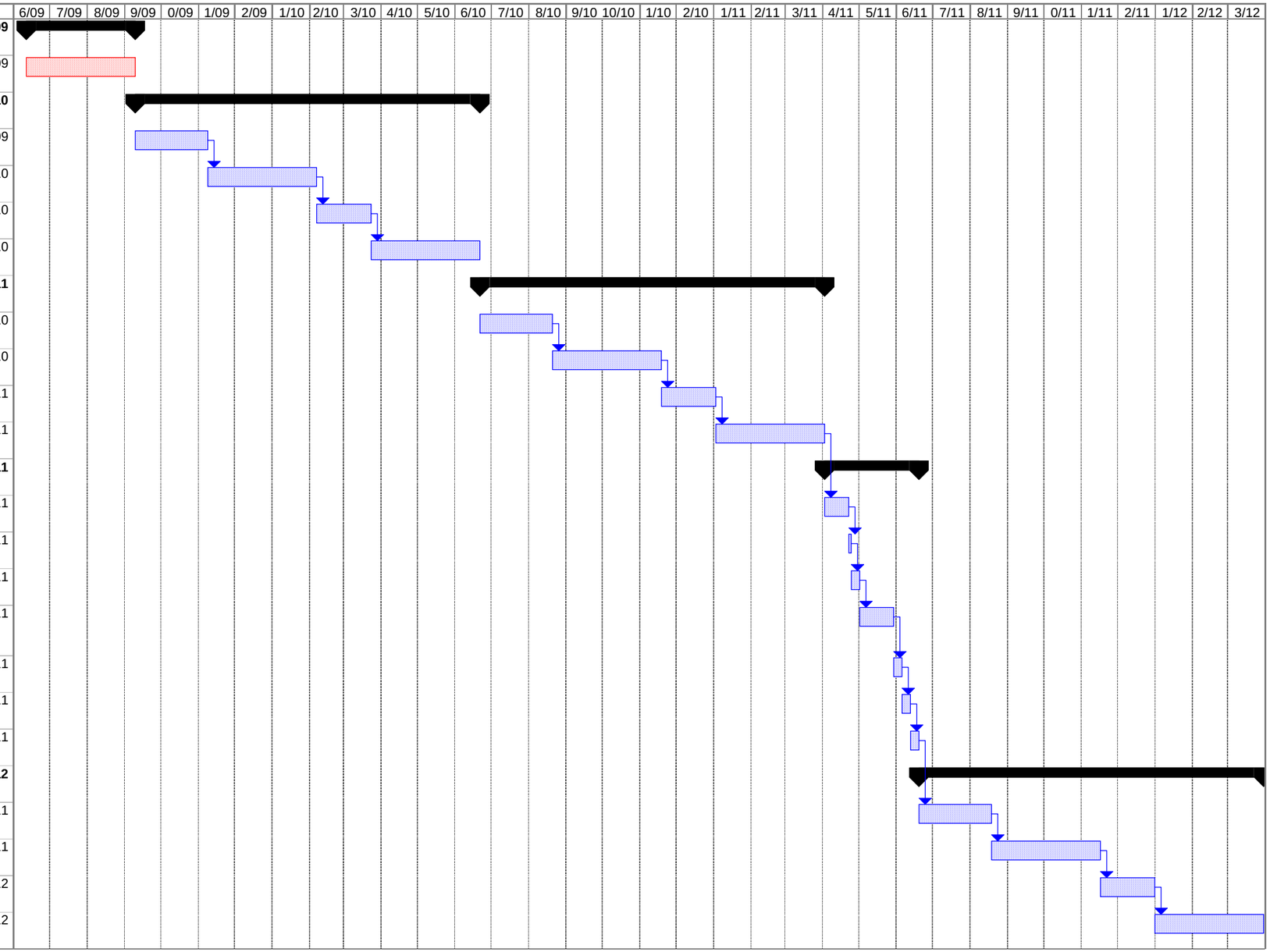
FIGURE 5-1
CONCEPTUAL DESIGN PLAN
SWMU 68-FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT

NAVAL ACTIVITY PUERTO RICO

Revised: June 12, 2009

FIGURE 5-2
CONCEPTUAL CMI SCHEDULE
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

ID	Task Name	Duration	Start	Finish
1	**Final CMS Report**	**64 days**	**6/12/09**	**9/10/09**
2	EPA Approval of CMS	90 edays	6/12/09	9/10/09
3	**CMI Design**	**203 days**	**9/10/09**	**6/22/10**
4	100 % Design	60 edays	9/10/09	11/9/09
5	EPA Review	90 edays	11/9/09	2/7/10
6	Final Design	45 edays	2/7/10	3/24/10
7	Final Design Approval	90 edays	3/24/10	6/22/10
8	**Contractor Planning Documents**	**204 days**	**6/22/10**	**4/3/11**
9	Draft Documents	60 edays	6/22/10	8/21/10
10	EPA Review	90 edays	8/21/10	11/19/10
11	Final Documets	45 edays	11/19/10	1/3/11
12	EPA Review and Approval	90 edays	1/3/11	4/3/11
13	**Cleanup Action**	**55 days**	**4/3/11**	**6/20/11**
14	Mobilization	20 edays	4/3/11	4/23/11
15	Survey	2 edays	4/23/11	4/25/11
16	Excavation and Staging	7 edays	4/25/11	5/2/11
17	Confirmation and Characterization Sampling and Analysis	28 edays	5/2/11	5/30/11
18	Transportation and Off-Site Disposal	7 edays	5/30/11	6/6/11
19	Backfill and Revegetation	7 edays	6/6/11	6/13/11
20	Demobilization	7 edays	6/13/11	6/20/11
21	**CMI Final Report**	**205 days**	**6/20/11**	**3/31/12**
22	Draft	60 edays	6/20/11	8/19/11
23	EPA Review	90 edays	8/19/11	11/17/11
24	Final Report	45 edays	11/17/11	1/1/12
25	EPA Review and Approval	90 edays	1/1/12	3/31/12



APPENDIX A
PHASE II ECP ANALYTICAL DATA

APPENDIX A

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - ORGANICS - ECP PHASE II REPORT
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03	14E-03
Sample ID	14E-SS01	14E-SS02	14E-SS03	14E-SS03D
Sample Date	05/08/04	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00
Volatile Organic Compounds (ug/kg)				
Chloroform	6.6 U	6.5 U	6.3 U	6 U
Dichlorodifluoromethane	6.6 U	6.5 U	6.3 U	6 U
1,1-Dichloroethane	6.6 U	6.5 U	6.3 U	6 U
1,2-Dichloroethane	6.6 U	6.5 U	6.3 U	6 U
1,1-Dichloroethene	6.6 U	6.5 U	6.3 U	6 U
1,2-Dichloropropane	6.6 U	6.5 U	6.3 U	6 U
Ethyl benzene	6.6 U	6.5 U	6.3 U	6 U
Acrolein 130	U	130 U	130 U	120 U
Methylene chloride	6.6 U	6.5 U	6.3 U	6 U
1,1,2,2-Tetrachloroethane	6.6 U	6.5 U	6.3 U	6 U
Tetrachloroethene	3.6 J	2.2 J	3.2 J	4.7 J
Toluene	6.6 U	6.5 U	6.3 U	6 U
trans-1,2-Dichloroethene	6.6 U	6.5 U	6.3 U	6 U
1,1,1-Trichloroethane	6.6 U	6.5 U	6.3 U	6 U
1,1,2-Trichloroethane	6.6 U	6.5 U	6.3 U	6 U
2-Butanone 33	U	32 U	32 U	30 U
Chloroprene	6.6 U	6.5 U	6.3 U	6 U
2-Hexanone	33 U	32 U	32 U	30 U
Acrylonitrile	130 U	130 U	130 U	120 U
3-Chloro-1-propene 6.6	U	6.5 U	6.3 U	6 U
Benzene	6.6 U	6.5 U	6.3 U	6 U
Bromoform	6.6 U	6.5 U	6.3 U	6 U
Carbon tetrachloride	6.6 U	6.5 U	6.3 U	6 U
Chlorobenzene	2.5 J	1.8 J	3.5 J	5 J
Acetonitrile	260 U	260 U	250 U	240 U
1,2-Dibromo-3-chloropropane	13 U	13 U	13 U	12 U
Dibromomethane 6.6	U	6.5 U	6.3 U	6 U
trans-1,4-Dichloro-2-butene	13 U	13 U	13 U	12 U
cis-1,3-Dichloropropene	6.6 U	6.5 U	6.3 U	6 U
trans-1,3-Dichloropropene	6.6 U	6.5 U	6.3 U	6 U
Ethyl methacrylate	6.6 U	6.5 U	6.3 U	6 U
Iodomethane 6.6	U	6.5 U	6.3 U	6 U
Methacrylonitrile	130 U	130 U	130 U	120 U
Methyl methacrylate	6.6 U	6.5 U	6.3 U	6 U
Pentachloroethane	33 U	32 U	32 U	30 U
1,1,1,2-Tetrachloroethane	6.6 U	6.5 U	6.3 U	6 U
Trichlorofluoromethane	6.6 U	6.5 U	6.3 U	6 U
1,2,3-Trichloropropane	6.6 U	6.5 U	6.3 U	6 U
Vinyl chloride	6.6 U	6.5 U	6.3 U	6 U
Dibromochloromethane	6.6 U	6.5 U	6.3 U	6 U
Chloroethane	6.6 U	6.5 U	6.3 U	6 U
Acetone	66 U	65 U	63 U	60 U
Bromodichloromethane	6.6 U	6.5 U	6.3 U	6 U

APPENDIX A

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - ORGANICS - ECP PHASE II REPORT
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03	14E-03
Sample ID	14E-SS01	14E-SS02	14E-SS03	14E-SS03D
Sample Date	05/08/04	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00
Volatile Organic Compounds (ug/kg) (Cont.)				
Bromomethane	6.6 U	6.5 U	6.3 U	6 U
Chloromethane 6.6	U	6.5 U	6.3 U	6 U
Carbon disulfide	6.6 U	6.5 U	6.3 U	6 U
1,2-Dibromoethane 6.6	U	6.5 U	6.3 U	6 U
Propionitrile	130 U	130 U	130 U	120 U
Isobutanol 260	U	260 U	250 U	240 U
4-Methyl-2-pentanone 33	U	32 U	32 U	30 U
Styrene	6.6 U	6.5 U	6.3 U	6 U
Trichloroethene	6.6 U	6.5 U	6.3 U	6 U
Vinyl acetate	13 U	13 U	13 U	12 U
Xylene	13 U	13 U	13 U	12 U
Semivolatile Organic Compounds (ug/kg)				
Phenol	440 U	440 U	450 U	440 U
bis(2-Chloroethoxy)methane	440 U	440 U	450 U	440 U
2,4,6-Trichlorophenol	440 U	440 U	450 U	440 U
bis(2-Chloroethyl)ether	440 U	440 U	450 U	440 U
bis(2-Chloroisopropyl)ether	440 U	440 U	450 U	440 U
bis(2-Ethylhexyl)phthalate	440 U	440 U	450 U	440 U
4-Bromophenylphenyl ether	440 U	440 U	450 U	440 U
Butylbenzylphthalate	440 U	440 U	450 U	440 U
2-Chloronaphthalene	440 U	440 U	450 U	440 U
4-Chlorophenyl phenyl ether	440 U	440 U	450 U	440 U
Chrysene	440 U	440 U	450 U	440 U
Dibenzo(a,h)anthracene	440 U	440 U	450 U	440 U
2-Chlorophenol	440 U	440 U	450 U	440 U
Acenaphthene	440 U	440 U	450 U	440 U
3,3'-Dichlorobenzidine	890 U	890 U	900 U	890 U
Diethylphthalate	440 U	440 U	450 U	440 U
Dimethyl phthalate	440 U	440 U	450 U	440 U
2,4-Dinitrotoluene	440 U	440 U	450 U	440 U
2,6-Dinitrotoluene	440 U	440 U	450 U	440 U
Di-n-octylphthalate	440 U	440 U	450 U	440 U
2,4-Dichlorophenol	440 U	440 U	450 U	440 U
Acenaphthylene	440 U	440 U	450 U	440 U
2-Methylnaphthalene	440 U	440 U	450 U	440 U
Fluoranthene	440 U	440 U	450 U	440 U
Fluorene	440 U	440 U	450 U	440 U
Hexachlorobenzene	440 U	440 U	450 U	440 U
Hexachlorobutadiene	440 U	440 U	450 U	440 U
Hexachlorocyclopentadiene	440 U	440 U	450 U	440 U
Hexachloroethane	440 U	440 U	450 U	440 U
Indeno(1,2,3-cd)pyrene	440 U	440 U	450 U	440 U

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SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03	14E-03
Sample ID	14E-SS01	14E-SS02	14E-SS03	14E-SS03D
Sample Date	05/08/04	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00
Semivolatile Organic Compounds (ug/kg) (Cont.)				
Isophorone	440 U	440 U	450 U	440 U
Naphthalene	440 U	440 U	450 U	440 U
2,4-Dimethylphenol	440 U	440 U	450 U	440 U
Anthracene	440 U	440 U	450 U	440 U
4,6-Dinitro-2-methylphenol 2,300	U	2,300 U	2,300 U	2,300 U
Nitrobenzene	440 U	440 U	450 U	440 U
N-Nitrosodimethylamine	440 U	440 U	450 U	440 U
N-Nitrosodiphenylamine	440 U	440 U	450 U	440 U
Phenanthrene	440 U	440 U	450 U	440 U
Pyrene	440 U	440 U	450 U	440 U
1,2,4-Trichlorobenzene	440 U	440 U	450 U	440 U
4-Nitroquinoline-1-oxide	4,400 U	4,400 U	4,500 U	4,400 U
2,4-Dinitrophenol	2,300 U	2,300 U	2,300 U	2,300 U
Benzo(a)anthracene	440 U	440 U	450 U	440 U
Benzo(a)pyrene	440 U	440 U	450 U	440 U
2,6-Dichlorophenol	440 U	440 U	450 U	440 U
Benzo(b)fluoranthene	440 U	440 U	450 U	440 U
4-Aminobiphenyl	440 U	440 U	450 U	440 U
p-(Dimethylamino)azobenzene	440 U	440 U	450 U	440 U
7,12-Dimethylbenz(a)anthracene	440 U	440 U	450 U	440 U
3,3'-Dimethyl benzidine	2,300 U	2,300 U	2,300 U	2,300 U
alpha,alpha-Dimethylphenethylamine	90,000 U	90,000 U	92,000 U	90,000 U
1,4-Dioxane	440 U	440 U	450 U	440 U
n-Nitrosodi-n-propylamine	440 U	440 U	450 U	440 U
Aniline	440 U	440 U	450 U	440 U
Ethylmethanesulfonate	440 U	440 U	450 U	440 U
Acetophenone	440 U	440 U	450 U	440 U
Aramite	440 U	400 U	450 U	440 U
Hexachlorophene	230,000 U	230,000 U	230,000 U	230,000 U
Hexachloropropene	440 U	440 U	450 U	440 U
Isosafrole	440 U	440 U	450 U	440 U
Methapyrilene	90,000 U	90,000 U	92,000 U	90,000 U
3-Methylcholanthrene	440 U	440 U	450 U	440 U
Methyl methanesulfonate	440 U	440 U	450 U	440 U
1,4-Naphthoquinone	440 U	440 U	450 U	440 U
1-Naphthylamine	440 U	440 U	450 U	440 U
2-Naphthylamine	440 U	440 U	450 U	440 U
N-Nitrosodi-n-butylamine	440 U	440 U	450 U	440 U
N-Nitrosodiethylamine	440 U	440 U	450 U	440 U
N-Nitrosomethylethylamine	440 U	440 U	450 U	440 U
N-Nitrosomorpholine	440 U	440 U	450 U	440 U
N-Nitrosopiperidine	440 U	440 U	450 U	440 U
N-Nitrosopyrrolidine	440 U	440 U	450 U	440 U

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SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03	14E-03
Sample ID	14E-SS01	14E-SS02	14E-SS03	14E-SS03D
Sample Date	05/08/04	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00
Semivolatile Organic Compounds (ug/kg) (Cont.)				
5-Nitro-o-toluidine	440 U	440 U	450 U	440 U
Pentachlorobenzene	440 U	440 U	450 U	440 U
Pentachloronitrobenzene	440 U	440 U	450 U	440 U
Phenacetin	440 U	440 U	450 U	440 U
2-Picoline	440 U	440 U	450 U	440 U
Pronamide	440 U	440 U	450 U	440 U
Pyridine	440 U	440 U	450 U	440 U
Safrole	440 U	440 U	450 U	440 U
1,2,4,5-Tetrachlorobenzene	440 U	440 U	450 U	440 U
2,3,4,6-Tetrachlorophenol	440 U	440 U	450 U	440 U
2,4,5-Trichlorophenol	440 U	440 U	450 U	440 U
1,3,5-Trinitrobenzene	440 U	440 U	450 U	440 U
2-Acetylaminofluorene	440 U	440 U	450 U	440 U
Dinoseb 440	U	440 U	450 U	440 U
4-Chloroaniline 890	U	890 U	900 U	890 U
4-Chloro-3-methylphenol 440	U	440 U	450 U	440 U
Benzo(g,h,i)perylene	440 U	440 U	450 U	440 U
Pentachlorophenol	2,300 U	2,300 U	2,300 U	2,300 U
Benzo(k)fluoranthene	440 U	440 U	450 U	440 U
Benzyl alcohol	440 U	440 U	450 U	440 U
Diallate	440 U	440 U	450 U	440 U
Dibenzofuran	440 U	440 U	450 U	440 U
Di-n-butylphthalate	440 U	440 U	450 U	440 U
Cresol, m & p	440 U	440 U	450 U	440 U
m-Dichlorobenzene	440 U	440 U	450 U	440 U
m-Dinitrobenzene	440 U	440 U	450 U	440 U
3-Nitroaniline	2,300 U	2,300 U	2,300 U	2,300 U
Cresol (ortho)	440 U	440 U	450 U	440 U
o-Dichlorobenzene	440 U	440 U	450 U	440 U
2-Nitroaniline 2,300	U	2,300 U	2,300 U	2,300 U
2-Nitrophenol 440	U	440 U	450 U	440 U
o-Toluidine	440 U	440 U	450 U	440 U
p-Dichlorobenzene	440 U	440 U	450 U	440 U
4-Nitroaniline 2,300	U	2,300 U	2,300 U	2,300 U
4-Nitrophenol	2,300 U	2,300 U	2,300 U	2,300 U
1,4-Phenylenediamine 2,300	U	2,300 U	2,300 U	2,300 U
Total Petroleum Hydrocarbons (mg/kg)				
Diesel Range Organics	6.2	4 J	4.9	4.5
Gasoline Range Organics	0.33 U	0.33 U	0.34 U	0.27 U

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SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03	14E-03
Sample ID	14E-SS01	14E-SS02	14E-SS03	14E-SS03D
Sample Date	05/08/04	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00
Appendix IX Inorganics (mg/kg)				
Silver	1.2 U	1.2 U	0.23 B	0.16 B
Arsenic	1.5	1.6	1.6	1.3 U
Barium	120	56	54	52
Beryllium	0.2 B	0.18 B	0.19 B	0.18 B
Cadmium	2.6	0.58 U	5.2	4.9
Cobalt	13	10	8.6	8.2
Chromium	25	17	23	21
Copper	100 *	28 *	250 *	200 *
Nickel	6.5	6.2	9.6	8.9
Lead	230	17	150	140
Antimony	1.2 BN	2.3 UN	1.4 BN	1.1 BN
Selenium	1.2 U	1.2 U	1.2 U	1.3 U
Tin	3.7 B	3.4 B	4.6 B	4.5 B
Thallium	1.2 U	1.2 U	1.2 U	1.3 U
Vanadium	74	77	65	61
Zinc	130	48	120	120
Mercury	0.042	0.046	0.056	0.053

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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03
Sample ID	14E-SB01-04	14E-SB02-02	14E-SB03-02
Sample Date	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	7.00 - 9.00	3.00 - 5.00	3.00 - 5.00
Volatile Organic Compounds (ug/kg)			
Chloroform	5.8 U	5.8 U	6.1 U
Dichlorodifluoromethane	5.8 U	5.8 U	6.1 U
1,1-Dichloroethane	5.8 U	5.8 U	6.1 U
1,2-Dichloroethane	5.8 U	5.8 U	6.1 U
1,1-Dichloroethene	5.8 U	5.8 U	6.1 U
1,2-Dichloropropane	5.8 U	5.8 U	6.1 U
Ethyl benzene	5.8 U	5.8 U	6.1 U
Acrolein 120	U	120 U	120 U
Methylene chloride	5.8 U	5.8 U	6.1 U
1,1,2,2-Tetrachloroethane	5.8 U	5.8 U	6.1 U
Tetrachloroethene	5.8 U	5.8 U	6.1 U
Toluene	5.8 U	5.8 U	6.1 U
trans-1,2-Dichloroethene	5.8 U	5.8 U	6.1 U
1,1,1-Trichloroethane	5.8 U	5.8 U	6.1 U
1,1,2-Trichloroethane	5.8 U	5.8 U	6.1 U
2-Butanone 29	U	29 U	31 U
Chloroprene	5.8 U	5.8 U	6.1 U
2-Hexanone	29 U	29 U	31 U
Acrylonitrile	120 U	120 U	120 U
3-Chloro-1-propene 5.8	U	5.8 U	6.1 U
Benzene	5.8 U	5.8 U	6.1 U
Bromoform	5.8 U	5.8 U	6.1 U
Carbon tetrachloride	5.8 U	5.8 U	6.1 U
Chlorobenzene	5.8 U	5.8 U	6.1 U
Acetonitrile	230 U	230 U	240 U
1,2-Dibromo-3-chloropropane	12 U	12 U	12 U
Dibromomethane 5.8	U	5.8 U	6.1 U
trans-1,4-Dichloro-2-butene	12 U	12 U	12 U
cis-1,3-Dichloropropene	5.8 U	5.8 U	6.1 U
trans-1,3-Dichloropropene	5.8 U	5.8 U	6.1 U
Ethyl methacrylate	5.8 U	5.8 U	6.1 U
Iodomethane 5.8	U	5.8 U	6.1 U
Methacrylonitrile	120 U	120 U	120 U
Methyl methacrylate	5.8 U	5.8 U	6.1 U
Pentachloroethane	29 U	29 U	31 U
1,1,1,2-Tetrachloroethane	5.8 U	5.8 U	6.1 U
Trichlorofluoromethane	5.8 U	5.8 U	6.1 U
1,2,3-Trichloropropane	5.8 U	5.8 U	6.1 U
Vinyl chloride	5.8 U	5.8 U	6.1 U
Dibromochloromethane	5.8 U	5.8 U	6.1 U
Chloroethane	5.8 U	5.8 U	6.1 U
Acetone	58 U	58 U	61 U
Bromodichloromethane	5.8 U	5.8 U	6.1 U

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SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03
Sample ID	14E-SB01-04	14E-SB02-02	14E-SB03-02
Sample Date	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	7.00 - 9.00	3.00 - 5.00	3.00 - 5.00
Volatile Organic Compounds (ug/kg) (Cont.)			
Bromomethane	5.8 U	5.8 U	6.1 U
Chloromethane 5.8	U	5.8 U	6.1 U
Carbon disulfide	5.8 U	5.8 U	6.1 U
1,2-Dibromoethane 5.8	U	5.8 U	6.1 U
Propionitrile	120 U	120 U	120 U
Isobutanol 230	U	230 U	240 U
4-Methyl-2-pentanone 29	U	29 U	31 U
Styrene	5.8 U	5.8 U	6.1 U
Trichloroethene	5.8 U	5.8 U	6.1 U
Vinyl acetate	12 U	12 U	12 U
Xylene	12 U	12 U	12 U
Semivolatile Organic Compounds (ug/kg)			
Phenol	400 U	400 U	410 U
bis(2-Chloroethoxy)methane	400 U	400 U	410 U
2,4,6-Trichlorophenol	400 U	400 U	410 U
bis(2-Chloroethyl)ether	400 U	400 U	410 U
bis(2-Chloroisopropyl)ether	400 U	400 U	410 U
bis(2-Ethylhexyl)phthalate	400 U	400 U	410 U
4-Bromophenylphenyl ether	400 U	400 U	410 U
Butylbenzylphthalate	400 U	400 U	410 U
2-Chloronaphthalene	400 U	400 U	410 U
4-Chlorophenyl phenyl ether	400 U	400 U	410 U
Chrysene	400 U	400 U	410 U
Dibenzo(a,h)anthracene	400 U	400 U	410 U
2-Chlorophenol	400 U	400 U	410 U
Acenaphthene	400 U	400 U	410 U
3,3'-Dichlorobenzidine	800 U	800 U	820 U
Diethylphthalate	400 U	400 U	410 U
Dimethyl phthalate	400 U	400 U	410 U
2,4-Dinitrotoluene	400 U	400 U	410 U
2,6-Dinitrotoluene	400 U	400 U	410 U
Di-n-octylphthalate	400 U	400 U	410 U
2,4-Dichlorophenol	400 U	400 U	410 U
Acenaphthylene	400 U	400 U	410 U
2-Methylnaphthalene	400 U	400 U	410 U
Fluoranthene	400 U	400 U	410 U
Fluorene	400 U	400 U	410 U
Hexachlorobenzene	400 U	400 U	410 U
Hexachlorobutadiene	400 U	400 U	410 U
Hexachlorocyclopentadiene	400 U	400 U	410 U
Hexachloroethane	400 U	400 U	410 U
Indeno(1,2,3-cd)pyrene	400 U	400 U	410 U

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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03
Sample ID	14E-SB01-04	14E-SB02-02	14E-SB03-02
Sample Date	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	7.00 - 9.00	3.00 - 5.00	3.00 - 5.00
Semivolatile Organic Compounds (ug/kg) (Cont.)			
Isophorone	400 U	400 U	410 U
Naphthalene	400 U	400 U	410 U
2,4-Dimethylphenol	400 U	400 U	410 U
Anthracene	400 U	400 U	410 U
4,6-Dinitro-2-methylphenol 2,100	U	2,000 U	2,100 U
Nitrobenzene	400 U	400 U	410 U
N-Nitrosodimethylamine	400 U	400 U	410 U
N-Nitrosodiphenylamine	400 U	400 U	410 U
Phenanthrene	400 U	400 U	410 U
Pyrene	400 U	400 U	410 U
1,2,4-Trichlorobenzene	400 U	400 U	410 U
4-Nitroquinoline-1-oxide	4,000 U	4,000 U	4,100 U
2,4-Dinitrophenol	2,100 U	2,000 U	2,100 U
Benzo(a)anthracene	400 U	400 U	410 U
Benzo(a)pyrene	400 U	400 U	410 U
2,6-Dichlorophenol	400 U	400 U	410 U
Benzo(b)fluoranthene	400 U	400 U	410 U
4-Aminobiphenyl	400 U	400 U	410 U
p-(Dimethylamino)azobenzene	400 U	400 U	410 U
7,12-Dimethylbenz(a)anthracene	400 U	400 U	410 U
3,3'-Dimethyl benzidine	2,100 U	2,000 U	2,100 U
alpha,alpha-Dimethylphenethylamine	82,000 U	81,000 U	84,000 U
1,4-Dioxane	400 U	400 U	410 U
n-Nitrosodi-n-propylamine	400 U	400 U	410 U
Aniline	400 U	400 U	410 U
Ethylmethanesulfonate	400 U	400 U	410 U
Acetophenone	400 U	400 U	410 U
Aramite	400 U	400 U	410 U
Hexachlorophene	210,000 U	200,000 U	210,000 U
Hexachloropropene	400 U	400 U	410 U
Isosafrole	400 U	400 U	410 U
Methapyrilene	82,000 U	81,000 U	84,000 U
3-Methylcholanthrene	400 U	400 U	410 U
Methyl methanesulfonate	400 U	400 U	410 U
1,4-Naphthoquinone	400 U	400 U	410 U
1-Naphthylamine	400 U	400 U	410 U
2-Naphthylamine	400 U	400 U	410 U
N-Nitrosodi-n-butylamine	400 U	400 U	410 U
N-Nitrosodiethylamine	400 U	400 U	410 U
N-Nitrosomethylethylamine	400 U	400 U	410 U
N-Nitrosomorpholine	400 U	400 U	410 U
N-Nitrosopiperidine	400 U	400 U	410 U
N-Nitrosopyrrolidine	400 U	400 U	410 U

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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03
Sample ID	14E-SB01-04	14E-SB02-02	14E-SB03-02
Sample Date	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	7.00 - 9.00	3.00 - 5.00	3.00 - 5.00
Semivolatile Organic Compounds (ug/kg) (Cont.)			
5-Nitro-o-toluidine	400 U	400 U	410 U
Pentachlorobenzene	400 U	400 U	410 U
Pentachloronitrobenzene	400 U	400 U	410 U
Phenacetin	400 U	400 U	410 U
2-Picoline	400 U	400 U	410 U
Pronamide	400 U	400 U	410 U
Pyridine	400 U	400 U	410 U
Safrole	400 U	400 U	410 U
1,2,4,5-Tetrachlorobenzene	400 U	400 U	410 U
2,3,4,6-Tetrachlorophenol	400 U	400 U	410 U
2,4,5-Trichlorophenol	400 U	400 U	410 U
1,3,5-Trinitrobenzene	400 U	400 U	410 U
2-Acetylaminofluorene	400 U	400 U	410 U
Dinoseb 400	U	400 U	410 U
4-Chloroaniline 800	U	800 U	820 U
4-Chloro-3-methylphenol 400	U	400 U	410 U
Benzo(g,h,i)perylene	400 U	400 U	410 U
Pentachlorophenol	2,100 U	2,000 U	2,100 U
Benzo(k)fluoranthene	400 U	400 U	410 U
Benzyl alcohol	400 U	400 U	410 U
Diallate	400 U	400 U	410 U
Dibenzofuran	400 U	400 U	410 U
Di-n-butylphthalate	400 U	400 U	410 U
Cresol, m & p	400 U	400 U	410 U
m-Dichlorobenzene	400 U	400 U	410 U
m-Dinitrobenzene	400 U	400 U	410 U
3-Nitroaniline	2,100 U	2,000 U	2,100 U
Cresol (ortho)	400 U	400 U	410 U
o-Dichlorobenzene	400 U	400 U	410 U
2-Nitroaniline 2,100	U	2,000 U	2,100 U
2-Nitrophenol 400	U	400 U	410 U
o-Toluidine	400 U	400 U	410 U
p-Dichlorobenzene	400 U	400 U	410 U
4-Nitroaniline 2,100	U	2,000 U	2,100 U
4-Nitrophenol	2,100 U	2,000 U	2,100 U
1,4-Phenylenediamine 2,100	U	2,000 U	2,100 U
Total Petroleum Hydrocarbons (mg/kg)			
Diesel Range Organics	2.6 J	2.2 J	2.6 J
Gasoline Range Organics	0.3 U	0.3 U	0.26 U

APPENDIX A

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - INORGANICS - ECP PHASE II REPORT
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	14E-01	14E-02	14E-03
Sample ID	14E-SB01-04	14E-SB02-02	14E-SB03-02
Sample Date	05/08/04	05/08/04	05/08/04
Sample Depth (ft bgs)	7.00 - 9.00	3.00 - 5.00	3.00 - 5.00
Appendix IX Inorganics (mg/kg)			
Silver	1.1 U	1.1 U	1.2 U
Arsenic	1.1 U	1.1 U	1.2 U
Barium	170	51	40
Beryllium	0.36 B	0.29 B	0.26 B
Cadmium	0.53 U	0.55 U	0.6 U
Cobalt	38	7.3	6.6
Chromium	16	28	19
Copper	26 *	48 *	33 *
Nickel	13	11	6.8
Lead	2.1	1.7	1.9
Antimony	2.1 UN	2.2 UN	2.4 UN
Selenium	2.1 U	1.1 U	1.2 U
Tin	1.7 B	2 B	2.7 B
Thallium	1.1 U	1.1 U	2.4 U
Vanadium	78	140	120
Zinc	61	54	38
Mercury	0.022	0.029	0.033

APPENDIX B
PHASE I RFI ANALYTICAL DATA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB02**	**68SB03**	**68SB04**	**68SB05**	**68SB06**
Sample ID	**68SB01-00**	**68SB02-00**	**68SB03-00**	**68SB04-00**	**68SB05-00**	**68SB06-00**
Sampling Date	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Volatile Organic Compounds (ug/kg)						
1112-Tetrachloroethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
111-Trichloroethane	4.3 UJ	4.6 UJ	4.4 U	4.3 U	4.7 UJ	5.0 U
1122-Tetrachloroethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
112-Trichloroethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
11-Dichloroethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
11-Dichloroethene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
123-Trichloropropane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
12-Dibromo-3-Chloropropane	8.5 U	9.2 U	8.7 U	8.7 U	9.3 U	10 U
12-Dichloroethane	4.3 UJ	4.6 UJ	4.4 U	4.3 U	4.7 UJ	5.0 U
12-Dichloropropane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
2-Chloro-13-butadiene	4.3 U	4.6 U	4.4 UJ	4.3 UJ	4.7 U	5.0 UJ
2-Hexanone	21 U	23 U	22 U	22 UJ	23 U	25 UJ
3-Chloro-1-propene	4.3 U	4.6 U	4.4 UJ	4.3 UJ	4.7 U	5.0 UJ
Acetone	44	170	110	93 J	55	71 J
Acetonitrile	170 U	180 U	170 U	170 U	190 U	200 U
Acrolein	85 UJ	92 UJ	87 UJ	87 UJ	93 UJ	100 UJ
Acrylonitrile	85 U	92 U	87 U	87 U	93 U	100 U
Benzene	4.3 UJ	4.6 UJ	4.4 U	1.0 J	4.7 UJ	5.0 U
Bromoform	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Bromomethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Carbon disulfide	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Carbon tetrachloride	4.3 UJ	4.6 UJ	4.4 U	4.3 U	4.7 UJ	5.0 U
Chlorobenzene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Chlorodibromomethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Chloroethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Chloroform	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Chloromethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
cis-13-Dichloropropene	4.3 UJ	4.6 UJ	4.4 U	4.3 U	4.7 UJ	5.0 U
Dibromomethane	4.3 UJ	4.6 UJ	4.4 U	4.3 U	4.7 UJ	5.0 U
Dichlorobromomethane	4.3 UJ	4.6 UJ	4.4 U	4.3 UJ	4.7 UJ	5.0 U
Dichlorodifluoromethane	4.3 R	4.6 R	4.4 U	4.3 U	4.7 R	5.0 UJ
Ethyl methacrylate	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Ethylbenzene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Ethylene Dibromide	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Iodomethane	4.3 U	4.6 U	4.4 UJ	4.3 UJ	4.7 U	5.0 UJ
Isobutanol	170 UJ	180 UJ	170 U	170 R	190 UJ	200 R
Methacrylonitrile	85 U	92 U	87 U	87 U	93 U	100 U
Methyl Ethyl Ketone	21 U	12 J	5.2 U	6.2 J	23 U	5.2 J
methyl isobutyl ketone	21 U	23 U	22 UJ	22 U	23 U	25 U
Methyl methacrylate	4.3 U	4.6 U	4.4 U	4.3 UJ	4.7 U	5.0 UJ
Methylene Chloride	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Pentachloroethane	21 UJ	23 UJ	22 UJ	22 UJ	23 UJ	25 UJ
Propionitrile	85 U	92 U	87 U	87 U	93 U	100 U
Styrene	4.3 U	4.6 U	2.8 J	4.3 U	4.7 U	5.0 U
Tetrachloroethene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Toluene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
trans-12-Dichloroethene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
trans-13-Dichloropropene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
trans-14-Dichloro-2-butene	8.5 U	9.2 U	8.7 U	8.7 U	9.3 U	10 U
Trichloroethene	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Trichlorofluoromethane	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Vinyl acetate	8.5 UJ	9.2 UJ	8.7 U	8.7 U	9.3 UJ	10 U
Vinyl chloride	4.3 U	4.6 U	4.4 U	4.3 U	4.7 U	5.0 U
Xylenes Total	8.5 U	9.2 U	8.7 U	8.7 U	9.3 U	10 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB02**	**68SB03**	**68SB04**	**68SB05**	**68SB06**
Sample ID	**68SB01-00**	**68SB02-00**	**68SB03-00**	**68SB04-00**	**68SB05-00**	**68SB06-00**
Sampling Date	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/kg)						
11'-Biphenyl	390 U	380 U	380 U	400 U	410 U	460 U
1245-Tetrachlorobenzene	390 U	380 U	380 U	400 U	410 U	460 U
124-Trichlorobenzene	390 U	380 U	380 U	400 U	410 U	460 U
12-Dichlorobenzene	390 U	380 U	380 U	400 U	410 U	460 U
135-Trinitrobenzene	390 UJ	380 UJ	380 UJ	400 U	410 UJ	460 U
13-Dichlorobenzene	390 U	380 U	380 U	400 U	410 U	460 U
13-Dinitrobenzene	390 U	380 U	380 U	400 U	410 U	460 U
14-Dichlorobenzene	390 U	380 U	380 U	400 U	410 U	460 U
14-Dioxane	390 U	380 U	380 U	400 U	410 U	460 UJ
14-Naphthoquinone	390 U	380 U	380 U	400 U	410 U	460 U
1-Naphthylamine	390 U	380 U	380 U	400 U	410 U	460 U
2346-Tetrachlorophenol	390 U	380 U	380 U	400 U	410 U	460 U
245-Trichlorophenol	390 U	380 U	380 U	400 U	410 U	460 U
246-Trichlorophenol	390 U	380 U	380 U	400 U	410 U	460 U
24-Dichlorophenol	390 U	380 U	380 U	400 U	410 U	460 U
24-Dimethylphenol	390 U	380 U	380 U	400 U	410 U	460 U
24-Dinitrophenol	2000 U	2000 U	2000 U	2100 UJ	2100 U	2300 UJ
24-Dinitrotoluene	390 U	380 U	380 U	400 U	410 U	460 U
26-Dichlorophenol	390 U	380 U	380 U	400 U	410 U	460 U
26-Dinitrotoluene	390 U	380 U	380 U	400 U	410 U	460 U
2-Acetylaminofluorene	390 U	380 U	380 U	400 U	410 U	460 U
2-Chloronaphthalene	390 U	380 U	380 U	400 U	410 U	460 U
2-Chlorophenol	390 U	380 U	380 U	400 U	410 U	460 U
2-Methylphenol	390 U	380 U	380 U	400 U	410 U	460 U
2-Naphthylamine	390 U	380 U	380 U	400 U	410 U	460 U
2-Nitroaniline	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
2-Nitrophenol	390 U	380 U	380 U	400 UJ	410 U	460 U
2-Picoline	390 U	380 U	380 U	400 U	410 U	460 UJ
2-Toluidine	390 U	380 U	380 U	400 U	410 U	460 U
3 & 4 Methylphenol	390 U	380 U	380 U	400 U	410 U	460 U
33'-Dichlorobenzidine	770 U	760 U	770 U	810 U	820 U	910 U
33'-Dimethylbenzidine	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
3-Methylcholanthrene	390 U	380 U	380 U	400 U	410 U	460 U
3-Nitroaniline	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
46-Dinitro-2-methylphenol	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
4-Aminobiphenyl	390 U	380 U	380 U	400 U	410 U	460 U
4-Bromophenyl phenyl ether	390 U	380 U	380 U	400 U	410 U	460 U
4-Chloro-3-methylphenol	390 U	380 U	380 U	400 U	410 U	460 U
4-Chloroaniline	770 U	760 U	770 U	810 U	820 U	910 U
4-Chlorophenyl phenyl ether	390 U	380 U	380 U	400 U	410 U	460 U
4-Nitroaniline	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
4-Nitrophenol	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
4-Nitroquinoline-1-oxide	3900 R	3800 R	3800 R	4000 UJ	4100 R	4600 R
712-Dimethylbenz(a)anthracene	390 U	380 U	380 U	400 U	410 U	460 U
Acetophenone	390 U	380 U	380 U	400 U	410 U	460 U
alphaalpha-Dimethyl phenethylamine	78000 UJ	77000 UJ	78000 UJ	82000 UJ	84000 UJ	92000 UJ
Aniline	770 U	760 U	770 U	810 U	820 U	910 U
Aramite Total	390 U	380 U	380 U	400 UJ	410 U	460 U
Benzyl alcohol	390 U	380 U	380 U	400 U	410 U	460 U
Bis(2-chloroethoxy)methane	390 U	380 U	380 U	400 U	410 U	460 U
Bis(2-chloroethyl)ether	390 U	380 U	380 U	400 U	410 U	460 U
Bis(2-ethylhexyl) phthalate	390 U	380 U	380 U	400 U	410 U	460 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB02**	**68SB03**	**68SB04**	**68SB05**	**68SB06**
Sample ID	**68SB01-00**	**68SB02-00**	**68SB03-00**	**68SB04-00**	**68SB05-00**	**68SB06-00**
Sampling Date	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/kg)						
bis(chloroisopropyl) ether	390 U	380 U	380 U	400 U	410 U	460 U
Butyl benzyl phthalate	390 U	380 U	380 U	400 U	410 U	460 U
Diallate	390 U	380 U	380 U	400 UJ	410 U	460 U
Dibenzofuran	390 U	380 U	380 U	400 U	410 U	460 U
Diethyl phthalate	390 U	380 U	380 U	400 U	410 U	460 U
Dimethoate	390 U	380 U	380 U	400 U	410 U	460 U
Dimethyl phthalate	390 U	380 U	380 U	400 U	410 U	460 U
Di-n-butyl phthalate	390 U	380 U	380 U	400 U	410 U	460 U
Di-n-octyl phthalate	390 U	380 U	380 U	400 U	410 U	460 U
Dinoseb	390 U	380 U	380 U	400 U	410 U	460 U
Disulfoton	390 U	380 U	380 U	400 U	410 U	460 U
Ethyl methanesulfonate	390 U	380 U	380 U	400 UJ	410 U	460 U
Famphur	390 U	380 U	380 U	400 U	410 U	460 U
Hexachlorobenzene	390 U	380 U	380 U	400 U	410 U	460 U
Hexachlorobutadiene	390 U	380 U	380 U	400 U	410 U	460 U
Hexachlorocyclopentadiene	390 U	380 U	380 U	400 U	410 U	460 U
Hexachloroethane	390 U	380 U	380 U	400 U	410 U	460 U
Hexachlorophene	200000 UJ	200000 UJ	200000 UJ	210000 UJ	210000 UJ	230000 UJ
Hexachloropropene	390 U	380 U	380 U	400 U	410 U	460 UJ
Isophorone	390 U	380 U	380 U	400 U	410 U	460 U
Isosafrole	390 U	380 U	380 U	400 U	410 U	460 U
Methapyrilene	78000 UJ	77000 UJ	78000 UJ	82000 UJ	84000 UJ	92000 U
Methyl methanesulfonate	390 U	380 U	380 U	400 U	410 U	460 U
Methyl parathion	390 U	380 U	380 U	400 U	410 U	460 U
Nitrobenzene	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitro-o-toluidine	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitrosodiethylamine	390 U	380 U	380 U	400 UJ	410 U	460 UJ
N-Nitrosodimethylamine	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitrosodi-n-butylamine	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitrosodi-n-propylamine	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitrosodiphenylamine	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitrosomethylethylamine	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitrosomorpholine	390 U	380 U	380 U	400 UJ	410 U	460 U
N-Nitrosopiperidine	390 U	380 U	380 U	400 U	410 U	460 U
N-Nitrosopyrrolidine	390 U	380 U	380 U	400 U	410 U	460 U
oo'o"-Triethylphosphorothioate	390 U	380 U	380 U	400 U	410 U	460 U
Parathion	390 U	380 U	380 U	400 U	410 U	460 U
p-Dimethylamino azobenzene	390 U	380 U	380 U	400 U	410 U	460 U
Pentachlorobenzene	390 U	380 U	380 U	400 U	410 U	460 U
Pentachloronitrobenzene	390 U	380 U	380 U	400 U	410 U	460 U
Pentachlorophenol	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
Phenacetin	390 U	380 U	380 U	400 U	410 U	460 U
Phenol	390 U	380 U	380 U	400 U	410 U	460 U
Phorate	390 UJ	380 UJ	380 UJ	400 U	410 UJ	460 U
p-Phenylene diamine	2000 U	2000 U	2000 U	2100 U	2100 U	2300 U
Pronamide	390 U	380 U	380 U	400 U	410 U	460 U
Pyridine	390 U	380 U	380 U	400 U	410 U	460 U
Safrole Total	390 U	380 U	380 U	400 U	410 U	460 U
Sulfotepp	390 U	380 U	380 U	400 U	410 U	460 U
Thionazin	390 U	380 U	380 U	400 U	410 U	460 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB02**	**68SB03**	**68SB04**	**68SB05**	**68SB06**
Sample ID	**68SB01-00**	**68SB02-00**	**68SB03-00**	**68SB04-00**	**68SB05-00**	**68SB06-00**
Sampling Date	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**	**11/13/06**	**11/14/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Low-Level PAHs (ug/kg)						
1-Methylnaphthalene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
2-Methylnaphthalene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Acenaphthene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Acenaphthylene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Anthracene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Benzo[a]anthracene	7.8 U	1.8 J	7.8 U	8.2 U	8.3 U	9.2 U
Benzo[a]pyrene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Benzo[b]fluoranthene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Benzo[ghi]perylene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Benzo[k]fluoranthene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Chrysene	7.8 U	2.3 J	7.8 U	8.2 U	8.3 U	9.2 U
Dibenz(ah)anthracene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Fluoranthene	7.8 U	1.9 J	7.8 U	8.2 U	8.3 U	9.2 U
Fluorene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Indeno[123-cd]pyrene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Naphthalene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Phenanthrene	7.8 U	7.7 U	7.8 U	8.2 U	8.3 U	9.2 U
Pyrene	7.8 U	2.3 J	7.8 U	8.2 U	8.3 U	9.2 U
PCBs (ug/kg)						
Aroclor 1016	39 U	38 U	39 U	40 U	41 U	46 U
Aroclor 1221	79 U	77 U	78 U	81 U	84 U	92 U
Aroclor 1232	39 U	38 U	39 U	40 U	41 U	46 U
Aroclor 1242	39 U	38 U	39 U	40 U	41 U	46 U
Aroclor 1248	39 U	38 U	39 U	40 U	41 U	46 U
Aroclor 1254	39 U	38 U	39 U	40 U	41 U	46 U
Aroclor 1260	39 U	38 U	39 U	40 U	41 U	46 U
Total Petroleum Hydrocarbons (mg/kg)						
Diesel Range Organics	3.9 U	3.8 U	3.9 U	4.0 U	4.1 U	4.6 U
Gasoline Range Organics	0.22 U	0.096 J	0.16 J	0.088 J	0.21 U	0.24 U
Metals (mg/kg)						
Antimony	4.2 UJ	4.1 UJ	4.5 UJ	4.5 UJ	4.7 UJ	0.90 J
Arsenic	1.4 J	3.4	1.2 J	1.7 J	1.3 J	0.92 J
Barium	76	260	78	100 J	87	72 J
Beryllium	0.27 J	0.30 J	0.28 J	0.28 J	0.28 J	0.27 J
Cadmium	1.0 U	0.19 J	0.047 J	0.13 J	1.2 U	0.61 J
Chromium	16 J	21 J	15 J	22	40 J	24
Cobalt	15	47	11	25 J	15	10 J
Copper	28 J	26 J	28 J	35 J	50 J	64 J
Lead	2.1 J	7.0 J	1.8 J	2.5	1.7 J	4.2
Nickel	7.8 J	7.5 J	7.5 J	12	16 J	10
Selenium	0.38 J	0.66 J	0.23 J	0.41 J	2.4 U	0.42 J
Silver	2.1 U	2.0 U	2.2 U	2.2 U	2.4 U	2.5 U
Thallium	2.1 U	0.18 J	2.2 U	2.2 U	2.4 U	2.5 U
Tin	10 UJ	10 UJ	11 UJ	11 UJ	12 UJ	12 UJ
Vanadium	100	130	91	130	170	94
Zinc	35 J	34 J	39 J	42 J	61 J	55 J
Mercury -7471A	0.016 J	0.060	0.033	0.034 J	0.020 J	0.031 J
Cyanide Total - 9012A	0.58 U	0.56 U	0.57 U	0.60 U	0.60 U	0.68 U
Sulfide - 9034	29 U	29 U	29 U	30 U	36	35 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB07**	**68SB08**	**68SB09**	**68SB10**	**68SB10**
Sample ID	**68SB07-00**	**68SB08-00**	**68SB09-00**	**68SB10-00**	**68SB10-00D**
Sampling Date	**11/15/06**	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Volatile Organic Compounds (ug/kg)					
1112-Tetrachloroethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
111-Trichloroethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
1122-Tetrachloroethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
112-Trichloroethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
11-Dichloroethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
11-Dichloroethene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
123-Trichloropropane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
12-Dibromo-3-Chloropropane	9.7 U	12 UJ	9.6 UJ	11 U	11 U
12-Dichloroethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
12-Dichloropropane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
2-Chloro-13-butadiene	4.9 UJ	5.8 U	4.8 U	5.3 UJ	5.5 UJ
2-Hexanone	24 UJ	29 UJ	24 UJ	27 UJ	28 UJ
3-Chloro-1-propene	4.9 UJ	5.8 UJ	4.8 UJ	5.3 UJ	5.5 UJ
Acetone	80 J	170	51	150 J	180 J
Acetonitrile	190 U	230 U	190 U	210 U	220 U
Acrolein	97 UJ	120 UJ	96 UJ	110 UJ	110 UJ
Acrylonitrile	97 U	120 U	96 U	110 U	110 U
Benzene	4.9 U	1.2 J	1.1 J	1.2 J	1.1 J
Bromoform	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Bromomethane	4.9 U	5.8 UJ	4.8 UJ	5.3 U	5.5 U
Carbon disulfide	4.9 U	5.8 UJ	4.8 UJ	5.3 U	5.5 U
Carbon tetrachloride	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Chlorobenzene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Chlorodibromomethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Chloroethane	4.9 U	5.8 UJ	4.8 UJ	5.3 U	5.5 U
Chloroform	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Chloromethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
cis-13-Dichloropropene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Dibromomethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Dichlorobromomethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Dichlorodifluoromethane	4.9 UJ	5.8 U	4.8 U	5.3 UJ	5.5 UJ
Ethyl methacrylate	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Ethylbenzene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Ethylene Dibromide	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Iodomethane	1.9 J	5.8 UJ	4.8 UJ	5.3 UJ	5.5 UJ
Isobutanol	190 R	230 R	190 R	210 R	220 R
Methacrylonitrile	97 U	120 U	96 U	110 U	110 U
Methyl Ethyl Ketone	7.8 J	9.9 J	24 U	7.2 J	10 J
methyl isobutyl ketone	24 U	29 UJ	24 UJ	27 U	28 U
Methyl methacrylate	4.9 UJ	5.8 U	4.8 U	5.3 UJ	5.5 UJ
Methylene Chloride	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Pentachloroethane	24 UJ	29 UJ	24 UJ	27 UJ	28 UJ
Propionitrile	97 U	120 U	96 U	110 U	110 U
Styrene	4.9 U	5.8 U	4.8 U	5.3 UJ	5.5 U
Tetrachloroethene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Toluene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
trans-12-Dichloroethene	4.9 U	5.8 UJ	4.8 UJ	5.3 U	5.5 U
trans-13-Dichloropropene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
trans-14-Dichloro-2-butene	9.7 U	12 U	9.6 U	11 U	11 U
Trichloroethene	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Trichlorofluoromethane	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Vinyl acetate	9.7 U	12 U	9.6 U	11 U	11 U
Vinyl chloride	4.9 U	5.8 U	4.8 U	5.3 U	5.5 U
Xylenes Total	9.7 U	12 U	9.6 U	11 U	11 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB07**	**68SB08**	**68SB09**	**68SB10**	**68SB10**
Sample ID	**68SB07-00**	**68SB08-00**	**68SB09-00**	**68SB10-00**	**68SB10-00D**
Sampling Date	**11/15/06**	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/k					
11'-Biphenyl	390 U	480 U	410 U	470 U	530 U
1245-Tetrachlorobenzene	390 U	480 U	410 U	470 U	530 U
124-Trichlorobenzene	390 U	480 U	410 U	470 U	530 U
12-Dichlorobenzene	390 U	480 U	410 U	470 U	530 U
135-Trinitrobenzene	390 U	480 U	410 U	470 U	530 U
13-Dichlorobenzene	390 U	480 U	410 U	470 U	530 U
13-Dinitrobenzene	390 U	480 U	410 U	470 U	530 U
14-Dichlorobenzene	390 U	480 U	410 U	470 U	530 U
14-Dioxane	390 U	480 U	410 U	470 U	530 U
14-Naphthoquinone	390 U	480 U	410 U	470 U	530 U
1-Naphthylamine	390 U	480 U	410 U	470 U	530 U
2346-Tetrachlorophenol	390 U	480 U	410 U	470 U	530 U
245-Trichlorophenol	390 U	480 U	410 U	470 U	530 U
246-Trichlorophenol	390 U	480 U	410 U	470 U	530 U
24-Dichlorophenol	390 U	480 U	410 U	470 U	530 U
24-Dimethylphenol	390 U	480 U	410 U	470 U	530 U
24-Dinitrophenol	2000 U	2500 UJ	2100 UJ	2400 U	2700 U
24-Dinitrotoluene	390 U	480 U	410 U	470 U	530 U
26-Dichlorophenol	390 U	480 U	410 U	470 U	530 U
26-Dinitrotoluene	390 U	480 U	410 U	470 U	530 U
2-Acetylaminofluorene	390 U	480 U	410 U	470 U	530 U
2-Chloronaphthalene	390 U	480 U	410 U	470 U	530 U
2-Chlorophenol	390 U	480 U	410 U	470 U	530 U
2-Methylphenol	390 U	480 U	410 U	470 U	530 U
2-Naphthylamine	390 U	480 U	410 U	470 U	530 U
2-Nitroaniline	2000 U	2500 U	2100 U	2400 U	2700 U
2-Nitrophenol	390 U	480 U	410 U	470 U	530 U
2-Picoline	390 UJ	480 UJ	410 UJ	470 UJ	530 UJ
2-Toluidine	390 U	480 U	410 U	470 U	530 U
3 & 4 Methylphenol	390 U	480 U	410 U	470 U	530 U
33'-Dichlorobenzidine	790 U	950 U	810 U	930 U	1100 U
33'-Dimethylbenzidine	2000 U	2500 U	2100 U	2400 U	2700 U
3-Methylcholanthrene	390 U	480 U	410 U	470 U	530 U
3-Nitroaniline	2000 U	2500 U	2100 U	2400 U	2700 U
46-Dinitro-2-methylphenol	2000 U	2500 U	2100 U	2400 U	2700 U
4-Aminobiphenyl	390 U	480 U	410 U	470 U	530 U
4-Bromophenyl phenyl ether	390 U	480 U	410 U	470 U	530 U
4-Chloro-3-methylphenol	390 U	480 U	410 U	470 U	530 U
4-Chloroaniline	790 U	950 U	810 U	930 U	1100 U
4-Chlorophenyl phenyl ether	390 U	480 U	410 U	470 U	530 U
4-Nitroaniline	2000 U	2500 U	2100 U	2400 U	2700 U
4-Nitrophenol	2000 U	2500 U	2100 U	2400 U	2700 U
4-Nitroquinoline-1-oxide	3900 U	4800 UJ	4100 UJ	4700 U	5300 U
712-Dimethylbenz(a)anthracene	390 U	480 U	410 U	470 U	530 U
Acetophenone	390 U	480 U	410 U	470 U	530 U
alphaalpha-Dimethyl phenethylamine	80000 U	97000 UJ	83000 UJ	95000 U	110000 U
Aniline	790 U	950 U	810 U	930 U	1100 U
Aramite Total	390 U	480 UJ	410 UJ	470 U	530 U
Benzyl alcohol	390 U	480 U	410 U	470 U	530 U
Bis(2-chloroethoxy)methane	390 U	480 U	410 U	470 U	530 U
Bis(2-chloroethyl)ether	390 U	480 U	410 U	470 U	530 U
Bis(2-ethylhexyl) phthalate	390 U	480 U	410 U	470 U	530 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB07**	**68SB08**	**68SB09**	**68SB10**	**68SB10**
Sample ID	**68SB07-00**	**68SB08-00**	**68SB09-00**	**68SB10-00**	**68SB10-00D**
Sampling Date	**11/15/06**	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/k					
bis(chloroisopropyl) ether	390 U	480 U	410 U	470 U	530 U
Butyl benzyl phthalate	390 U	480 U	410 U	470 U	530 U
Diallate	390 UJ	480 UJ	410 UJ	470 UJ	530 UJ
Dibenzofuran	390 U	480 U	410 U	470 U	530 U
Diethyl phthalate	390 U	480 U	410 U	470 U	530 U
Dimethoate	390 U	480 U	410 U	470 U	530 U
Dimethyl phthalate	390 U	480 U	410 U	470 U	530 U
Di-n-butyl phthalate	390 U	480 U	410 U	470 U	530 U
Di-n-octyl phthalate	390 U	480 U	410 U	470 U	530 U
Dinoseb	390 U	480 U	410 U	470 U	530 U
Disulfoton	390 U	480 U	410 U	470 U	530 U
Ethyl methanesulfonate	390 U	480 UJ	410 UJ	470 U	530 U
Famphur	390 U	480 U	410 U	470 U	530 U
Hexachlorobenzene	390 U	480 U	410 U	470 U	530 U
Hexachlorobutadiene	390 U	480 U	410 U	470 U	530 U
Hexachlorocyclopentadiene	390 U	480 U	410 U	470 U	530 U
Hexachloroethane	390 U	480 U	410 U	470 U	530 U
Hexachlorophene	200000 U	250000 UJ	210000 UJ	240000 U	270000 U
Hexachloropropene	390 U	480 U	410 U	470 U	530 U
Isophorone	390 U	480 U	410 U	470 U	530 U
Isosafrole	390 U	480 U	410 U	470 U	530 U
Methapyrilene	80000 U	97000 UJ	83000 UJ	95000 U	110000 U
Methyl methanesulfonate	390 U	480 U	410 U	470 U	530 U
Methyl parathion	390 U	480 U	410 U	470 U	530 U
Nitrobenzene	390 U	480 U	410 U	470 U	530 U
N-Nitro-o-toluidine	390 U	480 U	410 U	470 U	530 U
N-Nitrosodiethylamine	390 U	480 UJ	410 UJ	470 U	530 U
N-Nitrosodimethylamine	390 U	480 U	410 U	470 U	530 U
N-Nitrosodi-n-butylamine	390 U	480 U	410 U	470 U	530 U
N-Nitrosodi-n-propylamine	390 U	480 U	410 U	470 U	530 U
N-Nitrosodiphenylamine	390 U	480 U	410 U	470 U	530 U
N-Nitrosomethylethylamine	390 U	480 U	410 U	470 U	530 U
N-Nitrosomorpholine	390 U	480 UJ	410 UJ	470 U	530 U
N-Nitrosopiperidine	390 U	480 U	410 U	470 U	530 U
N-Nitrosopyrrolidine	390 U	480 U	410 U	470 U	530 U
oo'o"-Triethylphosphorothioate	390 U	480 U	410 U	470 U	530 U
Parathion	390 U	480 U	410 U	470 U	530 U
p-Dimethylamino azobenzene	390 U	480 U	410 U	470 U	530 U
Pentachlorobenzene	390 U	480 U	410 U	470 U	530 U
Pentachloronitrobenzene	390 U	480 U	410 U	470 U	530 U
Pentachlorophenol	2000 U	2500 U	2100 U	2400 U	2700 U
Phenacetin	390 U	480 U	410 U	470 U	530 U
Phenol	390 U	480 U	410 U	470 U	530 U
Phorate	390 U	480 U	410 U	470 U	530 U
p-Phenylene diamine	2000 U	2500 U	2100 U	2400 U	2700 U
Pronamide	390 U	480 U	410 U	470 U	530 U
Pyridine	390 U	480 U	410 U	470 U	530 U
Safrole Total	390 U	480 U	410 U	470 U	530 U
Sulfotepp	390 U	480 U	410 U	470 U	530 U
Thionazin	390 U	480 U	410 U	470 U	530 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB07**	**68SB08**	**68SB09**	**68SB10**	**68SB10**
Sample ID	**68SB07-00**	**68SB08-00**	**68SB09-00**	**68SB10-00**	**68SB10-00D**
Sampling Date	**11/15/06**	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Low-Level PAHs (ug/kg)					
1-Methylnaphthalene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
2-Methylnaphthalene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Acenaphthene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Acenaphthylene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Anthracene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Benzo[a]anthracene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Benzo[a]pyrene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Benzo[b]fluoranthene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Benzo[ghi]perylene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Benzo[k]fluoranthene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Chrysene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Dibenz(ah)anthracene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Fluoranthene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Fluorene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Indeno[123-cd]pyrene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Naphthalene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Phenanthrene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
Pyrene	8.0 U	9.7 U	8.3 U	9.5 U	11 U
PCBs (ug/kg)					
Aroclor 1016	40 U	48 U	40 U	46 U	53 U
Aroclor 1221	80 U	97 U	82 U	94 U	110 U
Aroclor 1232	40 U	48 U	40 U	46 U	53 U
Aroclor 1242	40 U	48 U	40 U	46 U	53 U
Aroclor 1248	40 U	48 U	40 U	46 U	53 U
Aroclor 1254	40 U	48 U	40 U	46 U	53 U
Aroclor 1260	40 U	48 U	40 U	46 U	53 U
Total Petroleum Hydrocarbons (mg/kg)					
Diesel Range Organics	4.0 U	4.8 U	4.1 U	4.6 U	5.3 U
Gasoline Range Organics	0.25 U	0.11 J	0.24 U	0.12 J	0.12 J
Metals (mg/kg)					
Antimony	4.5 UJ	5.3 UJ	4.4 UJ	5.2 UJ	5.9 UJ
Arsenic	1.4 J	2.3 J	1.3 J	1.9 J	2.4 J
Barium	110 J	61 J	69 J	53 J	59 J
Beryllium	0.33 J	0.14 J	0.35 J	0.21 J	0.26 J
Cadmium	0.073 J	0.27 J	0.056 J	0.39 J	0.57 J
Chromium	37	18	37	20	22
Cobalt	31 J	13 J	18 J	12 J	13 J
Copper	57 J	29 J	42 J	28 J	30 J
Lead	2.1	53	2.1	5.1	5.3
Nickel	19	11 U	11	10 U	12 U
Selenium	0.31 J	0.56 J	0.35 J	0.73 J	0.79 J
Silver	2.2 U	2.7 U	2.2 U	2.6 U	2.9 U
Thallium	2.2 U	2.7 U	2.2 U	2.6 U	2.9 U
Tin	11 UJ	13 UJ	11 UJ	13 UJ	15 UJ
Vanadium	160	81	130	85	94
Zinc	50 J	51 J	45 J	42 J	44 J
Mercury -7471A	0.022 J	0.050 J	0.030 J	0.049 J	0.052 J
Cyanide Total - 9012A	0.58 U	0.71 U	0.59 U	0.71 U	0.78 U
Sulfide - 9034	30 U	36 U	31 U	36 U	40 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS01**	**68SS01**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sample ID	**68SS01**	**68SS01D**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sampling Date	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Volatile Organic Compounds (ug/kg)							
1112-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA
111-Trichloroethane	NA	NA	NA	NA	NA	NA	NA
1122-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA
112-Trichloroethane	NA	NA	NA	NA	NA	NA	NA
11-Dichloroethane	NA	NA	NA	NA	NA	NA	NA
11-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
123-Trichloropropane	NA	NA	NA	NA	NA	NA	NA
12-Dibromo-3-Chloropropane	NA	NA	NA	NA	NA	NA	NA
12-Dichloroethane	NA	NA	NA	NA	NA	NA	NA
12-Dichloropropane	NA	NA	NA	NA	NA	NA	NA
2-Chloro-13-butadiene	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA
3-Chloro-1-propene	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Acetonitrile	NA	NA	NA	NA	NA	NA	NA
Acrolein	NA	NA	NA	NA	NA	NA	NA
Acrylonitrile	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA
cis-13-Dichloropropene	NA	NA	NA	NA	NA	NA	NA
Dibromomethane	NA	NA	NA	NA	NA	NA	NA
Dichlorobromomethane	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	NA	NA	NA	NA	NA	NA	NA
Ethyl methacrylate	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Ethylene Dibromide	NA	NA	NA	NA	NA	NA	NA
Iodomethane	NA	NA	NA	NA	NA	NA	NA
Isobutanol	NA	NA	NA	NA	NA	NA	NA
Methacrylonitrile	NA	NA	NA	NA	NA	NA	NA
Methyl Ethyl Ketone	NA	NA	NA	NA	NA	NA	NA
methyl isobutyl ketone	NA	NA	NA	NA	NA	NA	NA
Methyl methacrylate	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA	NA	NA
Pentachloroethane	NA	NA	NA	NA	NA	NA	NA
Propionitrile	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA
trans-12-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
trans-13-Dichloropropene	NA	NA	NA	NA	NA	NA	NA
trans-14-Dichloro-2-butene	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	NA	NA	NA	NA	NA	NA	NA
Vinyl acetate	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA
Xylenes Total	NA	NA	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS01**	**68SS01**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sample ID	**68SS01**	**68SS01D**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sampling Date	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/k							
11'-Biphenyl	NA	NA	NA	NA	NA	NA	NA
1245-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA
124-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA
12-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
135-Trinitrobenzene	NA	NA	NA	NA	NA	NA	NA
13-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
13-Dinitrobenzene	NA	NA	NA	NA	NA	NA	NA
14-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
14-Dioxane	NA	NA	NA	NA	NA	NA	NA
14-Naphthoquinone	NA	NA	NA	NA	NA	NA	NA
1-Naphthylamine	NA	NA	NA	NA	NA	NA	NA
2346-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA
245-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA
246-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA
24-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA
24-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA
24-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA
24-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
26-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA
26-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
2-Acetylaminofluorene	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA
2-Naphthylamine	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA
2-Picoline	NA	NA	NA	NA	NA	NA	NA
2-Toluidine	NA	NA	NA	NA	NA	NA	NA
3 & 4 Methylphenol	NA	NA	NA	NA	NA	NA	NA
33'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA
33'-Dimethylbenzidine	NA	NA	NA	NA	NA	NA	NA
3-Methylcholanthrene	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
46-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Aminobiphenyl	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl phenyl ether	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA
4-Nitroquinoline-1-oxide	NA	NA	NA	NA	NA	NA	NA
712-Dimethylbenz(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA
alphaalpha-Dimethyl phenethylamine	NA	NA	NA	NA	NA	NA	NA
Aniline	NA	NA	NA	NA	NA	NA	NA
Aramite Total	NA	NA	NA	NA	NA	NA	NA
Benzyl alcohol	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS01**	**68SS01**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sample ID	**68SS01**	**68SS01D**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sampling Date	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/kg							
bis(chloroisopropyl) ether	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	NA	NA	NA	NA	NA	NA	NA
Diallate	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Diethyl phthalate	NA	NA	NA	NA	NA	NA	NA
Dimethoate	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	NA	NA	NA	NA	NA	NA	NA
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA
Dinoseb	NA	NA	NA	NA	NA	NA	NA
Disulfoton	NA	NA	NA	NA	NA	NA	NA
Ethyl methanesulfonate	NA	NA	NA	NA	NA	NA	NA
Famphur	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA
Hexachlorophene	NA	NA	NA	NA	NA	NA	NA
Hexachloropropene	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA
Isosafrole	NA	NA	NA	NA	NA	NA	NA
Methapyrilene	NA	NA	NA	NA	NA	NA	NA
Methyl methanesulfonate	NA	NA	NA	NA	NA	NA	NA
Methyl parathion	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA
N-Nitro-o-toluidine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiethylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodimethylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodi-n-butylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosomethylethylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosomorpholine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosopiperidine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosopyrrolidine	NA	NA	NA	NA	NA	NA	NA
oo'o"-Triethylphosphorothioate	NA	NA	NA	NA	NA	NA	NA
Parathion	NA	NA	NA	NA	NA	NA	NA
p-Dimethylamino azobenzene	NA	NA	NA	NA	NA	NA	NA
Pentachlorobenzene	NA	NA	NA	NA	NA	NA	NA
Pentachloronitrobenzene	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA
Phenacetin	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA
Phorate	NA	NA	NA	NA	NA	NA	NA
p-Phenylene diamine	NA	NA	NA	NA	NA	NA	NA
Pronamide	NA	NA	NA	NA	NA	NA	NA
Pyridine	NA	NA	NA	NA	NA	NA	NA
Safrole Total	NA	NA	NA	NA	NA	NA	NA
Sulfotepp	NA	NA	NA	NA	NA	NA	NA
Thionazin	NA	NA	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS01**	**68SS01**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sample ID	**68SS01**	**68SS01D**	**68SS02**	**68SS03**	**68SS04**	**68SS05**	**68SS06**
Sampling Date	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**09/27/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Low-Level PAHs (ug/kg)							
1-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo[a]anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo[a]pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo[b]fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo[ghi]perylene	NA	NA	NA	NA	NA	NA	NA
Benzo[k]fluoranthene	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA
Dibenz(ah)anthracene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Indeno[123-cd]pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
PCBs (ug/kg)							
Aroclor 1016	NA	NA	NA	NA	NA	NA	NA
Aroclor 1221	NA	NA	NA	NA	NA	NA	NA
Aroclor 1232	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (mg/kg)							
Diesel Range Organics	NA	NA	NA	NA	NA	NA	NA
Gasoline Range Organics	NA	NA	NA	NA	NA	NA	NA
Metals (mg/kg)							
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.87 J	1 J	0.86 J	1.2 U	0.82 J	1.9	NA
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	55
Lead	NA	NA	NA	NA	NA	NA	21
Nickel	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Tin	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	47J
Mercury -7471A	NA	NA	NA	NA	NA	NA	NA
Cyanide Total - 9012A	NA	NA	NA	NA	NA	NA	NA
Sulfide - 9034	NA	NA	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS07**	**68SS08**	**68SS09**	**68SS09**	**68SS10**
Sample ID	**68SS07**	**68SS08**	**68SS09**	**68SS09D**	**68SS10**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Volatile Organic Compounds (ug/kg)					
1112-Tetrachloroethane	NA	NA	NA	NA	NA
111-Trichloroethane	NA	NA	NA	NA	NA
1122-Tetrachloroethane	NA	NA	NA	NA	NA
112-Trichloroethane	NA	NA	NA	NA	NA
11-Dichloroethane	NA	NA	NA	NA	NA
11-Dichloroethene	NA	NA	NA	NA	NA
123-Trichloropropane	NA	NA	NA	NA	NA
12-Dibromo-3-Chloropropane	NA	NA	NA	NA	NA
12-Dichloroethane	NA	NA	NA	NA	NA
12-Dichloropropane	NA	NA	NA	NA	NA
2-Chloro-13-butadiene	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA
3-Chloro-1-propene	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA
Acetonitrile	NA	NA	NA	NA	NA
Acrolein	NA	NA	NA	NA	NA
Acrylonitrile	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA
Chlorodibromomethane	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA
cis-13-Dichloropropene	NA	NA	NA	NA	NA
Dibromomethane	NA	NA	NA	NA	NA
Dichlorobromomethane	NA	NA	NA	NA	NA
Dichlorodifluoromethane	NA	NA	NA	NA	NA
Ethyl methacrylate	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA
Ethylene Dibromide	NA	NA	NA	NA	NA
Iodomethane	NA	NA	NA	NA	NA
Isobutanol	NA	NA	NA	NA	NA
Methacrylonitrile	NA	NA	NA	NA	NA
Methyl Ethyl Ketone	NA	NA	NA	NA	NA
methyl isobutyl ketone	NA	NA	NA	NA	NA
Methyl methacrylate	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA
Pentachloroethane	NA	NA	NA	NA	NA
Propionitrile	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA
trans-12-Dichloroethene	NA	NA	NA	NA	NA
trans-13-Dichloropropene	NA	NA	NA	NA	NA
trans-14-Dichloro-2-butene	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA
Trichlorofluoromethane	NA	NA	NA	NA	NA
Vinyl acetate	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA
Xylenes Total	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS07**	**68SS08**	**68SS09**	**68SS09**	**68SS10**
Sample ID	**68SS07**	**68SS08**	**68SS09**	**68SS09D**	**68SS10**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/kg					
11'-Biphenyl	NA	NA	NA	NA	NA
1245-Tetrachlorobenzene	NA	NA	NA	NA	NA
124-Trichlorobenzene	NA	NA	NA	NA	NA
12-Dichlorobenzene	NA	NA	NA	NA	NA
135-Trinitrobenzene	NA	NA	NA	NA	NA
13-Dichlorobenzene	NA	NA	NA	NA	NA
13-Dinitrobenzene	NA	NA	NA	NA	NA
14-Dichlorobenzene	NA	NA	NA	NA	NA
14-Dioxane	NA	NA	NA	NA	NA
14-Naphthoquinone	NA	NA	NA	NA	NA
1-Naphthylamine	NA	NA	NA	NA	NA
2346-Tetrachlorophenol	NA	NA	NA	NA	NA
245-Trichlorophenol	NA	NA	NA	NA	NA
246-Trichlorophenol	NA	NA	NA	NA	NA
24-Dichlorophenol	NA	NA	NA	NA	NA
24-Dimethylphenol	NA	NA	NA	NA	NA
24-Dinitrophenol	NA	NA	NA	NA	NA
24-Dinitrotoluene	NA	NA	NA	NA	NA
26-Dichlorophenol	NA	NA	NA	NA	NA
26-Dinitrotoluene	NA	NA	NA	NA	NA
2-Acetylaminofluorene	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA
2-Naphthylamine	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA
2-Picoline	NA	NA	NA	NA	NA
2-Toluidine	NA	NA	NA	NA	NA
3 & 4 Methylphenol	NA	NA	NA	NA	NA
33'-Dichlorobenzidine	NA	NA	NA	NA	NA
33'-Dimethylbenzidine	NA	NA	NA	NA	NA
3-Methylcholanthrene	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA
46-Dinitro-2-methylphenol	NA	NA	NA	NA	NA
4-Aminobiphenyl	NA	NA	NA	NA	NA
4-Bromophenyl phenyl ether	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA
4-Nitroquinoline-1-oxide	NA	NA	NA	NA	NA
712-Dimethylbenz(a)anthracene	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA
alphaalpha-Dimethyl phenethylamine	NA	NA	NA	NA	NA
Aniline	NA	NA	NA	NA	NA
Aramite Total	NA	NA	NA	NA	NA
Benzyl alcohol	NA	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	NA
Bis(2-chloroethyl)ether	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS07**	**68SS08**	**68SS09**	**68SS09**	**68SS10**
Sample ID	**68SS07**	**68SS08**	**68SS09**	**68SS09D**	**68SS10**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/k					
bis(chloroisopropyl) ether	NA	NA	NA	NA	NA
Butyl benzyl phthalate	NA	NA	NA	NA	NA
Diallate	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA
Diethyl phthalate	NA	NA	NA	NA	NA
Dimethoate	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA
Di-n-butyl phthalate	NA	NA	NA	NA	NA
Di-n-octyl phthalate	NA	NA	NA	NA	NA
Dinoseb	NA	NA	NA	NA	NA
Disulfoton	NA	NA	NA	NA	NA
Ethyl methanesulfonate	NA	NA	NA	NA	NA
Famphur	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA
Hexachlorophene	NA	NA	NA	NA	NA
Hexachloropropene	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA
Isosafrole	NA	NA	NA	NA	NA
Methapyrilene	NA	NA	NA	NA	NA
Methyl methanesulfonate	NA	NA	NA	NA	NA
Methyl parathion	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA
N-Nitro-o-toluidine	NA	NA	NA	NA	NA
N-Nitrosodiethylamine	NA	NA	NA	NA	NA
N-Nitrosodimethylamine	NA	NA	NA	NA	NA
N-Nitrosodi-n-butylamine	NA	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA
N-Nitrosomethylethylamine	NA	NA	NA	NA	NA
N-Nitrosomorpholine	NA	NA	NA	NA	NA
N-Nitrosopiperidine	NA	NA	NA	NA	NA
N-Nitrosopyrrolidine	NA	NA	NA	NA	NA
oo'o"-Triethylphosphorothioate	NA	NA	NA	NA	NA
Parathion	NA	NA	NA	NA	NA
p-Dimethylamino azobenzene	NA	NA	NA	NA	NA
Pentachlorobenzene	NA	NA	NA	NA	NA
Pentachloronitrobenzene	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA
Phenacetin	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA
Phorate	NA	NA	NA	NA	NA
p-Phenylene diamine	NA	NA	NA	NA	NA
Pronamide	NA	NA	NA	NA	NA
Pyridine	NA	NA	NA	NA	NA
Safrole Total	NA	NA	NA	NA	NA
Sulfotepp	NA	NA	NA	NA	NA
Thionazin	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS07**	**68SS08**	**68SS09**	**68SS09**	**68SS10**
Sample ID	**68SS07**	**68SS08**	**68SS09**	**68SS09D**	**68SS10**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Low-Level PAHs (ug/kg)					
1-Methylnaphthalene	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA
Benzo[a]anthracene	NA	NA	NA	NA	NA
Benzo[a]pyrene	NA	NA	NA	NA	NA
Benzo[b]fluoranthene	NA	NA	NA	NA	NA
Benzo[ghi]perylene	NA	NA	NA	NA	NA
Benzo[k]fluoranthene	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA
Dibenz(ah)anthracene	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA
Indeno[123-cd]pyrene	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA
PCBs (ug/kg)					
Aroclor 1016	NA	NA	NA	NA	NA
Aroclor 1221	NA	NA	NA	NA	NA
Aroclor 1232	NA	NA	NA	NA	NA
Aroclor 1242	NA	NA	NA	NA	NA
Aroclor 1248	NA	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (mg/kg)					
Diesel Range Organics	NA	NA	NA	NA	NA
Gasoline Range Organics	NA	NA	NA	NA	NA
Metals (mg/kg)					
Antimony	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA
Copper	120	40	40	38	69
Lead	110	18	95	85	66
Nickel	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA
Tin	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA
Zinc	92J	47J	77J	54J	79J
Mercury -7471A	NA	NA	NA	NA	NA
Cyanide Total - 9012A	NA	NA	NA	NA	NA
Sulfide - 9034	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sample ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Volatile Organic Compounds (ug/kg)					
1112-Tetrachloroethane	NA	NA	NA	NA	NA
111-Trichloroethane	NA	NA	NA	NA	NA
1122-Tetrachloroethane	NA	NA	NA	NA	NA
112-Trichloroethane	NA	NA	NA	NA	NA
11-Dichloroethane	NA	NA	NA	NA	NA
11-Dichloroethene	NA	NA	NA	NA	NA
123-Trichloropropane	NA	NA	NA	NA	NA
12-Dibromo-3-Chloropropane	NA	NA	NA	NA	NA
12-Dichloroethane	NA	NA	NA	NA	NA
12-Dichloropropane	NA	NA	NA	NA	NA
2-Chloro-13-butadiene	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA
3-Chloro-1-propene	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA
Acetonitrile	NA	NA	NA	NA	NA
Acrolein	NA	NA	NA	NA	NA
Acrylonitrile	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA
Chlorodibromomethane	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA
cis-13-Dichloropropene	NA	NA	NA	NA	NA
Dibromomethane	NA	NA	NA	NA	NA
Dichlorobromomethane	NA	NA	NA	NA	NA
Dichlorodifluoromethane	NA	NA	NA	NA	NA
Ethyl methacrylate	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA
Ethylene Dibromide	NA	NA	NA	NA	NA
Iodomethane	NA	NA	NA	NA	NA
Isobutanol	NA	NA	NA	NA	NA
Methacrylonitrile	NA	NA	NA	NA	NA
Methyl Ethyl Ketone	NA	NA	NA	NA	NA
methyl isobutyl ketone	NA	NA	NA	NA	NA
Methyl methacrylate	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA
Pentachloroethane	NA	NA	NA	NA	NA
Propionitrile	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA
trans-12-Dichloroethene	NA	NA	NA	NA	NA
trans-13-Dichloropropene	NA	NA	NA	NA	NA
trans-14-Dichloro-2-butene	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA
Trichlorofluoromethane	NA	NA	NA	NA	NA
Vinyl acetate	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA
Xylenes Total	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sample ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/k					
11'-Biphenyl	NA	NA	NA	NA	NA
1245-Tetrachlorobenzene	NA	NA	NA	NA	NA
124-Trichlorobenzene	NA	NA	NA	NA	NA
12-Dichlorobenzene	NA	NA	NA	NA	NA
135-Trinitrobenzene	NA	NA	NA	NA	NA
13-Dichlorobenzene	NA	NA	NA	NA	NA
13-Dinitrobenzene	NA	NA	NA	NA	NA
14-Dichlorobenzene	NA	NA	NA	NA	NA
14-Dioxane	NA	NA	NA	NA	NA
14-Naphthoquinone	NA	NA	NA	NA	NA
1-Naphthylamine	NA	NA	NA	NA	NA
2346-Tetrachlorophenol	NA	NA	NA	NA	NA
245-Trichlorophenol	NA	NA	NA	NA	NA
246-Trichlorophenol	NA	NA	NA	NA	NA
24-Dichlorophenol	NA	NA	NA	NA	NA
24-Dimethylphenol	NA	NA	NA	NA	NA
24-Dinitrophenol	NA	NA	NA	NA	NA
24-Dinitrotoluene	NA	NA	NA	NA	NA
26-Dichlorophenol	NA	NA	NA	NA	NA
26-Dinitrotoluene	NA	NA	NA	NA	NA
2-Acetylaminofluorene	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA
2-Naphthylamine	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA
2-Picoline	NA	NA	NA	NA	NA
2-Toluidine	NA	NA	NA	NA	NA
3 & 4 Methylphenol	NA	NA	NA	NA	NA
33'-Dichlorobenzidine	NA	NA	NA	NA	NA
33'-Dimethylbenzidine	NA	NA	NA	NA	NA
3-Methylcholanthrene	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA
46-Dinitro-2-methylphenol	NA	NA	NA	NA	NA
4-Aminobiphenyl	NA	NA	NA	NA	NA
4-Bromophenyl phenyl ether	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA
4-Nitroquinoline-1-oxide	NA	NA	NA	NA	NA
712-Dimethylbenz(a)anthracene	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA
alphaalpha-Dimethyl phenethylamine	NA	NA	NA	NA	NA
Aniline	NA	NA	NA	NA	NA
Aramite Total	NA	NA	NA	NA	NA
Benzyl alcohol	NA	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	NA
Bis(2-chloroethyl)ether	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sample ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Semivolatile Organic Compounds (ug/k					
bis(chloroisopropyl) ether	NA	NA	NA	NA	NA
Butyl benzyl phthalate	NA	NA	NA	NA	NA
Diallate	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA
Diethyl phthalate	NA	NA	NA	NA	NA
Dimethoate	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA
Di-n-butyl phthalate	NA	NA	NA	NA	NA
Di-n-octyl phthalate	NA	NA	NA	NA	NA
Dinoseb	NA	NA	NA	NA	NA
Disulfoton	NA	NA	NA	NA	NA
Ethyl methanesulfonate	NA	NA	NA	NA	NA
Famphur	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA
Hexachlorophene	NA	NA	NA	NA	NA
Hexachloropropene	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA
Isosafrole	NA	NA	NA	NA	NA
Methapyrilene	NA	NA	NA	NA	NA
Methyl methanesulfonate	NA	NA	NA	NA	NA
Methyl parathion	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA
N-Nitro-o-toluidine	NA	NA	NA	NA	NA
N-Nitrosodiethylamine	NA	NA	NA	NA	NA
N-Nitrosodimethylamine	NA	NA	NA	NA	NA
N-Nitrosodi-n-butylamine	NA	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA
N-Nitrosomethylethylamine	NA	NA	NA	NA	NA
N-Nitrosomorpholine	NA	NA	NA	NA	NA
N-Nitrosopiperidine	NA	NA	NA	NA	NA
N-Nitrosopyrrolidine	NA	NA	NA	NA	NA
oo'o"-Triethylphosphorothioate	NA	NA	NA	NA	NA
Parathion	NA	NA	NA	NA	NA
p-Dimethylamino azobenzene	NA	NA	NA	NA	NA
Pentachlorobenzene	NA	NA	NA	NA	NA
Pentachloronitrobenzene	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA
Phenacetin	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA
Phorate	NA	NA	NA	NA	NA
p-Phenylene diamine	NA	NA	NA	NA	NA
Pronamide	NA	NA	NA	NA	NA
Pyridine	NA	NA	NA	NA	NA
Safrole Total	NA	NA	NA	NA	NA
Sulfotepp	NA	NA	NA	NA	NA
Thionazin	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sample ID	**68SS11**	**68SS12**	**68SS13**	**68SS15**	**68SS17**
Sampling Date	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**	**10/24/07**
Sample Depth (ft bgs)	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**	**0.00 - 1.00**
Low-Level PAHs (ug/kg)					
1-Methylnaphthalene	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA
Benzo[a]anthracene	NA	NA	NA	NA	NA
Benzo[a]pyrene	NA	NA	NA	NA	NA
Benzo[b]fluoranthene	NA	NA	NA	NA	NA
Benzo[ghi]perylene	NA	NA	NA	NA	NA
Benzo[k]fluoranthene	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA
Dibenz(ah)anthracene	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA
Indeno[123-cd]pyrene	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA
PCBs (ug/kg)					
Aroclor 1016	NA	NA	NA	NA	NA
Aroclor 1221	NA	NA	NA	NA	NA
Aroclor 1232	NA	NA	NA	NA	NA
Aroclor 1242	NA	NA	NA	NA	NA
Aroclor 1248	NA	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (mg/kg)					
Diesel Range Organics	NA	NA	NA	NA	NA
Gasoline Range Organics	NA	NA	NA	NA	NA
Metals (mg/kg)					
Antimony	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA
Copper	20	29	16	31	28
Lead	6.7	12	8.2	31	7.9
Nickel	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA
Tin	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA
Zinc	35J	48J	34J	57J	52J
Mercury -7471A	NA	NA	NA	NA	NA
Cyanide Total - 9012A	NA	NA	NA	NA	NA
Sulfide - 9034	NA	NA	NA	NA	NA

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB01**	**68SB02**	**68SB02**	**68SB03**	**68SB03**
Sample ID	**68SB01-01**	**68SB01-02**	**68SB02-01**	**68SB02-02**	**68SB03-01**	**68SB03-02**
Sampling Date	**11/13/06**	**11/13/06**	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(13.0 - 15.0)**	**(2.0 - 4.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(17.0 - 19.0)**
Volatile Organic Compounds (ug/kg)						
1112-Tetrachloroethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
111-Trichloroethane	5.1 UJ	4.6 UJ	4.5 UJ	4.2 UJ	4.4 UJ	4.5 UJ
1122-Tetrachloroethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
112-Trichloroethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
11-Dichloroethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
11-Dichloroethene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
123-Trichloropropane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
12-Dibromo-3-Chloropropane	10 U	9.2 U	9.0 U	8.5 U	8.8 U	9.0 U
12-Dichloroethane	5.1 UJ	4.6 UJ	4.5 UJ	4.2 UJ	4.4 UJ	4.5 UJ
12-Dichloropropane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
2-Chloro-13-butadiene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
2-Hexanone	25 U	23 U	22 U	21 U	22 U	23 U
3-Chloro-1-propene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Acetone	22 J	46 U	65	45	8.3 J	45 U
Acetonitrile	200 U	180 U	180 U	170 U	180 U	180 U
Acrolein	100 UJ	92 UJ	90 UJ	85 UJ	88 UJ	90 UJ
Acrylonitrile	100 U	92 U	90 U	85 U	88 U	90 U
Benzene	5.1 UJ	4.6 UJ	4.5 UJ	4.2 UJ	4.4 UJ	4.5 UJ
Bromoform	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Bromomethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Carbon disulfide	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Carbon tetrachloride	5.1 UJ	4.6 UJ	4.5 UJ	4.2 UJ	4.4 UJ	4.5 UJ
Chlorobenzene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Chlorodibromomethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Chloroethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Chloroform	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Chloromethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
cis-13-Dichloropropene	5.1 UJ	4.6 UJ	4.5 UJ	4.2 UJ	4.4 UJ	4.5 UJ
Dibromomethane	5.1 UJ	4.6 UJ	4.5 UJ	4.2 UJ	4.4 UJ	4.5 UJ
Dichlorobromomethane	5.1 UJ	4.6 UJ	4.5 UJ	4.2 UJ	4.4 UJ	4.5 UJ
Dichlorodifluoromethane	5.1 R	4.6 R	4.5 R	4.2 R	4.4 R	4.5 R
Ethyl methacrylate	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Ethylbenzene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Ethylene Dibromide	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Iodomethane	5.1 U	4.6 U	6.1	4.2 U	4.4 U	4.5 U
Isobutanol	200 UJ	180 UJ	180 UJ	170 UJ	180 UJ	180 UJ
Methacrylonitrile	100 U	92 U	90 U	85 U	88 U	90 U
Methyl Ethyl Ketone	25 U	23 U	8.7 J	21 U	22 U	23 U
methyl isobutyl ketone	25 U	23 U	22 U	21 U	22 U	23 U
Methyl methacrylate	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Methylene Chloride	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Pentachloroethane	25 UJ	23 UJ	22 UJ	21 UJ	22 UJ	23 UJ
Propionitrile	100 U	92 U	90 U	85 U	88 U	90 U
Styrene	1.2 J	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Tetrachloroethene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Toluene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
trans-12-Dichloroethene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
trans-13-Dichloropropene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
trans-14-Dichloro-2-butene	10 U	9.2 U	9.0 U	8.5 U	8.8 U	9.0 U
Trichloroethene	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Trichlorofluoromethane	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Vinyl acetate	10 UJ	9.2 UJ	9.0 UJ	8.5 UJ	8.8 UJ	9.0 UJ
Vinyl chloride	5.1 U	4.6 U	4.5 U	4.2 U	4.4 U	4.5 U
Xylenes Total	10 U	9.2 U	9.0 U	8.5 U	8.8 U	9.0 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB01**	**68SB02**	**68SB02**	**68SB03**	**68SB03**
Sample ID	**68SB01-01**	**68SB01-02**	**68SB02-01**	**68SB02-02**	**68SB03-01**	**68SB03-02**
Sampling Date	**11/13/06**	**11/13/06**	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(13.0 - 15.0)**	**(2.0 - 4.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(17.0 - 19.0)**
Semivolatile Organic Compounds (ug/kg)						
11'-Biphenyl	400 U	400 U	380 U	400 U	390 U	430 U
1245-Tetrachlorobenzene	400 U	400 U	380 U	400 U	390 U	430 U
124-Trichlorobenzene	400 U	400 U	380 U	400 U	390 U	430 U
12-Dichlorobenzene	400 U	400 U	380 U	400 U	390 U	430 U
135-Trinitrobenzene	400 UJ	400 UJ	380 UJ	400 UJ	390 UJ	430 UJ
13-Dichlorobenzene	400 U	400 U	380 U	400 U	390 U	430 U
13-Dinitrobenzene	400 U	400 U	380 U	400 U	390 U	430 U
14-Dichlorobenzene	400 U	400 U	380 U	400 U	390 U	430 U
14-Dioxane	400 U	400 U	380 U	400 U	390 U	430 U
14-Naphthoquinone	400 U	400 U	380 U	400 U	390 U	430 U
1-Naphthylamine	400 U	400 U	380 U	400 U	390 U	430 U
2346-Tetrachlorophenol	400 U	400 U	380 U	400 U	390 U	430 U
245-Trichlorophenol	400 U	400 U	380 U	400 U	390 U	430 U
246-Trichlorophenol	400 U	400 U	380 U	400 U	390 U	430 U
24-Dichlorophenol	400 U	400 U	380 U	400 U	390 U	430 U
24-Dimethylphenol	400 U	400 U	380 U	400 U	390 U	430 U
24-Dinitrophenol	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
24-Dinitrotoluene	400 U	400 U	380 U	400 U	390 U	430 U
26-Dichlorophenol	400 U	400 U	380 U	400 U	390 U	430 U
26-Dinitrotoluene	400 U	400 U	380 U	400 U	390 U	430 U
2-Acetylaminofluorene	400 U	400 U	380 U	400 U	390 U	430 U
2-Chloronaphthalene	400 U	400 U	380 U	400 U	390 U	430 U
2-Chlorophenol	400 U	400 U	380 U	400 U	390 U	430 U
2-Methylphenol	400 U	400 U	380 U	400 U	390 U	430 U
2-Naphthylamine	400 U	400 U	380 U	400 U	390 U	430 U
2-Nitroaniline	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
2-Nitrophenol	400 U	400 U	380 U	400 U	390 U	430 U
2-Picoline	400 U	400 U	380 U	400 U	390 U	430 U
2-Toluidine	400 U	400 U	380 U	400 U	390 U	430 U
3 & 4 Methylphenol	400 U	400 U	380 U	400 U	390 U	430 U
33'-Dichlorobenzidine	800 U	800 U	760 U	800 U	770 U	870 U
33'-Dimethylbenzidine	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
3-Methylcholanthrene	400 U	400 U	380 U	400 U	390 U	430 U
3-Nitroaniline	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
46-Dinitro-2-methylphenol	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
4-Aminobiphenyl	400 U	400 U	380 U	400 U	390 U	430 U
4-Bromophenyl phenyl ether	400 U	400 U	380 U	400 U	390 U	430 U
4-Chloro-3-methylphenol	400 U	400 U	380 U	400 U	390 U	430 U
4-Chloroaniline	800 U	800 U	760 U	800 U	770 U	870 U
4-Chlorophenyl phenyl ether	400 U	400 U	380 U	400 U	390 U	430 U
4-Nitroaniline	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
4-Nitrophenol	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
4-Nitroquinoline-1-oxide	4000 R	4000 R	3800 R	4000 R	3900 R	4300 R
712-Dimethylbenz(a)anthracene	400 U	400 U	380 U	400 U	390 U	430 U
Acetophenone	400 U	400 U	380 U	400 U	390 U	430 U
alphaalpha-Dimethyl phenethylamine	82000 UJ	81000 UJ	77000 UJ	82000 UJ	78000 UJ	88000 UJ
Aniline	800 U	800 U	760 U	800 U	770 U	870 U
Aramite Total	400 U	400 U	380 U	400 U	390 U	430 U
Benzyl alcohol	400 U	400 U	380 U	400 U	390 U	430 U
Bis(2-chloroethoxy)methane	400 U	400 U	380 U	400 U	390 U	430 U
Bis(2-chloroethyl)ether	400 U	400 U	380 U	400 U	390 U	430 U
Bis(2-ethylhexyl) phthalate	400 U	400 U	380 U	400 U	390 U	430 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB01**	**68SB02**	**68SB02**	**68SB03**	**68SB03**
Sample ID	**68SB01-01**	**68SB01-02**	**68SB02-01**	**68SB02-02**	**68SB03-01**	**68SB03-02**
Sampling Date	**11/13/06**	**11/13/06**	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(13.0 - 15.0)**	**(2.0 - 4.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(17.0 - 19.0)**
Semivolatile Organic Compounds (ug/kg)						
bis(chloroisopropyl) ether	400 U	400 U	380 U	400 U	390 U	430 U
Butyl benzyl phthalate	400 U	400 U	380 U	400 U	390 U	430 U
Diallate	400 U	400 U	380 U	400 U	390 U	430 U
Dibenzofuran	400 U	400 U	380 U	400 U	390 U	430 U
Diethyl phthalate	400 U	400 U	380 U	400 U	390 U	430 U
Dimethoate	400 U	400 U	380 U	400 U	390 U	430 U
Dimethyl phthalate	400 U	400 U	380 U	400 U	390 U	430 U
Di-n-butyl phthalate	400 U	400 U	380 U	400 U	390 U	430 U
Di-n-octyl phthalate	400 U	400 U	380 U	400 U	390 U	430 U
Dinoseb	400 U	400 U	380 U	400 U	390 U	430 U
Disulfoton	400 U	400 U	380 U	400 U	390 U	430 U
Ethyl methanesulfonate	400 U	400 U	380 U	400 U	390 U	430 U
Famphur	400 U	400 U	380 U	400 U	390 U	430 U
Hexachlorobenzene	400 U	400 U	380 U	400 U	390 U	430 U
Hexachlorobutadiene	400 U	400 U	380 U	400 U	390 U	430 U
Hexachlorocyclopentadiene	400 U	400 U	380 U	400 U	390 U	430 U
Hexachloroethane	400 U	400 U	380 U	400 U	390 U	430 U
Hexachlorophene	210000 UJ	210000 UJ	200000 UJ	210000 UJ	200000 UJ	220000 UJ
Hexachloropropene	400 U	400 U	380 U	400 U	390 U	430 U
Isophorone	400 U	400 U	380 U	400 U	390 U	430 U
Isosafrole	400 U	400 U	380 U	400 U	390 U	430 U
Methapyrilene	82000 UJ	81000 UJ	77000 UJ	82000 UJ	78000 UJ	88000 UJ
Methyl methanesulfonate	400 U	400 U	380 U	400 U	390 U	430 U
Methyl parathion	400 U	400 U	380 U	400 U	390 U	430 U
Nitrobenzene	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitro-o-toluidine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosodiethylamine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosodimethylamine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosodi-n-butylamine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosodi-n-propylamine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosodiphenylamine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosomethylethylamine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosomorpholine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosopiperidine	400 U	400 U	380 U	400 U	390 U	430 U
N-Nitrosopyrrolidine	400 U	400 U	380 U	400 U	390 U	430 U
oo'o"-Triethylphosphorothioate	400 U	400 U	380 U	400 U	390 U	430 U
Parathion	400 U	400 U	380 U	400 U	390 U	430 U
p-Dimethylamino azobenzene	400 U	400 U	380 U	400 U	390 U	430 U
Pentachlorobenzene	400 U	400 U	380 U	400 U	390 U	430 U
Pentachloronitrobenzene	400 U	400 U	380 U	400 U	390 U	430 U
Pentachlorophenol	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
Phenacetin	400 U	400 U	380 U	400 U	390 U	430 U
Phenol	400 U	400 U	380 U	400 U	390 U	430 U
Phorate	400 UJ	400 UJ	380 UJ	400 UJ	390 UJ	430 UJ
p-Phenylene diamine	2100 U	2100 U	2000 U	2100 U	2000 U	2200 U
Pronamide	400 U	400 U	380 U	400 U	390 U	430 U
Pyridine	400 U	400 U	380 U	400 U	390 U	430 U
Safrole Total	400 U	400 U	380 U	400 U	390 U	430 U
Sulfotepp	400 U	400 U	380 U	400 U	390 U	430 U
Thionazin	400 U	400 U	380 U	400 U	390 U	430 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB01**	**68SB01**	**68SB02**	**68SB02**	**68SB03**	**68SB03**
Sample ID	**68SB01-01**	**68SB01-02**	**68SB02-01**	**68SB02-02**	**68SB03-01**	**68SB03-02**
Sampling Date	**11/13/06**	**11/13/06**	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(13.0 - 15.0)**	**(2.0 - 4.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(17.0 - 19.0)**
Low-Level PAHs (ug/kg)						
1-Methylnaphthalene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
2-Methylnaphthalene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Acenaphthene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Acenaphthylene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Anthracene	8.2 U	8.1 U	7.7 U	8.2 U	1.6 J	8.8 U
Benzo[a]anthracene	8.2 U	8.1 U	7.7 U	8.2 U	2.3 J	8.8 U
Benzo[a]pyrene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Benzo[b]fluoranthene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Benzo[ghi]perylene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Benzo[k]fluoranthene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Chrysene	8.2 U	8.1 U	7.7 U	8.2 U	3.0 J	8.8 U
Dibenz(ah)anthracene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Fluoranthene	8.2 U	8.1 U	7.7 U	8.2 U	8.5 U	8.8 U
Fluorene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Indeno[123-cd]pyrene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Naphthalene	8.2 U	8.1 U	7.7 U	8.2 U	7.9 U	8.8 U
Phenanthrene	8.2 U	8.1 U	7.7 U	8.2 U	4.0 J	8.8 U
Pyrene	8.2 U	8.1 U	7.7 U	8.2 U	6.8 J	8.8 U
PCBs (ug/kg)						
Aroclor 1016	40 U	40 U	38 U	40 U	39 U	44 U
Aroclor 1221	82 U	82 U	77 U	81 U	79 U	88 U
Aroclor 1232	40 U	40 U	38 U	40 U	39 U	44 U
Aroclor 1242	40 U	40 U	38 U	40 U	39 U	44 U
Aroclor 1248	40 U	40 U	38 U	40 U	39 U	44 U
Aroclor 1254	40 U	40 U	38 U	40 U	39 U	44 U
Aroclor 1260	40 U	40 U	38 U	40 U	39 U	44 U
Total Petroleum Hydrocarbons (mg/kg)						
Diesel Range Organics	4.0 U	4.0 U	3.8 U	4.0 U	3.9 U	4.4 U
Gasoline Range Organics	0.21 U	0.23 U	0.22 U	0.25 U	0.23 U	0.25 U
Metals (mg/kg)						
Antimony	4.7 U	4.6 UJ	4.2 UJ	4.5 UJ	4.5 UJ	4.8 UJ
Arsenic	2.7	1.1 J	1.2 J	3.2	1.1 J	0.35 J
Barium	13 J	25	34	260	60	18
Beryllium	0.27 J	0.51 J	0.21 J	1.2	0.28 J	0.97 U
Cadmium	1.2 U	1.1 U	1.0 U	1.1 U	1.1 U	1.2 U
Chromium	15 J	20 J	15 J	17 J	19 J	15 J
Cobalt	8.0	7.6	8.9	20	9.9	0.68 J
Copper	19 J	10 R	20 J	62 J	32 J	15 R
Lead	3.9	1.3 J	2.6 J	2.1 J	1.8 J	0.79 J
Nickel	12	4.7 J	5.0 J	10 J	8.1 J	1.3 J
Selenium	1.1 J	2.3 U	2.1 U	2.3 U	2.3 U	2.4 U
Silver	2.3 U	2.3 U	2.1 U	2.3 U	2.3 U	2.4 U
Thallium	2.3 U	2.3 U	2.1 U	2.3 U	2.3 U	2.4 U
Tin	12 UJ	11 UJ	10 UJ	11 UJ	11 UJ	12 UJ
Vanadium	180 J	48	76	220	95	48
Zinc	29 J	25 J	26 J	75 J	42 J	3.9 J
Mercury -7471A	0.097	0.013 J	0.16	0.022 U	0.083	0.0051 J
Cyanide Total - 9012A	0.59 U	0.60 U	0.55 U	0.60 U	0.59 U	0.65 U
Sulfide - 9034	31 U	30 U	29 U	30 U	29 U	33 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB04**	**68SB04**	**68SB05**	**68SB05**	**68SB05**
Sample ID	**68SB04-01**	**68SB04-02**	**68SB05-01**	**68SB05-01D**	**68SB05-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Volatile Organic Compounds (ug/kg)					
1112-Tetrachloroethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
111-Trichloroethane	5.1 UJ	5.8 U	4.7 UJ	5.1 UJ	4.0 UJ
1122-Tetrachloroethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
112-Trichloroethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
11-Dichloroethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
11-Dichloroethene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
123-Trichloropropane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
12-Dibromo-3-Chloropropane	10 U	12 U	9.5 U	10 U	8.0 U
12-Dichloroethane	5.1 U	5.8 U	4.7 UJ	5.1 UJ	4.0 UJ
12-Dichloropropane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
2-Chloro-13-butadiene	5.1 UJ	5.8 UJ	4.7 U	5.1 U	4.0 U
2-Hexanone	26 UJ	29 UJ	24 U	26 U	20 U
3-Chloro-1-propene	5.1 UJ	5.8 UJ	4.7 U	5.1 U	4.0 U
Acetone	51 UJ	5.8 J	15 J	12 J	14 J
Acetonitrile	200 U	230 U	190 U	200 U	160 U
Acrolein	100 UJ	120 UJ	95 UJ	100 UJ	80 UJ
Acrylonitrile	100 U	120 U	95 U	100 U	80 U
Benzene	5.1 U	1.3 J	4.7 UJ	5.1 UJ	4.0 UJ
Bromoform	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Bromomethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Carbon disulfide	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Carbon tetrachloride	5.1 U	5.8 U	4.7 UJ	5.1 UJ	4.0 UJ
Chlorobenzene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Chlorodibromomethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Chloroethane	5.1 UJ	5.8 U	4.7 U	5.1 U	4.0 U
Chloroform	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Chloromethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
cis-13-Dichloropropene	5.1 U	5.8 U	4.7 UJ	5.1 UJ	4.0 UJ
Dibromomethane	5.1 U	5.8 U	4.7 UJ	5.1 UJ	4.0 UJ
Dichlorobromomethane	5.1 U	5.8 U	4.7 UJ	5.1 UJ	4.0 UJ
Dichlorodifluoromethane	5.1 U	5.8 UJ	4.7 R	5.1 R	4.0 R
Ethyl methacrylate	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Ethylbenzene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Ethylene Dibromide	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Iodomethane	5.1 U	5.8 UJ	4.7 U	5.1 U	4.0 U
Isobutanol	200 R	230 R	190 UJ	200 UJ	160 UJ
Methacrylonitrile	100 U	120 U	95 U	100 U	80 U
Methyl Ethyl Ketone	26 U	29 U	24 U	26 U	20 U
methyl isobutyl ketone	26 UJ	29 U	24 U	26 U	20 U
Methyl methacrylate	5.1 U	5.8 UJ	4.7 U	5.1 U	4.0 U
Methylene Chloride	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Pentachloroethane	26 UJ	29 UJ	24 UJ	26 UJ	20 UJ
Propionitrile	100 U	120 U	95 U	100 U	80 U
Styrene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Tetrachloroethene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Toluene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
trans-12-Dichloroethene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
trans-13-Dichloropropene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
trans-14-Dichloro-2-butene	10 U	12 U	9.5 U	10 U	8.0 U
Trichloroethene	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Trichlorofluoromethane	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Vinyl acetate	10 U	12 U	9.5 UJ	10 UJ	8.0 UJ
Vinyl chloride	5.1 U	5.8 U	4.7 U	5.1 U	4.0 U
Xylenes Total	10 U	12 U	9.5 U	10 U	8.0 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB04**	**68SB04**	**68SB05**	**68SB05**	**68SB05**
Sample ID	**68SB04-01**	**68SB04-02**	**68SB05-01**	**68SB05-01D**	**68SB05-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Semivolatile Organic Compounds (ug/kg)					
11'-Biphenyl	440 U	440 U	390 U	400 U	390 U
1245-Tetrachlorobenzene	440 U	440 U	390 U	400 U	390 U
124-Trichlorobenzene	440 U	440 U	390 U	400 U	390 U
12-Dichlorobenzene	440 U	440 U	390 U	400 U	390 U
135-Trinitrobenzene	440 U	440 U	390 UJ	400 UJ	390 UJ
13-Dichlorobenzene	440 U	440 U	390 U	400 U	390 U
13-Dinitrobenzene	440 U	440 U	390 U	400 U	390 U
14-Dichlorobenzene	440 U	440 U	390 U	400 U	390 U
14-Dioxane	440 U	440 U	390 U	400 U	390 U
14-Naphthoquinone	440 U	440 U	390 U	400 U	390 U
1-Naphthylamine	440 U	440 U	390 U	400 U	390 U
2346-Tetrachlorophenol	440 U	440 U	390 U	400 U	390 U
245-Trichlorophenol	440 U	440 U	390 U	400 U	390 U
246-Trichlorophenol	440 U	440 U	390 U	400 U	390 U
24-Dichlorophenol	440 U	440 U	390 U	400 U	390 U
24-Dimethylphenol	440 U	440 U	390 U	400 U	390 U
24-Dinitrophenol	2300 UJ	2300 UJ	2000 U	2000 U	2000 U
24-Dinitrotoluene	440 U	440 U	390 U	400 U	390 U
26-Dichlorophenol	440 U	440 U	390 U	400 U	390 U
26-Dinitrotoluene	440 U	440 U	390 U	400 U	390 U
2-Acetylaminofluorene	440 U	440 U	390 U	400 U	390 U
2-Chloronaphthalene	440 U	440 U	390 U	400 U	390 U
2-Chlorophenol	440 U	440 U	390 U	400 U	390 U
2-Methylphenol	440 U	440 U	390 U	400 U	390 U
2-Naphthylamine	440 U	440 U	390 U	400 U	390 U
2-Nitroaniline	2300 U	2300 U	2000 U	2000 U	2000 U
2-Nitrophenol	440 U	440 U	390 U	400 U	390 U
2-Picoline	440 UJ	440 UJ	390 U	400 U	390 U
2-Toluidine	440 U	440 U	390 U	400 U	390 U
3 & 4 Methylphenol	440 U	440 U	390 U	400 U	390 U
33'-Dichlorobenzidine	890 U	880 U	790 U	800 U	780 U
33'-Dimethylbenzidine	2300 U	2300 U	2000 U	2000 U	2000 U
3-Methylcholanthrene	440 U	440 U	390 U	400 U	390 U
3-Nitroaniline	2300 U	2300 U	2000 U	2000 U	2000 U
46-Dinitro-2-methylphenol	2300 U	2300 U	2000 U	2000 U	2000 U
4-Aminobiphenyl	440 U	440 U	390 U	400 U	390 U
4-Bromophenyl phenyl ether	440 U	440 U	390 U	400 U	390 U
4-Chloro-3-methylphenol	440 U	440 U	390 U	400 U	390 U
4-Chloroaniline	890 U	880 U	790 U	800 U	780 U
4-Chlorophenyl phenyl ether	440 U	440 UJ	390 U	400 U	390 U
4-Nitroaniline	2300 U	2300 U	2000 U	2000 U	2000 U
4-Nitrophenol	2300 U	2300 U	2000 U	2000 U	2000 U
4-Nitroquinoline-1-oxide	4400 UJ	4400 UJ	3900 R	4000 R	3900 R
712-Dimethylbenz(a)anthracene	440 U	440 U	390 U	400 U	390 U
Acetophenone	440 U	440 U	390 U	400 U	390 U
alphaalpha-Dimethyl phenethylamine	90000 UJ	89000 UJ	80000 UJ	81000 UJ	79000 UJ
Aniline	890 U	880 U	790 U	800 U	780 U
Aramite Total	440 UJ	440 UJ	390 U	400 U	390 U
Benzyl alcohol	440 U	440 U	390 U	400 U	390 U
Bis(2-chloroethoxy)methane	440 U	440 U	390 U	400 U	390 U
Bis(2-chloroethyl)ether	440 U	440 U	390 U	400 U	390 U
Bis(2-ethylhexyl) phthalate	440 U	440 U	390 U	400 U	390 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB04**	**68SB04**	**68SB05**	**68SB05**	**68SB05**
Sample ID	**68SB04-01**	**68SB04-02**	**68SB05-01**	**68SB05-01D**	**68SB05-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Semivolatile Organic Compounds (ug/kg)					
bis(chloroisopropyl) ether	440 U	440 U	390 U	400 U	390 U
Butyl benzyl phthalate	440 U	440 U	390 U	400 U	390 U
Diallate	440 UJ	440 UJ	390 U	400 U	390 U
Dibenzofuran	440 U	440 U	390 U	400 U	390 U
Diethyl phthalate	440 U	440 U	390 U	400 U	390 U
Dimethoate	440 U	440 U	390 U	400 U	390 U
Dimethyl phthalate	440 U	440 U	390 U	400 U	390 U
Di-n-butyl phthalate	440 U	440 U	390 U	400 U	390 U
Di-n-octyl phthalate	440 U	440 U	390 U	400 U	390 U
Dinoseb	440 U	440 U	390 U	400 U	390 U
Disulfoton	440 U	440 U	390 U	400 U	390 U
Ethyl methanesulfonate	440 UJ	440 UJ	390 U	400 U	390 U
Famphur	440 U	440 U	390 U	400 U	390 U
Hexachlorobenzene	440 U	440 U	390 U	400 U	390 U
Hexachlorobutadiene	440 U	440 U	390 U	400 U	390 U
Hexachlorocyclopentadiene	440 U	440 U	390 U	400 U	390 U
Hexachloroethane	440 U	440 U	390 U	400 U	390 U
Hexachlorophene	230000 UJ	230000 UJ	200000 UJ	200000 UJ	200000 UJ
Hexachloropropene	440 U	440 U	390 U	400 U	390 U
Isophorone	440 U	440 U	390 U	400 U	390 U
Isosafrole	440 U	440 U	390 U	400 U	390 U
Methapyrilene	90000 UJ	89000 UJ	80000 UJ	81000 UJ	79000 UJ
Methyl methanesulfonate	440 U	440 U	390 U	400 U	390 U
Methyl parathion	440 U	440 U	390 U	400 U	390 U
Nitrobenzene	440 U	440 U	390 U	400 U	390 U
N-Nitro-o-toluidine	440 U	440 U	390 U	400 U	390 U
N-Nitrosodiethylamine	440 U	440 UJ	390 U	400 U	390 U
N-Nitrosodimethylamine	440 U	440 U	390 U	400 U	390 U
N-Nitrosodi-n-butylamine	440 U	440 U	390 U	400 U	390 U
N-Nitrosodi-n-propylamine	440 U	440 U	390 U	400 U	390 U
N-Nitrosodiphenylamine	440 U	440 U	390 U	400 U	390 U
N-Nitrosomethylethylamine	440 U	440 U	390 U	400 U	390 U
N-Nitrosomorpholine	440 UJ	440 UJ	390 U	400 U	390 U
N-Nitrosopiperidine	440 U	440 U	390 U	400 U	390 U
N-Nitrosopyrrolidine	440 U	440 U	390 U	400 U	390 U
oo'o"-Triethylphosphorothioate	440 U	440 U	390 U	400 U	390 U
Parathion	440 U	440 U	390 U	400 U	390 U
p-Dimethylamino azobenzene	440 U	440 U	390 U	400 U	390 U
Pentachlorobenzene	440 U	440 U	390 U	400 U	390 U
Pentachloronitrobenzene	440 U	440 U	390 U	400 U	390 U
Pentachlorophenol	2300 U	2300 U	2000 U	2000 U	2000 U
Phenacetin	440 U	440 U	390 U	400 U	390 U
Phenol	440 U	440 U	390 U	400 U	390 U
Phorate	440 U	440 U	390 UJ	400 UJ	390 UJ
p-Phenylene diamine	2300 U	2300 U	2000 U	2000 U	2000 U
Pronamide	440 U	440 U	390 U	400 U	390 U
Pyridine	440 U	440 U	390 U	400 U	390 U
Safrole Total	440 U	440 U	390 U	400 U	390 U
Sulfotepp	440 U	440 U	390 U	400 U	390 U
Thionazin	440 U	440 U	390 U	400 U	390 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB04**	**68SB04**	**68SB05**	**68SB05**	**68SB05**
Sample ID	**68SB04-01**	**68SB04-02**	**68SB05-01**	**68SB05-01D**	**68SB05-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/13/06**	**11/13/06**	**11/13/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Low-Level PAHs (ug/kg)					
1-Methylnaphthalene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
2-Methylnaphthalene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Acenaphthene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Acenaphthylene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Anthracene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Benzo[a]anthracene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Benzo[a]pyrene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Benzo[b]fluoranthene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Benzo[ghi]perylene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Benzo[k]fluoranthene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Chrysene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Dibenz(ah)anthracene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Fluoranthene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Fluorene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Indeno[123-cd]pyrene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Naphthalene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Phenanthrene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
Pyrene	9.0 U	8.9 U	8.0 U	8.1 U	7.9 U
PCBs (ug/kg)					
Aroclor 1016	44 UJ	44 U	39 U	40 U	39 U
Aroclor 1221	90 UJ	88 U	80 U	81 U	79 U
Aroclor 1232	44 UJ	44 U	39 U	40 U	39 U
Aroclor 1242	44 UJ	44 U	39 U	40 U	39 U
Aroclor 1248	44 UJ	44 U	39 U	40 U	39 U
Aroclor 1254	44 UJ	44 U	39 U	40 U	39 U
Aroclor 1260	44 UJ	44 U	39 U	40 U	39 U
Total Petroleum Hydrocarbons (mg/kg)					
Diesel Range Organics	4.4 U	4.4 U	3.9 U	4.0 U	3.9 U
Gasoline Range Organics	0.30 U	0.25 U	0.24 U	0.21 U	0.18 U
Metals (mg/kg)					
Antimony	5.2 UJ	4.8 UJ	4.4 UJ	4.4 UJ	4.3 UJ
Arsenic	1.2 J	3.6	0.93 J	1.1 J	1.2 J
Barium	11 J	11 J	59	81	65
Beryllium	1.0 U	0.95 U	0.31 J	0.33 J	0.31 J
Cadmium	1.3 U	1.2 U	1.1 U	1.1 U	0.051 J
Chromium	63	190	26 J	36 J	32 J
Cobalt	1.3 J	0.57 J	6.9 R	16	15
Copper	29 J	66 J	39 J	52 J	44 J
Lead	2.2	4.9	1.6 J	2.0 J	2.0 J
Nickel	10 U	9.6 U	11 J	14 J	12 J
Selenium	4.1	4.2	2.2 U	2.2 U	2.2 U
Silver	2.6 U	2.4 U	2.2 U	2.2 U	2.2 U
Thallium	2.6 U	2.4 U	2.2 U	2.2 U	2.2 U
Tin	13 UJ	12 UJ	11 UJ	11 UJ	11 UJ
Vanadium	110	440	100 J	150 J	140
Zinc	7.9	7.9	42 J	45 J	44 J
Mercury -7471A	0.035	0.026	0.051	0.044	0.041
Cyanide Total - 9012A	0.65 U	0.66 U	0.60 U	0.59 U	0.57 U
Sulfide - 9034	42	33 U	30 U	30 U	30 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB06**	**68SB06**	**68SB07**	**68SB07**	**68SB08**	**68SB08**
Sample ID	**68SB06-01**	**68SB06-02**	**68SB07-01**	**68SB07-02**	**68SB08-01**	**68SB08-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/14/06**	**11/14/06**
Sample Depth (ft bgs)	**(2.0 - 4.0)**	**(6.0 - 8.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Volatile Organic Compounds (ug/kg)						
1112-Tetrachloroethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
111-Trichloroethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
1122-Tetrachloroethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
112-Trichloroethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
11-Dichloroethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
11-Dichloroethene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
123-Trichloropropane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
12-Dibromo-3-Chloropropane	9.7 U	10 U	9.6 UJ	8.4 UJ	12 UJ	7.2 UJ
12-Dichloroethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
12-Dichloropropane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
2-Chloro-13-butadiene	4.8 UJ	5.2 UJ	4.8 U	4.2 U	5.9 UJ	3.6 U
2-Hexanone	24 UJ	26 UJ	24 UJ	21 UJ	29 UJ	18 UJ
3-Chloro-1-propene	4.8 UJ	5.2 UJ	4.8 UJ	4.2 UJ	5.9 UJ	3.6 UJ
Acetone	13 J	85 J	11 J	4.9 J	14 J	5.8 J
Acetonitrile	190 U	210 U	190 U	170 U	230 UJ	140 U
Acrolein	97 UJ	100 UJ	96 UJ	84 UJ	120 UJ	72 U
Acrylonitrile	97 U	100 U	96 U	84 U	120 UJ	72 UJ
Benzene	0.86 J	1.0 J	1.0 J	0.77 J	5.9 UJ	0.69 J
Bromoform	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Bromomethane	4.8 U	5.2 U	4.8 UJ	4.2 UJ	5.9 UJ	3.6 UJ
Carbon disulfide	4.8 U	5.2 U	4.8 U	4.2 UJ	5.9 UJ	3.6 UJ
Carbon tetrachloride	4.8 U	5.2 U	4.8 UJ	4.2 U	5.9 UJ	3.6 U
Chlorobenzene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Chlorodibromomethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Chloroethane	4.8 U	5.2 U	4.8 UJ	4.2 UJ	5.9 UJ	3.6 UJ
Chloroform	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Chloromethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
cis-13-Dichloropropene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Dibromomethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Dichlorobromomethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Dichlorodifluoromethane	4.8 UJ	5.2 UJ	4.8 U	4.2 U	5.9 UJ	3.6 U
Ethyl methacrylate	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Ethylbenzene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Ethylene Dibromide	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Iodomethane	4.8 UJ	1.9 J	4.8 UJ	4.2 UJ	5.9 UJ	3.6 UJ
Isobutanol	190 R	210 R	190 R	170 R	230 R	140 R
Methacrylonitrile	97 U	100 U	96 U	84 U	120 UJ	72 U
Methyl Ethyl Ketone	24 U	13 J	24 U	21 U	29 UJ	18 U
methyl isobutyl ketone	24 U	26 U	24 UJ	21 UJ	29 UJ	18 UJ
Methyl methacrylate	4.8 UJ	5.2 UJ	4.8 U	4.2 U	5.9 UJ	3.6 U
Methylene Chloride	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Pentachloroethane	24 UJ	26 UJ	24 UJ	21 UJ	29 UJ	18 UJ
Propionitrile	97 U	100 U	96 U	84 U	120 UJ	72 U
Styrene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Tetrachloroethene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Toluene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
trans-12-Dichloroethene	4.8 U	5.2 U	4.8 UJ	4.2 UJ	5.9 UJ	3.6 UJ
trans-13-Dichloropropene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
trans-14-Dichloro-2-butene	9.7 U	10 U	9.6 U	8.4 U	12 UJ	7.2 U
Trichloroethene	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Trichlorofluoromethane	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Vinyl acetate	9.7 U	10 U	9.6 U	8.4 U	12 UJ	7.2 U
Vinyl chloride	4.8 U	5.2 U	4.8 U	4.2 U	5.9 UJ	3.6 U
Xylenes Total	9.7 U	10 U	9.6 U	8.4 U	12 UJ	7.2 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB06**	**68SB06**	**68SB07**	**68SB07**	**68SB08**	**68SB08**
Sample ID	**68SB06-01**	**68SB06-02**	**68SB07-01**	**68SB07-02**	**68SB08-01**	**68SB08-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/14/06**	**11/14/06**
Sample Depth (ft bgs)	**(2.0 - 4.0)**	**(6.0 - 8.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Semivolatile Organic Compounds (ug/kg)						
11'-Biphenyl	400 U	400 U	410 U	400 U	380 U	370 U
1245-Tetrachlorobenzene	400 U	400 U	410 U	400 U	380 U	370 U
124-Trichlorobenzene	400 U	400 U	410 U	400 U	380 U	370 U
12-Dichlorobenzene	400 U	400 U	410 U	400 U	380 U	370 U
135-Trinitrobenzene	400 U	400 U	410 U	400 U	380 U	370 U
13-Dichlorobenzene	400 U	400 U	410 U	400 U	380 U	370 U
13-Dinitrobenzene	400 U	400 U	410 U	400 U	380 U	370 U
14-Dichlorobenzene	400 U	400 U	410 U	400 U	380 U	370 U
14-Dioxane	400 U	400 U	410 U	400 U	380 U	370 U
14-Naphthoquinone	400 U	400 U	410 U	400 U	380 U	370 U
1-Naphthylamine	400 U	400 U	410 U	400 U	380 U	370 U
2346-Tetrachlorophenol	400 U	400 U	410 U	400 U	380 U	370 U
245-Trichlorophenol	400 U	400 U	410 U	400 U	380 U	370 U
246-Trichlorophenol	400 U	400 U	410 U	400 U	380 U	370 U
24-Dichlorophenol	400 U	400 U	410 U	400 U	380 U	370 U
24-Dimethylphenol	400 U	400 U	410 U	400 U	380 U	370 U
24-Dinitrophenol	2100 UJ	2100 UJ	2100 U	2000 U	2000 UJ	1900 UJ
24-Dinitrotoluene	400 U	400 U	410 U	400 U	380 U	370 U
26-Dichlorophenol	400 U	400 U	410 U	400 U	380 U	370 U
26-Dinitrotoluene	400 U	400 U	410 U	400 U	380 U	370 U
2-Acetylaminofluorene	400 U	400 U	410 U	400 U	380 U	370 U
2-Chloronaphthalene	400 U	400 U	410 U	400 U	380 U	370 U
2-Chlorophenol	400 U	400 U	410 U	400 U	380 U	370 U
2-Methylphenol	400 U	400 U	410 U	400 U	380 U	370 U
2-Naphthylamine	400 U	400 U	410 U	400 U	380 U	370 U
2-Nitroaniline	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
2-Nitrophenol	400 U	400 U	410 U	400 U	380 U	370 U
2-Picoline	400 UJ	400 UJ	410 UJ	400 UJ	380 UJ	370 UJ
2-Toluidine	400 U	400 U	410 U	400 U	380 U	370 U
3 & 4 Methylphenol	400 U	400 U	410 U	400 U	380 U	370 U
33'-Dichlorobenzidine	800 U	800 U	810 U	790 U	770 U	750 U
33'-Dimethylbenzidine	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
3-Methylcholanthrene	400 U	400 U	410 U	400 U	380 U	370 U
3-Nitroaniline	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
46-Dinitro-2-methylphenol	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
4-Aminobiphenyl	400 U	400 U	410 U	400 U	380 U	370 U
4-Bromophenyl phenyl ether	400 U	400 U	410 U	400 U	380 U	370 U
4-Chloro-3-methylphenol	400 U	400 U	410 U	400 U	380 U	370 U
4-Chloroaniline	800 U	800 U	810 U	790 U	770 U	750 U
4-Chlorophenyl phenyl ether	400 U	400 U	410 U	400 U	380 U	370 U
4-Nitroaniline	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
4-Nitrophenol	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
4-Nitroquinoline-1-oxide	4000 UJ	4000 UJ	4100 U	4000 U	3800 UJ	3700 UJ
712-Dimethylbenz(a)anthracene	400 U	400 U	410 U	400 U	380 U	370 U
Acetophenone	400 U	400 U	410 U	400 U	380 U	370 U
alphaalpha-Dimethyl phenethylamine	81000 UJ	81000 UJ	83000 U	80000 U	78000 UJ	76000 UJ
Aniline	800 U	800 U	810 U	790 U	770 U	750 U
Aramite Total	400 UJ	400 UJ	410 U	400 U	380 UJ	370 UJ
Benzyl alcohol	400 U	400 U	410 U	400 U	380 U	370 U
Bis(2-chloroethoxy)methane	400 U	400 U	410 U	400 U	380 U	370 U
Bis(2-chloroethyl)ether	400 U	400 U	410 U	400 U	380 U	370 U
Bis(2-ethylhexyl) phthalate	400 U	400 U	410 U	400 U	380 U	370 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB06**	**68SB06**	**68SB07**	**68SB07**	**68SB08**	**68SB08**
Sample ID	**68SB06-01**	**68SB06-02**	**68SB07-01**	**68SB07-02**	**68SB08-01**	**68SB08-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/14/06**	**11/14/06**
Sample Depth (ft bgs)	**(2.0 - 4.0)**	**(6.0 - 8.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Semivolatile Organic Compounds (ug/kg)						
bis(chloroisopropyl) ether	400 U	400 U	410 U	400 U	380 U	370 U
Butyl benzyl phthalate	400 U	400 U	410 U	400 U	380 U	370 U
Diallate	400 UJ	400 UJ	410 UJ	400 UJ	380 UJ	370 UJ
Dibenzofuran	400 U	400 U	410 U	400 U	380 U	370 U
Diethyl phthalate	400 U	400 U	410 U	400 U	380 U	370 U
Dimethoate	400 U	400 U	410 U	400 U	380 U	370 U
Dimethyl phthalate	400 U	400 U	410 U	400 U	380 U	370 U
Di-n-butyl phthalate	400 U	400 U	410 U	400 U	380 U	370 U
Di-n-octyl phthalate	400 U	400 U	410 U	400 U	380 U	370 U
Dinoseb	400 U	400 U	410 U	400 U	380 U	370 U
Disulfoton	400 U	400 U	410 U	400 U	380 U	370 U
Ethyl methanesulfonate	400 UJ	400 UJ	410 U	400 U	380 UJ	370 UJ
Famphur	400 U	400 U	410 U	400 U	380 U	370 U
Hexachlorobenzene	400 U	400 U	410 U	400 U	380 U	370 U
Hexachlorobutadiene	400 U	400 U	410 U	400 U	380 U	370 U
Hexachlorocyclopentadiene	400 U	400 U	410 U	400 U	380 U	370 U
Hexachloroethane	400 U	400 U	410 U	400 U	380 U	370 U
Hexachlorophene	210000 UJ	210000 UJ	210000 U	200000 U	200000 UJ	190000 UJ
Hexachloropropene	400 U	400 U	410 U	400 U	380 U	370 U
Isophorone	400 U	400 U	410 U	400 U	380 U	370 U
Isosafrole	400 U	400 U	410 U	400 U	380 U	370 U
Methapyrilene	81000 UJ	81000 UJ	83000 U	80000 U	78000 UJ	76000 UJ
Methyl methanesulfonate	400 U	400 U	410 U	400 U	380 U	370 U
Methyl parathion	400 U	400 U	410 U	400 U	380 U	370 U
Nitrobenzene	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitro-o-toluidine	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitrosodiethylamine	400 UJ	400 UJ	410 U	400 U	380 UJ	370 UJ
N-Nitrosodimethylamine	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitrosodi-n-butylamine	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitrosodi-n-propylamine	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitrosodiphenylamine	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitrosomethylethylamine	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitrosomorpholine	400 UJ	400 UJ	410 U	400 U	380 UJ	370 UJ
N-Nitrosopiperidine	400 U	400 U	410 U	400 U	380 U	370 U
N-Nitrosopyrrolidine	400 U	400 U	410 U	400 U	380 U	370 U
oo'o"-Triethylphosphorothioate	400 U	400 U	410 U	400 U	380 U	370 U
Parathion	400 U	400 U	410 U	400 U	380 U	370 U
p-Dimethylamino azobenzene	400 U	400 U	410 U	400 U	380 U	370 U
Pentachlorobenzene	400 U	400 U	410 U	400 U	380 U	370 U
Pentachloronitrobenzene	400 U	400 U	410 U	400 U	380 U	370 U
Pentachlorophenol	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
Phenacetin	400 U	400 U	410 U	400 U	380 U	370 U
Phenol	400 U	400 U	410 U	400 U	380 U	370 U
Phorate	400 U	400 U	410 U	400 U	380 U	370 U
p-Phenylene diamine	2100 U	2100 U	2100 U	2000 U	2000 U	1900 U
Pronamide	400 U	400 U	410 U	400 U	380 U	370 U
Pyridine	400 U	400 U	410 U	400 U	380 U	370 U
Safrole Total	400 U	400 U	410 U	400 U	380 U	370 U
Sulfotepp	400 U	400 U	410 U	400 U	380 U	370 U
Thionazin	400 U	400 U	410 U	400 U	380 U	370 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB06**	**68SB06**	**68SB07**	**68SB07**	**68SB08**	**68SB08**
Sample ID	**68SB06-01**	**68SB06-02**	**68SB07-01**	**68SB07-02**	**68SB08-01**	**68SB08-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/14/06**	**11/14/06**
Sample Depth (ft bgs)	**(2.0 - 4.0)**	**(6.0 - 8.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**	**(5.0 - 7.0)**	**(10.0 - 12.0)**
Low-Level PAHs (ug/kg)						
1-Methylnaphthalene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
2-Methylnaphthalene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Acenaphthene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Acenaphthylene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Anthracene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Benzo[a]anthracene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Benzo[a]pyrene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Benzo[b]fluoranthene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Benzo[ghi]perylene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Benzo[k]fluoranthene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Chrysene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Dibenz(ah)anthracene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Fluoranthene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Fluorene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Indeno[123-cd]pyrene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Naphthalene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Phenanthrene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
Pyrene	8.2 U	8.1 U	8.3 U	8.1 U	7.9 U	7.7 U
PCBs (ug/kg)						
Aroclor 1016	40 U	40 U	41 U	40 U	38 U	37 U
Aroclor 1221	81 U	81 U	83 U	81 U	78 U	76 U
Aroclor 1232	40 U	40 U	41 U	40 U	38 U	37 U
Aroclor 1242	40 U	40 U	41 U	40 U	38 U	37 U
Aroclor 1248	40 U	40 U	41 U	40 U	38 U	37 U
Aroclor 1254	40 U	40 U	41 U	40 U	38 U	37 U
Aroclor 1260	40 U	40 U	41 U	40 U	38 U	37 U
Total Petroleum Hydrocarbons (mg/kg)						
Diesel Range Organics	4.0 U	4.0 U	4.1 U	3.9 U	3.9 U	3.8 U
Gasoline Range Organics	0.24 U	0.25 U	0.23 U	0.21 U	0.23 U	0.27 U
Metals (mg/kg)						
Antimony	4.7 UJ	4.6 U	4.4 UJ	4.5 UJ	4.5 U	4.1 UJ
Arsenic	1.1 J	1.1 J	0.80 J	1.3 J	1.3 J	0.89 J
Barium	72 J	87 J	44 J	72 J	64 J	53 J
Beryllium	0.28 J	0.37 J	0.22 J	0.37 J	0.42 J	0.22 J
Cadmium	1.2 U	0.061 J	1.1 U	0.17 J	1.1 U	1.0 U
Chromium	35	34 J	22	28	22 J	22
Cobalt	14 J	14	6.3 J	17 J	15	12 J
Copper	61 J	51 J	27 J	36 J	39 J	34 J
Lead	1.8	2.4	1.8	2.3	2.6	1.9
Nickel	16	14	8.8 U	13	10	9.8
Selenium	2.4 U	2.3 U	2.2 U	2.2 U	2.3 U	2.0 U
Silver	2.4 U	2.3 U	2.2 U	2.2 U	2.3 U	2.0 U
Thallium	2.4 U	2.3 U	2.2 U	2.2 U	2.3 U	2.0 U
Tin	12 UJ	11 UJ	11 UJ	11 UJ	11 UJ	10 UJ
Vanadium	170	140 J	90	120	110 J	110
Zinc	56 J	60 J	39 J	61 J	57 J	38 J
Mercury -7471A	0.030 J	0.053 J	0.047 J	0.060 J	0.028 J	0.02 U
Cyanide Total - 9012A	0.60 U	0.59 U	0.63 U	0.59 U	0.58 U	0.57 U
Sulfide - 9034	31 U	30 U	44	40	29 U	29 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB09**	**68SB09**	**68SB10**	**68SB10**	**68SB10**
Sample ID	**68SB09-01**	**68SB09-02**	**68SB10-01**	**68SB10-01D**	**68SB10-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(7.0 - 9.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**
Volatile Organic Compounds (ug/kg)					
1112-Tetrachloroethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
111-Trichloroethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
1122-Tetrachloroethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
112-Trichloroethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
11-Dichloroethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
11-Dichloroethene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
123-Trichloropropane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
12-Dibromo-3-Chloropropane	9.4 U	8.7 U	9.5 UJ	8.9 UJ	8.7 UJ
12-Dichloroethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
12-Dichloropropane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
2-Chloro-13-butadiene	4.7 UJ	4.3 UJ	4.8 U	4.5 U	4.4 U
2-Hexanone	24 UJ	22 UJ	24 UJ	22 UJ	22 UJ
3-Chloro-1-propene	4.7 UJ	4.3 UJ	4.8 UJ	4.5 UJ	4.4 UJ
Acetone	9.3 J	43 UJ	25 J	25 J	7.2 J
Acetonitrile	190 U	170 U	190 U	180 U	170 U
Acrolein	94 UJ	87 UJ	95 UJ	89 UJ	87 UJ
Acrylonitrile	94 U	87 U	95 U	89 U	87 U
Benzene	0.98 J	4.3 U	0.90 J	1.0 J	4.4 U
Bromoform	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Bromomethane	4.7 U	4.3 U	4.8 UJ	4.5 UJ	4.4 UJ
Carbon disulfide	4.7 U	4.3 U	4.8 UJ	4.5 UJ	4.4 UJ
Carbon tetrachloride	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Chlorobenzene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Chlorodibromomethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Chloroethane	4.7 U	4.3 U	4.8 UJ	4.5 UJ	4.4 UJ
Chloroform	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Chloromethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
cis-13-Dichloropropene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Dibromomethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Dichlorobromomethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Dichlorodifluoromethane	4.7 UJ	4.3 UJ	4.8 U	4.5 U	4.4 U
Ethyl methacrylate	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Ethylbenzene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Ethylene Dibromide	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Iodomethane	4.7 UJ	4.3 UJ	2.7 J	2.5 J	0.99 J
Isobutanol	190 R	170 R	190 R	180 R	170 R
Methacrylonitrile	94 U	87 U	95 U	89 U	87 U
Methyl Ethyl Ketone	24 U	22 U	4.9 J	4.8 J	22 U
methyl isobutyl ketone	24 U	22 U	24 UJ	22 UJ	22 UJ
Methyl methacrylate	4.7 UJ	4.3 UJ	4.8 U	4.5 U	4.4 U
Methylene Chloride	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Pentachloroethane	24 UJ	22 UJ	24 UJ	22 UJ	22 UJ
Propionitrile	94 U	87 U	95 U	89 U	87 U
Styrene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 R
Tetrachloroethene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Toluene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
trans-12-Dichloroethene	4.7 U	4.3 U	4.8 UJ	4.5 UJ	4.4 UJ
trans-13-Dichloropropene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
trans-14-Dichloro-2-butene	9.4 U	8.7 U	9.5 U	8.9 U	8.7 U
Trichloroethene	4.7 U	4.3 U	4.8 U	4.5 U	4.4 UJ
Trichlorofluoromethane	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Vinyl acetate	9.4 U	8.7 U	9.5 U	8.9 U	8.7 R
Vinyl chloride	4.7 U	4.3 U	4.8 U	4.5 U	4.4 U
Xylenes Total	9.4 U	8.7 U	9.5 U	8.9 U	8.7 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB09**	**68SB09**	**68SB10**	**68SB10**	**68SB10**
Sample ID	**68SB09-01**	**68SB09-02**	**68SB10-01**	**68SB10-01D**	**68SB10-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(7.0 - 9.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**
Semivolatile Organic Compounds (ug/kg)					
11'-Biphenyl	400 U	410 U	390 U	380 U	440 U
1245-Tetrachlorobenzene	400 U	410 U	390 U	380 U	440 U
124-Trichlorobenzene	400 U	410 U	390 U	380 U	440 U
12-Dichlorobenzene	400 U	410 U	390 U	380 U	440 U
135-Trinitrobenzene	400 U	410 U	390 U	380 U	440 U
13-Dichlorobenzene	400 U	410 U	390 U	380 U	440 U
13-Dinitrobenzene	400 U	410 U	390 U	380 U	440 U
14-Dichlorobenzene	400 U	410 U	390 U	380 U	440 U
14-Dioxane	400 UJ	410 U	390 UJ	380 UJ	440 UJ
14-Naphthoquinone	400 U	410 U	390 U	380 U	440 U
1-Naphthylamine	400 U	410 U	390 U	380 U	440 U
2346-Tetrachlorophenol	400 U	410 U	390 U	380 U	440 U
245-Trichlorophenol	400 U	410 U	390 U	380 U	440 U
246-Trichlorophenol	400 U	410 U	390 U	380 U	440 U
24-Dichlorophenol	400 U	410 U	390 U	380 U	440 U
24-Dimethylphenol	400 U	410 U	390 U	380 U	440 U
24-Dinitrophenol	2000 UJ	2100 U	2000 UJ	2000 UJ	2300 UJ
24-Dinitrotoluene	400 U	410 U	390 U	380 U	440 U
26-Dichlorophenol	400 U	410 U	390 U	380 U	440 U
26-Dinitrotoluene	400 U	410 U	390 U	380 U	440 U
2-Acetylaminofluorene	400 U	410 U	390 U	380 U	440 U
2-Chloronaphthalene	400 U	410 U	390 U	380 U	440 U
2-Chlorophenol	400 U	410 U	390 U	380 U	440 U
2-Methylphenol	400 U	410 U	390 U	380 U	440 U
2-Naphthylamine	400 U	410 U	390 U	380 U	440 U
2-Nitroaniline	2000 U	2100 U	2000 U	2000 U	2300 U
2-Nitrophenol	400 U	410 U	390 U	380 U	440 U
2-Picoline	400 UJ	410 UJ	390 UJ	380 UJ	440 U
2-Toluidine	400 U	410 U	390 U	380 U	440 U
3 & 4 Methylphenol	400 U	410 U	390 U	380 U	440 U
33'-Dichlorobenzidine	790 U	820 U	780 U	760 U	880 U
33'-Dimethylbenzidine	2000 U	2100 U	2000 U	2000 U	2300 U
3-Methylcholanthrene	400 U	410 U	390 U	380 U	440 U
3-Nitroaniline	2000 U	2100 U	2000 U	2000 U	2300 U
46-Dinitro-2-methylphenol	2000 U	2100 U	2000 U	2000 U	2300 U
4-Aminobiphenyl	400 U	410 U	390 U	380 U	440 U
4-Bromophenyl phenyl ether	400 U	410 U	390 U	380 U	440 U
4-Chloro-3-methylphenol	400 U	410 U	390 U	380 U	440 U
4-Chloroaniline	790 U	820 U	780 U	760 U	880 U
4-Chlorophenyl phenyl ether	400 U	410 U	390 U	380 U	440 U
4-Nitroaniline	2000 U	2100 U	2000 U	2000 U	2300 U
4-Nitrophenol	2000 U	2100 U	2000 U	2000 U	2300 U
4-Nitroquinoline-1-oxide	4000 R	4100 U	3900 R	3800 R	4400 R
712-Dimethylbenz(a)anthracene	400 U	410 U	390 U	380 U	440 U
Acetophenone	400 U	410 U	390 U	380 U	440 U
alphaalpha-Dimethyl phenethylamine	80000 UJ	83000 U	79000 UJ	77000 UJ	89000 UJ
Aniline	790 U	820 U	780 U	760 U	880 U
Aramite Total	400 U	410 U	390 U	380 U	440 U
Benzyl alcohol	400 U	410 U	390 U	380 U	440 U
Bis(2-chloroethoxy)methane	400 U	410 U	390 U	380 U	440 U
Bis(2-chloroethyl)ether	400 U	410 U	390 U	380 U	440 U
Bis(2-ethylhexyl) phthalate	400 U	410 U	390 U	380 U	440 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB09**	**68SB09**	**68SB10**	**68SB10**	**68SB10**
Sample ID	**68SB09-01**	**68SB09-02**	**68SB10-01**	**68SB10-01D**	**68SB10-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(7.0 - 9.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**
Semivolatile Organic Compounds (ug/kg)					
bis(chloroisopropyl) ether	400 U	410 U	390 U	380 U	440 U
Butyl benzyl phthalate	400 U	410 U	390 U	380 U	440 U
Diallate	400 U	410 UJ	390 U	380 U	440 U
Dibenzofuran	400 U	410 U	390 U	380 U	440 U
Diethyl phthalate	400 U	410 U	390 U	380 U	440 U
Dimethoate	400 U	410 U	390 U	380 U	440 UJ
Dimethyl phthalate	400 U	410 U	390 U	380 U	440 U
Di-n-butyl phthalate	400 U	410 U	390 U	380 U	440 U
Di-n-octyl phthalate	400 U	410 U	390 U	380 U	440 U
Dinoseb	400 U	410 U	390 U	380 U	440 U
Disulfoton	400 U	410 U	390 U	380 U	440 U
Ethyl methanesulfonate	400 U	410 U	390 U	380 U	440 U
Famphur	400 U	410 U	390 U	380 U	440 U
Hexachlorobenzene	400 U	410 U	390 U	380 U	440 U
Hexachlorobutadiene	400 U	410 U	390 U	380 U	440 U
Hexachlorocyclopentadiene	400 U	410 U	390 U	380 U	440 U
Hexachloroethane	400 U	410 U	390 U	380 U	440 U
Hexachlorophene	200000 UJ	210000 U	200000 UJ	200000 UJ	230000 U
Hexachloropropene	400 UJ	410 U	390 UJ	380 UJ	440 U
Isophorone	400 U	410 U	390 U	380 U	440 U
Isosafrole	400 U	410 U	390 U	380 U	440 U
Methapyrilene	80000 U	83000 U	79000 U	77000 U	89000 U
Methyl methanesulfonate	400 U	410 U	390 U	380 U	440 U
Methyl parathion	400 U	410 U	390 U	380 U	440 U
Nitrobenzene	400 U	410 U	390 U	380 U	440 U
N-Nitro-o-toluidine	400 U	410 U	390 U	380 U	440 U
N-Nitrosodiethylamine	400 UJ	410 U	390 UJ	380 UJ	440 U
N-Nitrosodimethylamine	400 U	410 U	390 U	380 U	440 U
N-Nitrosodi-n-butylamine	400 U	410 U	390 U	380 U	440 U
N-Nitrosodi-n-propylamine	400 U	410 U	390 U	380 U	440 U
N-Nitrosodiphenylamine	400 U	410 U	390 U	380 U	440 U
N-Nitrosomethylethylamine	400 U	410 U	390 U	380 U	440 U
N-Nitrosomorpholine	400 U	410 U	390 U	380 U	440 U
N-Nitrosopiperidine	400 U	410 U	390 U	380 U	440 U
N-Nitrosopyrrolidine	400 U	410 U	390 U	380 U	440 U
oo'o"-Triethylphosphorothioate	400 U	410 U	390 U	380 U	440 UJ
Parathion	400 U	410 U	390 U	380 U	440 U
p-Dimethylamino azobenzene	400 U	410 U	390 U	380 U	440 U
Pentachlorobenzene	400 U	410 U	390 U	380 U	440 U
Pentachloronitrobenzene	400 U	410 U	390 U	380 U	440 U
Pentachlorophenol	2000 U	2100 U	2000 U	2000 U	2300 U
Phenacetin	400 U	410 U	390 U	380 U	440 U
Phenol	400 U	410 U	390 U	380 U	440 U
Phorate	400 U	410 U	390 U	380 U	440 UJ
p-Phenylene diamine	2000 U	2100 U	2000 U	2000 U	2300 U
Pronamide	400 U	410 U	390 U	380 U	440 U
Pyridine	400 U	410 U	390 U	380 U	440 U
Safrole Total	400 U	410 U	390 U	380 U	440 U
Sulfotepp	400 U	410 U	390 U	380 U	440 U
Thionazin	400 U	410 U	390 U	380 U	440 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN SUBSURFACE SOIL - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68SB09**	**68SB09**	**68SB10**	**68SB10**	**68SB10**
Sample ID	**68SB09-01**	**68SB09-02**	**68SB10-01**	**68SB10-01D**	**68SB10-02**
Sampling Date	**11/14/06**	**11/14/06**	**11/15/06**	**11/15/06**	**11/15/06**
Sample Depth (ft bgs)	**(5.0 - 7.0)**	**(7.0 - 9.0)**	**(5.0 - 7.0)**	**(5.0 - 7.0)**	**(12.0 - 14.0)**
Low-Level PAHs (ug/kg)					
1-Methylnaphthalene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
2-Methylnaphthalene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Acenaphthene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Acenaphthylene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Anthracene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Benzo[a]anthracene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Benzo[a]pyrene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 UJ
Benzo[b]fluoranthene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Benzo[ghi]perylene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Benzo[k]fluoranthene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Chrysene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Dibenz(ah)anthracene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Fluoranthene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 UJ
Fluorene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Indeno[123-cd]pyrene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Naphthalene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Phenanthrene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
Pyrene	8.0 U	8.3 U	7.9 U	7.8 U	8.9 U
PCBs (ug/kg)					
Aroclor 1016	40 U	41 U	39 U	38 U	44 U
Aroclor 1221	81 U	84 U	78 U	77 U	89 U
Aroclor 1232	40 U	41 U	39 U	38 U	44 U
Aroclor 1242	40 U	41 U	39 U	38 U	44 U
Aroclor 1248	40 U	41 U	39 U	38 U	44 U
Aroclor 1254	40 U	41 U	39 U	38 U	44 U
Aroclor 1260	40 U	41 U	39 U	38 U	44 U
Total Petroleum Hydrocarbons (mg/kg)					
Diesel Range Organics	4.0 U	4.1 U	3.9 U	3.8 U	4.4 U
Gasoline Range Organics	0.22 U	0.20 U	0.22 U	0.21 U	0.19 U
Metals (mg/kg)					
Antimony	4.5 U	4.8 UJ	4.3 UJ	4.4 UJ	4.9 UJ
Arsenic	1.0 J	0.94 J	0.85 J	1.8 J	1.4 J
Barium	60 J	36 J	26 J	52 J	47 J
Beryllium	0.31 J	0.24 J	0.34 J	0.36 J	0.30 J
Cadmium	1.1 U	1.2 U	1.1 U	0.087 J	0.094 J
Chromium	41 J	31	23	22	34
Cobalt	14	9.8 J	4.7 J	13 J	16 J
Copper	53 J	45 J	32 J	34 J	37 J
Lead	2.0	1.9	1.9	2.9	2.1
Nickel	16	12	9.6	11	12
Selenium	0.28 J	2.4 U	2.2 U	0.22 J	0.27 J
Silver	2.3 U	2.4 U	2.2 U	2.2 U	2.5 U
Thallium	2.3 U	2.4 U	2.2 U	2.2 U	2.5 U
Tin	11 UJ	12 UJ	11 UJ	11 UJ	12 UJ
Vanadium	160 J	140	98	130	140
Zinc	64 J	53 J	48 J	43 J	45 J
Mercury -7471A	0.024 U	0.035 J	0.11 J	0.082 J	0.029 J
Cyanide Total - 9012A	0.59 U	0.61 U	0.57 U	0.57 U	0.66 U
Sulfide - 9034	30 U	31 U	29 U	29 U	33 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68TW01**	**68TW02**	**68TW04**	**68TW05**	**68TW05**
Sample ID	**68TW01**	**68TW02**	**68TW04**	**68TW05**	**68TW05D**
Sampling Date	**11/16/06**	**11/16/06**	**11/16/06**	**11/14/06**	**11/14/06**
Volatile Organic Compounds (ug/L)					
1112-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
111-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1122-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
112-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
123-Trichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
12-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
12-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
12-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Chloro-13-butadiene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U
3-Chloro-1-propene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	25 U	25 U	25 U	25 U	25 U
Acetonitrile	40 U	40 U	40 U	40 U	40 U
Acrolein	20 U	20 U	20 U	20 U	20 U
Acrylonitrile	20 U	20 U	20 U	20 U	20 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
Carbon disulfide	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Carbon tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorodibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-13-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorobromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
Ethyl methacrylate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Iodomethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isobutanol	40 R	40 R	40 R	40 R	40 R
Methacrylonitrile	20 U	20 U	20 U	20 U	20 U
Methyl Ethyl Ketone	10 U	10 U	10 U	10 U	10 U
methyl isobutyl ketone	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Methyl methacrylate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Pentachloroethane	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
Propionitrile	20 U	20 U	20 U	20 U	20 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-12-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-13-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-14-Dichloro-2-butene	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl acetate	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes Total	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW01**	**68TW02**	**68TW04**	**68TW05**	**68TW05D**
Sampling Date	**11/16/06**	**11/16/06**	**11/16/06**	**11/14/06**	**11/14/06**
Semivolatile Organic Compounds (ug/L)					
11'-Biphenyl	NA	NA	11 U	10 U	10 U
1245-Tetrachlorobenzene	NA	NA	11 U	10 U	10 U
124-Trichlorobenzene	NA	NA	11 U	10 U	10 U
12-Dichlorobenzene	NA	NA	11 U	10 U	10 U
135-Trinitrobenzene	NA	NA	11 UJ	10 U	10 UJ
13-Dichlorobenzene	NA	NA	11 U	10 U	10 U
13-Dinitrobenzene	NA	NA	11 U	10 U	10 U
14-Dichlorobenzene	NA	NA	11 U	10 U	10 U
14-Dioxane	NA	NA	11 U	10 U	10 U
14-Naphthoquinone	NA	NA	11 U	10 U	10 U
1-Naphthylamine	NA	NA	11 U	10 U	10 U
2346-Tetrachlorophenol	NA	NA	11 U	10 U	10 U
245-Trichlorophenol	NA	NA	11 U	10 U	10 U
246-Trichlorophenol	NA	NA	11 U	10 U	10 U
24-Dichlorophenol	NA	NA	11 U	10 U	10 U
24-Dimethylphenol	NA	NA	11 U	10 U	10 U
24-Dinitrophenol	NA	NA	57 U	50 U	50 U
24-Dinitrotoluene	NA	NA	11 U	10 U	10 U
26-Dichlorophenol	NA	NA	11 U	10 U	10 U
26-Dinitrotoluene	NA	NA	11 U	10 U	10 U
2-Acetylaminofluorene	NA	NA	11 U	10 U	10 U
2-Chloronaphthalene	NA	NA	11 U	10 U	10 U
2-Chlorophenol	NA	NA	11 U	10 U	10 U
2-Methylphenol	NA	NA	11 U	10 U	10 U
2-Naphthylamine	NA	NA	11 U	10 U	10 U
2-Nitroaniline	NA	NA	57 U	50 U	50 U
2-Nitrophenol	NA	NA	11 U	10 U	10 U
2-Picoline	NA	NA	11 U	10 UJ	10 UJ
2-Toluidine	NA	NA	11 U	10 U	10 U
3 & 4 Methylphenol	NA	NA	11 U	10 U	10 U
33'-Dichlorobenzidine	NA	NA	23 U	20 U	20 U
33'-Dimethylbenzidine	NA	NA	23 U	20 U	20 U
3-Methylcholanthrene	NA	NA	11 U	10 U	10 U
3-Nitroaniline	NA	NA	57 U	50 U	50 U
46-Dinitro-2-methylphenol	NA	NA	57 U	50 U	50 U
4-Aminobiphenyl	NA	NA	11 U	10 U	10 U
4-Bromophenyl phenyl ether	NA	NA	11 U	10 U	10 U
4-Chloro-3-methylphenol	NA	NA	11 U	10 U	10 U
4-Chloroaniline	NA	NA	23 U	20 U	20 U
4-Chlorophenyl phenyl ether	NA	NA	11 U	10 U	10 U
4-Nitroaniline	NA	NA	57 U	50 U	50 U
4-Nitrophenol	NA	NA	57 U	50 U	50 U
4-Nitroquinoline-1-oxide	NA	NA	23 R	20 U	20 U
712-Dimethylbenz(a)anthracene	NA	NA	11 U	10 U	10 U
Acetophenone	NA	NA	11 U	10 U	10 U
alphaalpha-Dimethyl phenethylamine	NA	NA	2300 U	2000 U	2000 UJ
Aniline	NA	NA	23 U	20 U	20 U
Aramite Total	NA	NA	11 U	10 UJ	10 U
Benzyl alcohol	NA	NA	11 U	10 U	10 U
Bis(2-chloroethoxy)methane	NA	NA	11 U	10 U	10 U
Bis(2-chloroethyl)ether	NA	NA	11 U	10 U	10 U
Bis(2-ethylhexyl) phthalate	NA	NA	11 U	10 U	10 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW01**	**68TW02**	**68TW04**	**68TW05**	**68TW05D**
Sampling Date	**11/16/06**	**11/16/06**	**11/16/06**	**11/14/06**	**11/14/06**
Semivolatile Organic Compounds (ug/L)					
bis(chloroisopropyl) ether	NA	NA	11 U	10 U	10 U
Butyl benzyl phthalate	NA	NA	11 U	10 U	10 U
Diallate	NA	NA	11 U	10 U	10 U
Dibenzofuran	NA	NA	11 U	10 U	10 U
Diethyl phthalate	NA	NA	11 U	10 U	10 U
Dimethoate	NA	NA	11 UJ	10 U	10 U
Dimethyl phthalate	NA	NA	11 U	10 U	10 U
Di-n-butyl phthalate	NA	NA	11 U	10 U	10 U
Di-n-octyl phthalate	NA	NA	11 U	10 U	10 U
Dinoseb	NA	NA	11 U	10 U	10 U
Disulfoton	NA	NA	11 U	10 U	10 U
Ethyl methanesulfonate	NA	NA	11 U	10 U	10 U
Famphur	NA	NA	11 U	10 U	10 U
Hexachlorobenzene	NA	NA	11 U	10 U	10 U
Hexachlorobutadiene	NA	NA	11 U	10 U	10 U
Hexachlorocyclopentadiene	NA	NA	11 U	10 U	10 U
Hexachloroethane	NA	NA	11 U	10 U	10 U
Hexachlorophene	NA	NA	5700 UJ	5000 U	5000 U
Hexachloropropene	NA	NA	11 U	10 U	10 U
Isophorone	NA	NA	11 U	10 U	10 U
Isosafrole	NA	NA	11 U	10 U	10 U
Methapyrilene	NA	NA	2300 U	2000 UJ	2000 U
Methyl methanesulfonate	NA	NA	11 U	10 U	10 U
Methyl parathion	NA	NA	11 U	10 UJ	10 U
Nitrobenzene	NA	NA	11 U	10 U	10 U
N-Nitro-o-toluidine	NA	NA	11 U	10 U	10 U
N-Nitrosodiethylamine	NA	NA	11 U	10 U	10 U
N-Nitrosodimethylamine	NA	NA	11 U	10 U	10 U
N-Nitrosodi-n-butylamine	NA	NA	11 U	10 U	10 U
N-Nitrosodi-n-propylamine	NA	NA	11 U	10 U	10 U
N-Nitrosodiphenylamine	NA	NA	11 U	10 U	10 U
N-Nitrosomethylethylamine	NA	NA	11 U	10 U	10 U
N-Nitrosomorpholine	NA	NA	11 U	10 U	10 U
N-Nitrosopiperidine	NA	NA	11 U	10 U	10 U
N-Nitrosopyrrolidine	NA	NA	11 U	10 U	10 U
oo'o"-Triethylphosphorothioate	NA	NA	11 U	10 U	10 U
Parathion	NA	NA	11 U	10 U	10 U
p-Dimethylamino azobenzene	NA	NA	11 U	10 U	10 U
Pentachlorobenzene	NA	NA	11 U	10 U	10 U
Pentachloronitrobenzene	NA	NA	11 U	10 U	10 U
Pentachlorophenol	NA	NA	57 U	50 U	50 U
Phenacetin	NA	NA	11 U	10 U	10 U
Phenol	NA	NA	11 U	10 U	10 U
Phorate	NA	NA	11 UJ	10 U	10 U
p-Phenylene diamine	NA	NA	2300 U	2000 U	2000 U
Pronamide	NA	NA	11 U	10 U	10 U
Pyridine	NA	NA	57 U	50 U	50 U
Safrole Total	NA	NA	11 U	10 U	10 U
Sulfotepp	NA	NA	11 U	10 U	10 U
Thionazin	NA	NA	11 U	10 U	10 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW01**	**68TW02**	**68TW04**	**68TW05**	**68TW05D**
Sampling Date	**11/16/06**	**11/16/06**	**11/16/06**	**11/14/06**	**11/14/06**
Low Level PAHs (ug/L)					
1-Methylnaphthalene	NA	0.19 U	0.20 U	0.20 U	0.20 U
2-Methylnaphthalene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Acenaphthene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Acenaphthylene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Anthracene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Benzo[a]anthracene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Benzo[a]pyrene	NA	0.19 U	0.20 U	0.20 UJ	0.20 U
Benzo[b]fluoranthene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Benzo[ghi]perylene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Benzo[k]fluoranthene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Chrysene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Dibenz(ah)anthracene	NA	0.19 U	0.20 U	0.20 UJ	0.20 U
Fluoranthene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Fluorene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Indeno[123-cd]pyrene	NA	0.19 U	0.20 U	0.20 UJ	0.20 U
Naphthalene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Phenanthrene	NA	0.19 U	0.20 U	0.20 U	0.20 U
Pyrene	NA	0.19 U	0.20 U	0.20 U	0.20 U
PCBs (ug/L)					
Aroclor 1016	1.7 UJ	NA	0.98 UJ	0.98 U	0.98 UJ
Aroclor 1221	3.3 UJ	NA	2.0 UJ	2.0 U	2.0 UJ
Aroclor 1232	1.7 UJ	NA	0.98 UJ	0.98 U	0.98 UJ
Aroclor 1242	1.7 UJ	NA	0.98 UJ	0.98 U	0.98 UJ
Aroclor 1248	1.7 UJ	NA	0.98 UJ	0.98 U	0.98 UJ
Aroclor 1254	1.7 UJ	NA	0.98 UJ	0.98 U	0.98 UJ
Aroclor 1260	1.7 UJ	NA	0.98 UJ	0.98 U	0.98 UJ
Total Petroleum Hydrocarbons (mg/L)					
Diesel Range Organics [C10-C28]	0.18 U	0.10 U	0.17 U	0.10 U	0.096 U
Gasoline Range Organics (GRO)-C6-C10	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Total Metals (ug/L)					
Antimony	20 U	NA	20 U	20 U	20 U
Arsenic	3.0 J	NA	1.6 J	10 U	10 U
Barium	150 J	NA	17 J	62 J	84 J
Beryllium	0.71 J	NA	4.0 U	4.0 U	4.0 U
Cadmium	5.0 U	NA	5.0 U	5.0 U	5.0 U
Chromium	39 J	NA	92 J	8.2 J	8.1 J
Cobalt	19 J	NA	2.0 J	3.9 J	8.5 J
Copper	50 R	NA	65 R	20 U	20 U
Lead	4.8 J	NA	2.1 J	0.66 J	0.96 J
Nickel	40 U	NA	40 U	40 U	40 U
Selenium	10 U	NA	10 U	10 U	10 U
Silver	10 U	NA	10 U	10 U	10 U
Thallium	10 UJ	NA	10 U	10 U	10 U
Tin	1.7 J	NA	10 UJ	10 UJ	10 UJ
Vanadium	210 J	NA	160 J	34 J	33 J
Zinc	80 J	NA	24 J	21 J	22 J
Mercury - 7470A (ug/L)	0.20 U	NA	0.20 U	0.20 U	0.13 J
Cyanide Total - 9012A (mg/L)	0.010 U	NA	0.010 U	0.010 U	0.010 U
Sulfide - 9034 (mg/L)	1.0 U	NA	1.0 U	1.0 U	1.0 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW01**	**68TW02**	**68TW04**	**68TW05**	**68TW05D**
Sampling Date	**11/16/06**	**11/16/06**	**11/16/06**	**11/14/06**	**11/14/06**
Dissolved Metals (ug/L)					
Antimony Dissolved	20 U	20 U	20 U	20 U	20 U
Arsenic Dissolved	10 U	10 U	10 U	10 U	10 U
Barium Dissolved	48	39	15	39	40
Beryllium Dissolved	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Cadmium Dissolved	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chromium Dissolved	10 U	10 U	10 U	10 U	10 U
Cobalt Dissolved	11	8.6 J	7.6 J	1.4 J	0.89 J
Copper Dissolved	20 U	20 U	20 U	20 U	20 U
Lead Dissolved	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Nickel Dissolved	2.4 J	2.8 J	1.5 J	0.96 J	0.99 J
Selenium Dissolved	4.0 J	1.6 J	1.7 J	10 U	10 U
Silver Dissolved	10 U	10 U	10 U	10 U	10 U
Thallium Dissolved	10 U	10 U	10 U	10 U	10 U
Tin Dissolved	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Vanadium Dissolved	6.6 J	10	3.1 J	3.7 J	3.8 J
Zinc Dissolved	6.4 J	10 J	6.8 J	4.8 J	5.4 J
Mercury Dissolved - 7470A (ug/L)	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**68TW06**	**68TW07**	**68TW08**	**68TW09**	**68TW10**
Sample ID	**68TW06**	**68TW07**	**68TW08**	**68TW09**	**68TW10**
Sampling Date	**11/15/06**	**11/16/06**	**11/16/06**	**11/16/06**	**11/16/06**
Volatile Organic Compounds (ug/L)					
1112-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
111-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1122-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
112-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
123-Trichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
12-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
12-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
12-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Chloro-13-butadiene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U
3-Chloro-1-propene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	25 U	25 U	25 U	9.1 J	25 U
Acetonitrile	40 U	40 U	40 U	40 U	40 U
Acrolein	20 U	20 U	20 U	20 U	20 U
Acrylonitrile	20 U	20 U	20 U	20 U	20 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
Carbon disulfide	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Carbon tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorodibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-13-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorobromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
Ethyl methacrylate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Iodomethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isobutanol	40 R	40 R	40 R	40 R	40 R
Methacrylonitrile	20 U	20 U	20 U	20 U	20 U
Methyl Ethyl Ketone	10 U	2.0 J	1.8 J	10 U	10 U
methyl isobutyl ketone	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Methyl methacrylate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Pentachloroethane	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
Propionitrile	20 U	20 U	20 U	20 U	20 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-12-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-13-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-14-Dichloro-2-butene	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl acetate	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes Total	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW06**	**68TW07**	**68TW08**	**68TW09**	**68TW10**
Sampling Date	**11/15/06**	**11/16/06**	**11/16/06**	**11/16/06**	**11/16/06**
Semivolatile Organic Compounds (ug/L)					
11'-Biphenyl	10 U	11 U	9.6 U	10 U	10 U
1245-Tetrachlorobenzene	10 U	11 U	9.6 U	10 U	10 U
124-Trichlorobenzene	10 U	11 U	9.6 U	10 U	10 U
12-Dichlorobenzene	10 U	11 U	9.6 U	10 U	10 U
135-Trinitrobenzene	10 U	11 UJ	9.6 U	10 UJ	10 UJ
13-Dichlorobenzene	10 U	11 U	9.6 U	10 U	10 U
13-Dinitrobenzene	10 U	11 U	9.6 U	10 U	10 U
14-Dichlorobenzene	10 U	11 U	9.6 U	10 U	10 U
14-Dioxane	10 UJ	11 U	9.6 UJ	10 U	10 U
14-Naphthoquinone	10 U	11 U	9.6 U	10 U	10 U
1-Naphthylamine	10 U	11 U	9.6 U	10 U	10 U
2346-Tetrachlorophenol	10 U	11 U	9.6 U	10 U	10 U
245-Trichlorophenol	10 U	11 U	9.6 U	10 U	10 U
246-Trichlorophenol	10 U	11 U	9.6 U	10 U	10 U
24-Dichlorophenol	10 U	11 U	9.6 U	10 U	10 U
24-Dimethylphenol	10 U	11 U	9.6 U	10 U	10 U
24-Dinitrophenol	50 UJ	57 U	48 UJ	50 U	50 U
24-Dinitrotoluene	10 U	11 U	9.6 U	10 U	10 U
26-Dichlorophenol	10 U	11 U	9.6 U	10 U	10 U
26-Dinitrotoluene	10 U	11 U	9.6 U	10 U	10 U
2-Acetylaminofluorene	10 U	11 U	9.6 U	10 U	10 U
2-Chloronaphthalene	10 U	11 U	9.6 U	10 U	10 U
2-Chlorophenol	10 U	11 U	9.6 U	10 U	10 U
2-Methylphenol	10 U	11 U	9.6 U	1.5 J	10 U
2-Naphthylamine	10 U	11 U	9.6 U	10 U	10 U
2-Nitroaniline	50 U	57 U	48 U	50 U	50 U
2-Nitrophenol	10 U	11 U	9.6 U	10 U	10 U
2-Picoline	10 U	11 U	9.6 U	10 U	10 U
2-Toluidine	10 U	11 U	9.6 U	10 U	10 U
3 & 4 Methylphenol	10 U	11 U	9.6 U	10 U	10 U
33'-Dichlorobenzidine	20 U	23 U	19 U	20 U	20 U
33'-Dimethylbenzidine	20 U	23 U	19 U	20 U	20 U
3-Methylcholanthrene	10 U	11 U	9.6 U	10 U	10 U
3-Nitroaniline	50 U	57 U	48 U	50 U	50 U
46-Dinitro-2-methylphenol	50 U	57 U	48 U	50 U	50 U
4-Aminobiphenyl	10 U	11 U	9.6 U	10 U	10 U
4-Bromophenyl phenyl ether	10 U	11 U	9.6 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	11 U	9.6 U	10 U	10 U
4-Chloroaniline	20 U	23 U	19 U	20 U	20 U
4-Chlorophenyl phenyl ether	10 U	11 U	9.6 U	10 U	10 U
4-Nitroaniline	50 U	57 U	48 U	50 U	50 U
4-Nitrophenol	50 U	57 U	48 U	50 U	50 U
4-Nitroquinoline-1-oxide	20 R	23 R	19 R	20 R	20 R
712-Dimethylbenz(a)anthracene	10 U	11 U	9.6 U	10 U	10 U
Acetophenone	10 U	11 U	9.6 U	10 U	10 U
alphaalpha-Dimethyl phenethylamine	2000 UJ	2300 U	1900 UJ	2000 U	2000 U
Aniline	20 U	23 U	19 U	20 U	20 U
Aramite Total	10 U	11 U	9.6 U	10 U	10 U
Benzyl alcohol	10 U	11 U	9.6 U	2.7 J	10 U
Bis(2-chloroethoxy)methane	10 U	11 U	9.6 U	10 U	10 U
Bis(2-chloroethyl)ether	10 U	11 U	9.6 U	10 U	10 U
Bis(2-ethylhexyl) phthalate	10 U	11 U	9.6 U	10 U	10 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW06**	**68TW07**	**68TW08**	**68TW09**	**68TW10**
Sampling Date	**11/15/06**	**11/16/06**	**11/16/06**	**11/16/06**	**11/16/06**
Semivolatile Organic Compounds (ug/L)					
bis(chloroisopropyl) ether	10 U	11 U	9.6 U	10 U	10 U
Butyl benzyl phthalate	10 U	11 U	9.6 U	10 U	10 U
Diallate	10 U	11 U	9.6 U	10 U	10 U
Dibenzofuran	10 U	11 U	9.6 U	10 U	10 U
Diethyl phthalate	10 U	11 U	9.6 U	10 U	10 U
Dimethoate	10 UJ	11 UJ	9.6 UJ	10 UJ	10 UJ
Dimethyl phthalate	10 U	11 U	9.6 U	10 U	10 U
Di-n-butyl phthalate	10 U	11 U	9.6 U	10 U	10 U
Di-n-octyl phthalate	10 U	11 U	9.6 U	10 U	10 U
Dinoseb	10 U	11 U	9.6 U	10 U	10 U
Disulfoton	10 U	11 U	9.6 U	10 U	10 U
Ethyl methanesulfonate	10 U	11 U	9.6 U	10 U	10 U
Famphur	10 U	11 U	9.6 U	10 U	10 U
Hexachlorobenzene	10 U	11 U	9.6 U	10 U	10 U
Hexachlorobutadiene	10 U	11 U	9.6 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	11 U	9.6 U	10 U	10 U
Hexachloroethane	10 U	11 U	9.6 U	10 U	10 U
Hexachlorophene	5000 U	5700 UJ	4800 U	5000 UJ	5000 UJ
Hexachloropropene	10 U	11 U	9.6 U	10 U	10 U
Isophorone	10 U	11 U	9.6 U	10 U	10 U
Isosafrole	10 U	11 U	9.6 U	10 U	10 U
Methapyrilene	2000 U	2300 U	1900 U	2000 U	2000 U
Methyl methanesulfonate	10 U	11 U	9.6 U	10 U	10 U
Methyl parathion	10 U	11 U	9.6 U	10 U	10 U
Nitrobenzene	10 U	11 U	9.6 U	10 U	10 U
N-Nitro-o-toluidine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosodiethylamine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosodimethylamine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosodi-n-butylamine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosomethylethylamine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosomorpholine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosopiperidine	10 U	11 U	9.6 U	10 U	10 U
N-Nitrosopyrrolidine	10 U	11 U	9.6 U	10 U	10 U
oo'o"-Triethylphosphorothioate	10 UJ	11 U	9.6 UJ	10 U	10 U
Parathion	10 U	11 U	9.6 U	10 U	10 U
p-Dimethylamino azobenzene	10 U	11 U	9.6 U	10 U	10 U
Pentachlorobenzene	10 U	11 U	9.6 U	10 U	10 U
Pentachloronitrobenzene	10 U	11 U	9.6 U	10 U	10 U
Pentachlorophenol	50 U	57 U	48 U	50 U	50 U
Phenacetin	10 U	11 U	9.6 U	10 U	10 U
Phenol	10 U	11 U	9.6 U	10 U	10 U
Phorate	10 UJ	11 UJ	9.6 UJ	10 UJ	10 UJ
p-Phenylene diamine	2000 U	2300 U	1900 U	2000 U	2000 U
Pronamide	10 U	11 U	9.6 U	10 U	10 U
Pyridine	50 U	57 U	48 U	50 U	50 U
Safrole Total	10 U	11 U	9.6 U	10 U	10 U
Sulfotepp	10 U	11 U	9.6 U	10 U	10 U
Thionazin	10 U	11 U	9.6 U	10 U	10 U

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW06**	**68TW07**	**68TW08**	**68TW09**	**68TW10**
Sampling Date	**11/15/06**	**11/16/06**	**11/16/06**	**11/16/06**	**11/16/06**
Low Level PAHs (ug/L)					
1-Methylnaphthalene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Methylnaphthalene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Acenaphthene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Acenaphthylene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Anthracene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo[a]anthracene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo[a]pyrene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo[b]fluoranthene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo[ghi]perylene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo[k]fluoranthene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Chrysene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Dibenz(ah)anthracene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Fluoranthene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Fluorene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Indeno[123-cd]pyrene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Naphthalene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Phenanthrene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Pyrene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
PCBs (ug/L)					
Aroclor 1016	1.0 U	1.7 UJ	1.0 U	1.0 UJ	0.97 U
Aroclor 1221	2.0 U	3.3 UJ	2.0 U	2.0 UJ	1.9 U
Aroclor 1232	1.0 U	1.7 UJ	1.0 U	1.0 UJ	0.97 U
Aroclor 1242	1.0 U	1.7 UJ	1.0 U	1.0 UJ	0.97 U
Aroclor 1248	1.0 U	1.7 UJ	1.0 U	1.0 UJ	0.97 U
Aroclor 1254	1.0 U	1.7 UJ	1.0 U	1.0 UJ	0.97 U
Aroclor 1260	1.0 U	1.7 UJ	1.0 U	1.0 UJ	0.97 U
Total Petroleum Hydrocarbons (mg/L)					
Diesel Range Organics [C10-C28]	0.10 U	0.10 U	0.13 U	0.21 U	0.75 U
Gasoline Range Organics (GRO)-C6-C10	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Total Metals (ug/L)					
Antimony	20 U	20 U	20 U	NA	20 U
Arsenic	10 U	10 U	1.3 J	NA	10 U
Barium	51 J	68 J	150 J	NA	43 J
Beryllium	4.0 U	4.0 U	0.20 J	NA	4.0 U
Cadmium	0.17 J	5.0 U	5.0 U	NA	5.0 U
Chromium	4.2 J	5.1 J	28 J	NA	6.8 J
Cobalt	1.9 J	8.2 J	24 J	NA	7.4 J
Copper	20 U	20 U	36 R	NA	20 U
Lead	1.1 J	5.0 U	1.7 J	NA	0.77 J
Nickel	40 U	40 U	40 U	NA	40 U
Selenium	10 U	10 U	10 U	NA	10 U
Silver	10 U	10 U	10 U	NA	10 U
Thallium	10 U	10 U	10 U	NA	10 U
Tin	10 UJ	10 UJ	1.3 J	NA	10 UJ
Vanadium	17 J	24 J	100 J	NA	34 J
Zinc	18 J	16 J	45 J	NA	15 J
Mercury - 7470A (ug/L)	0.20 U	0.20 U	0.20 U	NA	0.20 U
Cyanide Total - 9012A (mg/L)	0.010 U	0.010 U	0.010 U	NA	0.010 U
Sulfide - 9034 (mg/L)	1.0 U	1.0 U	1.0 U	NA	1.1

APPENDIX B

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER - PHASE I RFI
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID	**68TW06**	**68TW07**	**68TW08**	**68TW09**	**68TW10**
Sampling Date	**11/15/06**	**11/16/06**	**11/16/06**	**11/16/06**	**11/16/06**
Dissolved Metals (ug/L)					
Antimony Dissolved	20 U	20 U	20 U	20 U	20 U
Arsenic Dissolved	10 U	10 U	10 U	10 U	0.63 J
Barium Dissolved	39	74	53	25	36
Beryllium Dissolved	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Cadmium Dissolved	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chromium Dissolved	10 U	10 U	10 U	10 U	5.9 J
Cobalt Dissolved	3.2 J	11	12	9.5 J	14
Copper Dissolved	20 U	20 U	20 U	20 U	20 U
Lead Dissolved	5.0 U	5.0 U	5.0 U	5.0 U	0.62 J
Nickel Dissolved	1.2 J	3.2 J	3.3 J	3.5 J	4.3 J
Selenium Dissolved	10 U	10 U	10 U	10 U	6.7 J
Silver Dissolved	10 U	10 U	10 U	10 U	10 U
Thallium Dissolved	10 U	10 U	10 U	10 U	10 U
Tin Dissolved	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Vanadium Dissolved	4.0 J	4.5 J	2.6 J	3.8 J	34
Zinc Dissolved	8.6 J	30 J	8.4 J	11 J	16 J
Mercury Dissolved - 7470A (ug/L)	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U

APPENDIX C
PRELIMINARY HUMAN HEALTH RISK CALCULATIONS FOR ARSENIC

Revised: March 5, 2009

TABLE C-1

TOTAL SOIL DATA AND COPC SELECTION SUMMARY
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Contaminant	Criteria (1)	Contaminant Frequency / Range / Location			COPC Selection		Exposure Concentration Selection		
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	Selected as a COPC?	Rationale for Selection or Deletion	95% UCL (3) (ProUCL)	Exposure Concentration	Rationale for Concentration Selection
Arsenic	0.390 C	29/33	0.8 J - 3.4	68SB02-00	YES	ASL	1.55 (NP)	1.55	95% KM (BCA) UCL

Notes:

UCL - Upper Confidence Limit
PRG - Preliminary Remediation Goal
COPC - Chemical of Potential Concern

ug/kg - microgram per kilogram
mg/kg - milligram per kilogram
C = Carcinogenic

J - Analyte present - Reported value is estimated

Rationale Codes:

(ASL) Above Screening Level

Shaded constituents were identified as COPCs for quantitative risk evaluation.

(1) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals.
USEPA Region IX Residential Soil COC Screening Value (derived from USEPA Region IX PRG Table)

(2) ProUCL was used to calculate the 95% UCL and distribution (>4 samples):

Revised: March 5, 2009

TABLE C-2

SUMMARY OF EXPOSURE PARAMETERS
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Parameter	Units	Future Adult Residents RME	Future Young Child Residents RME
Soil			
Ingestion Rate of Soil (IR-S)	mg/day	100 USEPA, 1991	200 USEPA, 1991
Fraction Ingested from Source (Fi)	NA	1 Prof Judge	1 Prof Judge
Exposure Frequency (EF)	days/year	350 USEPA, 1991	350 USEPA, 1991
Exposure Duration (ED)	years	24 USEPA, 1997	6 USEPA, 1997
Exposure Time (ET)	hours/day	24 Prof Judge	24 Prof Judge
Surface Area Available for Contact (SA)	cm2/day	5,700 USEPA, 1997	2,800 USEPA, 1997
Respiration Rate (RR)	m3/hour	1.27 USEPA, 1997	0.69 USEPA, 1997
Conversion Factor (CF)	kg/mg	1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989
Averaging Time (Non-Cancer) (AT-N)	days	8,760 USEPA, 1989	2,190 USEPA, 1989
Other Parameters			
Body Weight (BW)	kg	70 USEPA, 1997	15 USEPA, 1997
Soil to Skin Adherence Factor (AF)	mg/cm2	0.07 USEPA, 1997	0.2 USEPA, 1997
Particulate Emission Factor (PEF)	m3/kg	1.32E+09 Cowherd, et al., 1995	1.32E+09 Cowherd, et al., 1995
Averaging Time (Cancer) (AT-C)	days	25,550 USEPA, 1989	25,550 USEPA, 1989

Notes:

RME - Reasonalble Maximum Exposure
Prof Judge - Professional Judgment
Gastrointestinal absorption efficiencies (GIABS) and dermal absorption factors (ABS) obtained from RAGS Part E (USEPA, 2004).

Cowherd, et al., 1995: Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination. OHEA. EPA/600/8-85/002.
USEPA, 1989. Risk Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual (Part A) Interim Final.
USEPA, 1991. Risk Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual Supplemental Gudiance. "Standard Default Exposure Factors."
USEPA, 1997. Exposure Factors Handbook. Vol. 1: General Factors. ORD. EPA/600/P-95/002Fa.
USEPA, 2004: Risk Assessment Guidance for Superfund Vol 1, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R-99/005.

Revised: March 5, 2009

TABLE C-3

HUMAN HEALTH RISK ASSESSMENT TOXICITY FACTORS
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PERTO RICO, CEIBA, PUERTO RICO

Constituents	Oral CSF $(mg/kg/day)^{-1}$	Inhalation CSF $(mg/kg/day)^{-1}$	Oral RfD $(mg/kg/day)^{-1}$	Inhalation RfD $(mg/kg/day)^{-1}$	Oral Absorption Factors [1]	Oral to Dermal Adjustment [1]	WOE	Target Organ (Systemic Toxicity)	Critical Effect (Systemic Toxicity)
Arsenic	1.50E+00	1.51E+01	3.00E-04	8.57E-06	0.03	100%	A	(o) Skin / CVS	(o) Hyperpigmentation, keratosis, possible vascular complications

Notes:

CSF = Cancer Slope Factor
RfD = Reference Dose
WOE = Weight of Evidence

NA = Not Available
(o) = Toxicty due to oral exposure
(i) = Toxicity due to inhalation exposure

WOE / EPA Group:

A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen — Known/Likely (EPA classes A, B1, B2, C)
D - Not classifiable as a human carcinogen — Cannot be Determined (EPA class D)
E - Evidence of noncarcinogenicity — Not Likely (EPA class E)

Target Organ Abbreviations:

CVS = Cardiovascular System

[1] Gastrointestinal absorption efficiencies (GIABS) and dermal absorption factors (ABS) obtained from RAGS Part E (USEPA, 2004).

Revised: March 5, 2009

TABLE C-4

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	Total Soil	Arsenic	1.1E-06	--	1.3E-07	--	1.2E-06	Skin / CVS	<0.01	--	<0.01	<0.01
			Chemical Total	1.1E-06	--	1.3E-07	--	1.2E-06		<0.01	--	<0.01	<0.01
		Exposure Point Total						1.2E-06					<0.01
	Exposure Medium Total							1.2E-06					<0.01
	Air	Fugative Dust	Arsenic	--	2.5E-09	--	--	2.5E-09	NA	--	--	--	--
			Chemical Total	--	2.5E-09	--	--	2.5E-09		--	--	--	--
		Exposure Point Total						2.5E-09					--
	Exposure Medium Total							2.5E-09					--
Total Soil Total								**1.23E-06**					**<0.01**
Adult Residents Total								**1.23E-06**					**<0.01**

Total Risk Across Total Soil	1.2E-06	Total Hazard Index Across Total Soil	<0.01
Total Risk Across All Media and All Exposure Routes	1.2E-06	Total Hazard Index Across All Media and All Exposure Routes	0.0

Notes:

Target Organ Abbreviations:
CVS = Cardiovascular System

Oral and Dermal Exposure Routes:

Oral / Dermal Cardiovascular System HI =	<0.01
Oral / Dermal Skin HI =	<0.01

Ingestion Pathway Intake:
CDI (mg/kg-day) = C x IR x CF x Fi x EF x ED x 1/BW x 1/AT

Dermal Pathway Intake:
CDI (mg/kg-day) = C x CF x SA x AF x ABS x EF x ED x 1/BW x1/AT

Inhalation Pathway Intake:
CDI (mg/kg-day) = Ca x RR x ET x EF x ED x 1/PEF x 1/BW x1/AT

Carcinogenic Risk =
ILCR = ∑CDI*CSF

Noncarcinogenic Risk =
HQ = ∑CDI/RfD

Revised: March 5, 2009

TABLE C-5

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 68 - FORMER SOUTHERN FIRE TRAINING AREA
CORRECTIVE MEASURES STUDY FINAL REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	Total Soil	Arsenic	2.5E-06	--	2.1E-07	--	2.8E-06	Skin / CVS	0.06	--	<0.01	0.07
			Chemical Total	2.5E-06	--	2.1E-07	--	2.8E-06		0.06	--	<0.01	0.07
		Exposure Point Total						2.8E-06					0.07
	Exposure Medium Total							2.8E-06					0.07
	Air	Fugative Dust	Arsenic	--	1.6E-09	--	--	1.6E-09	NA	--	--	--	--
			Chemical Total	--	1.6E-09	--	--	1.6E-09		--	--	--	--
		Exposure Point Total						1.6E-09					--
	Exposure Medium Total							1.6E-09					--
Total Soil Total								**2.76E-06**					**0.07**
Young Child Residents Total								**2.76E-06**					**0.07**

Total Risk Across Total Soil	2.8E-06	Total Hazard Index Across Total Soil	0.1
Total Risk Across All Media and All Exposure Routes	2.8E-06	Hazard Index Across All Media and All Exposure Routes	0.1

Notes:

Target Organ Abbreviations:
CVS = Cardiovascular System

Oral and Dermal Exposure Routes:

Oral / Dermal Cardiovascular System HI =	0.1
Oral / Dermal Skin HI =	0.1

Ingestion Pathway Intake:
CDI (mg/kg-day) = C x IR x CF x Fi x EF x ED x 1/BW x 1/AT

Dermal Pathway Intake:
CDI (mg/kg-day) = C x CF x SA x AF x ABS x EF x ED x 1/BW x1/AT

Inhalation Pathway Intake:
CDI (mg/kg-day) = Ca x RR x ET x EF x ED x 1/PEF x 1/BW x1/AT

Carcinogenic Risk =
ILCR = ∑CDI*CSF

Noncarcinogenic Risk =
HQ = ∑CDI/RfD

ProUCL RESULTS FOR ARSENIC

Revised: March 5, 2009

ARSENIC IN SURFACE SOIL

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\00Projects\Puerto Rico\SWMU 68\Tables\for CMS\SS Data.wst
Full Precision	OFF
Confidence Coefficient	95%
umber of Bootstrap Operations	2000

Arsenic

General Statistics

Number of Valid Data	18	Number of Detected Data	17
Number of Distinct Detected Data	14	Number of Non-Detect Data	1
		Percent Non-Detects	5.56%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.82	Minimum Detected	-0.198
Maximum Detected	3.4	Maximum Detected	1.224
Mean of Detected	1.565	Mean of Detected	0.376
SD of Detected	0.655	SD of Detected	0.381
Minimum Non-Detect	1.2	Minimum Non-Detect	0.182
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.875	Shapiro Wilk Test Statistic	0.967
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.511	Mean	0.327
SD	0.675	SD	0.424
95% DL/2 (t) UCL	1.788	95% H-Stat (DL/2) UCL	1.741
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.477	Mean in Log Scale	0.35
SD	0.717	SD in Log Scale	0.386
95% MLE (t) UCL	1.771	Mean in Original Scale	1.528
95% MLE (Tiku) UCL	1.782	SD in Original Scale	0.654
		95% Percentile Bootstrap UCL	1.784
		95% BCA Bootstrap UCL	1.868

ARSENIC IN SURFACE SOIL (continued)

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	5.942
Theta Star	0.263
nu star	202
A-D Test Statistic	0.319
5% A-D Critical Value	0.74
K-S Test Statistic	0.74
5% K-S Critical Value	0.209

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.82
Maximum	3.4
Mean	1.527
Median	1.4
SD	0.655
k star	5.767
Theta star	0.265
Nu star	207.6
AppChi2	175.3
95% Gamma Approximate UCL	1.809
95% Adjusted Gamma UCL	1.839

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	1.528
SD	0.636
SE of Mean	0.155
95% KM (t) UCL	1.797
95% KM (z) UCL	1.782
95% KM (jackknife) UCL	1.796
95% KM (bootstrap t) UCL	1.912
95% KM (BCA) UCL	1.783
95% KM (Percentile Bootstrap) UCL	1.786
95% KM (Chebyshev) UCL	2.201
97.5% KM (Chebyshev) UCL	2.493
99% KM (Chebyshev) UCL	3.066

Potential UCLs to Use

95% KM (BCA) UCL	1.783

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ARSENIC IN TOTAL SOIL

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics

Number of Valid Data	33	Number of Detected Data	29
Number of Distinct Detected Data	19	Number of Non-Detect Data	4
		Percent Non-Detects	12.12%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.8	Minimum Detected	-0.223
Maximum Detected	3.4	Maximum Detected	1.224
Mean of Detected	1.446	Mean of Detected	0.3
SD of Detected	0.606	SD of Detected	0.362
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	15
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	18
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	45.45%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.839	Shapiro Wilk Test Statistic	0.946
5% Shapiro Wilk Critical Value	0.926	5% Shapiro Wilk Critical Value	0.926
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.341	Mean	0.196
SD	0.636	SD	0.442
95% DL/2 (t) UCL	1.528	95% H-Stat (DL/2) UCL	1.543
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.204	Mean in Log Scale	0.252
SD	0.793	SD in Log Scale	0.366
95% MLE (t) UCL	1.438	Mean in Original Scale	1.381
95% MLE (Tiku) UCL	1.48	SD in Original Scale	0.595
		95% Percentile Bootstrap UCL	1.561
		95% BCA Bootstrap UCL	1.588

ARSENIC IN TOTAL SOIL (continued)

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	6.676
Theta Star	0.217
nu star	387.2
A-D Test Statistic	0.766
5% A-D Critical Value	0.747
K-S Test Statistic	0.747
5% K-S Critical Value	0.163

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.752
Maximum	3.4
Mean	1.395
Median	1.2
SD	0.589
k star	6.764
Theta star	0.206
Nu star	446.4
AppChi2	398.4
95% Gamma Approximate UCL	1.563
95% Adjusted Gamma UCL	1.572

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.384
SD	0.584
SE of Mean	0.104
95% KM (t) UCL	1.56
95% KM (z) UCL	1.555
95% KM (jackknife) UCL	1.56
95% KM (bootstrap t) UCL	1.607
95% KM (BCA) UCL	1.548
95% KM (Percentile Bootstrap) UCL	1.566
95% KM (Chebyshev) UCL	1.836
97.5% KM (Chebyshev) UCL	2.031
99% KM (Chebyshev) UCL	2.415

Potential UCLs to Use

95% KM (BCA) UCL	1.548