



**FINAL
PHASE I RCRA FACILITY INVESTIGATION
REPORT
SWMU 60 – FORMER LANDFILL AT THE
MARINA**



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



Prepared for:

**Department of the Navy
NAVFAC SOUTHEAST**
North Charleston, South Carolina



Prepared by:

Baker

Michael Baker Jr., Inc.
Moon Township, PA

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

July 22, 2011

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

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DELIVERY ORDER 0002**

Prepared by:

**MICHAEL BAKER JR., INC.
Moon Township, Pennsylvania**

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

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LIST OF ACRONYMS AND ABBREVIATIONS

AET	Apparent Effects Threshold
AFWTF	Atlantic Fleet Weapons Training Facility
APA	Aerial Photographic Analysis
AQUIRE	Aquatic Toxicity Information Retrieval
AST	Aboveground Storage Tank
Baker	Michael Baker Jr., Inc.
bgs	below ground surface
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
CADD	Computer Aided Design and Drafting
CCME	Canadian Council of Ministers of the Environment
CERCLA	Comprehensive Environmental Recovery, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CRQL	Contract Required Quantitation Limit
CSF	Cancer Slope Factor
DGPS	Differential Global Positioning System
DMMP	Dredged Material Management Program
DO	Delivery Order
DPT	Direct Push Technology
DRO	Diesel-Range Organics
E2SS3	Estuarine-Intertidal-Scrub/Shrub
EC ₅₀	Median Effective Concentration
Eco-SSL	Ecological Screening Level
ECOTOX	ECOTOXicolog
ECP	Environmental Condition of Property
EPA	Environmental Protection Agency
EqP	Equilibrium Partitioning
ER-L	Effects Range-Low
ER-M	Effects Range-Median
ESLs	Ecological Screening Levels
F	Fahrenheit
FCV	Final Chronic Value
GIS	Geographic Information System
GPS	Global Positioning System
GRO	Gasoline-Range Organics
HQ	Hazard Quotient
HSA	Hollow-Stem Auger
IAS	Initial Assessment Study
ID	Inside Diameter
IDW	Investigation-Derived Waste
ILCR	Incremental Lifetime Cancer Risk

LIST OF ACRONYMS AND ABBREVIATIONS

(continued)

ISQGs	Interim Freshwater Sediment Quality Guidelines
IUR	Inhalation Unit Risk
J	
	Estimated Value
kg	
	Kilograms
LANTDIV	
	Naval Facilities Engineering Command, Atlantic Division
LC ₅₀	Median Lethal Concentration
LEL	Lowest Effect Level
LLPAH	Low-Level Polynuclear Aromatic Hydrocarbon
LOAEC	Lowest Observed Adverse Effect Concentration
LOEC	Lowest Observed Effect Concentration
LOEL	Lowest Observable Effect Level
M2US2	
	Marine Intertidal Unconsolidated Shore Sand
MATC	Maximum Acceptable Toxicant Concentration
MC	Macro-Core®
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
µg/L	Micrograms per Liter
MGD	Million Gallons per Day
mg/kg	Milligrams per Kilograms
MHSPE	Ministry of Housing, Spatial Planning and Environment
ml	Milliliter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAD	
	North American Datum
NAPR	Naval Activity Puerto Rico
NAVFAC	Naval Facilities Engineering Command
NAWQC	National Ambient Water Quality Criteria
NEESA	Naval Energy and Environmental Support Activity
NOAA	National Oceanic and Atmospheric Administration
NOAEC	No Observed Adverse Effect Concentration
NOEC	No Observed Effect Concentration
NOEL	No Observed Effect Level
NSRR	Naval Station Roosevelt Roads
OP	
	Organo-Phosphorus
OVA	Organic Vapor Analyzer
PAH	
	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PEL	Probable Effects Level
PI	Photo Identified
PID	Photoionization Detector
PMO	Program Management Office
PREQB	Puerto Rico Environmental Quality Board
PRWQS	Puerto Rico Water Quality Standards

LIST OF ACRONYMS AND ABBREVIATIONS

(continued)

PRWQSR	Puerto Rico Water Quality Standards Regulation
PSQGs	Provincial Sediment Quality Guidelines
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
R	Rejected Value
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RTK	Real-Time Kinematic
SCV	Secondary Chronic Values
SDG	Sample Delivery Group
SE	Southeast
SL	Screening Level
SQGs	Sediment Quality Guidelines
SQUIRTs	Screening Quick Reference Tables
SVOC	Semi-Volatile Organic Compound
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TEL	Threshold Effects Level
TGO	Trimble Geometrics Office™
TPH	Total Petroleum Hydrocarbons
U	Nondetect
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This document presents the results of the Phase I Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) Report at Solid Waste Management Unit (SWMU) 60 – Former Landfill at the Marina located at Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico, formerly known as Naval Station Roosevelt Roads (NSRR). This report has been prepared by Michael Baker Jr., Inc. (Baker), for the Navy Base Realignment and Closure (BRAC) Program Management Office (PMO) Southeast (SE) office under contract with the Naval Facilities Engineering Command (NAVFAC), SE (Contract Number N62470-07-D-0502, Delivery Order [DO] 0002).

The United States Environmental Protection Agency (USEPA) issued a RCRA 7003 Administrative Order on Consent (USEPA Docket No. RCRA-02-2007-7301) (USEPA, 2007a) to NAPR which identified SWMU 60 (formerly referred to as Environmental Condition of Property [ECP] 6) as having documented releases of solid and/or hazardous waste and hazardous constituents. The Administrative Order required the preparation and submittal to the USEPA for their approval, an acceptable work plan to complete the equivalent to a Phase I RFI. The Final Phase I RFI Work Plan (Baker, 2007) was approved by USEPA on May 13, 2008. This Phase I RFI Report presents the results of the field investigation conducted in January 2009 following the approved Phase I RFI Work Plan for SWMU 60.

1.1 Purpose of Report

A Phase I RFI is required as outlined in the NAPR RCRA 7003 Order issued by USEPA Region II. The RCRA Order provides for the development of a work plan, field investigation, and reporting on the findings of the investigation with recommendations of follow-up actions necessary to ensure protection of human health and the environment. This report has been prepared to document the findings of the January 2009 Phase I RFI field work, which was implemented to confirm the presence of, and to further characterize volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, total petroleum hydrocarbon (TPH) diesel-range organics (DRO)/gasoline-range organics (GRO), and metals detected in the surface soil, subsurface soil, and groundwater and SVOCs, pesticides, and metals detected in the sediment during the Environmental Condition of Property (ECP) Phase II Investigation.

It should be noted that the samples collected from 60SB04 and 60SB05 were analyzed for TPH DRO and GRO because they are located along the former pipeline associated with the aboveground storage tanks (ASTs). Samples 60SB01 through 60SB03 were not analyzed for TPH DRO/GRO since it is not suspected that these proposed sample locations were impacted by the release of petroleum products from Marina operations.

1.2 Objectives

The objectives of the RFI are to:

- Determine whether contaminants are present from past operations at SWMU 60 (including both a landfill disposal area and activities relating to the Marina), from the completion of field activities (surface and subsurface soil, open water sediment, and groundwater sampling) as described in the approved Phase I RFI Work Plan (Baker, 2007);
- Screen the impacted media for potential human health risks posed by the site;

- Screen the impacted media for potential ecological risks posed by the site; and
- Provide recommendations as to whether additional action is warranted at this SWMU.

1.3 Organization of the Phase I RFI Report

This report is organized into eight sections. Section 1.0 of this document discusses the purpose and objectives of this RFI. Section 2.0 presents a brief summary of the background of NAPR and the history and previous investigations at SWMU 60. Section 3.0 discusses the climatology, topography and regional geology, hydrology and hydrogeology for NAPR. The scope of the field investigation is provided in Section 4.0. Section 5.0 presents and discusses the physical characteristics of the study area observed during this Phase I RFI including the site geology/hydrogeology. Section 6.0 presents the laboratory analytical results performed on the environmental samples and quality assurance/quality control (QA/QC) samples collected during the Phase I RFI with a comparison to appropriate human health and ecological screening values and background values. Section 7.0 presents the conclusions and recommendations from the RFI, while Section 8.0 lists report references.

2.0 BACKGROUND

This section discusses the history and description of NAPR and SWMU 60. This section also includes a summary of the results of previous investigations conducted at SWMU 60.

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 ten 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 41,000), which is about five miles north of NAPR off Route 3. Ceiba (population approximately 18,000) adjoins the west boundary of NAPR (see Figure 2-1).

The facility was commissioned in 1943 as a Naval Operations Base, and re-designated as a Naval Station in 1957. 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 six 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 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 was present (NAVFAC Atlantic, 2005). The Final ECP report recommended completion of a RCRA facility investigation of SWMU 60, which was the basis for the Phase I RFI and this report.

The RCRA 7003 Administrative Order (Environmental Protection Agency [EPA] Docket No. RCRA-02-2007-7301) identified SWMU 60 (formerly referred to as ECP Site 6) as having documented releases of solid and/or hazardous waste and hazardous constituents and required an

acceptable work plan to complete site characterization equivalent to a Phase I RFI. Following a public comment period the Administrative Order became effective on January 29, 2007.

2.2 SWMU 60 Description and History

SWMU 60 – Former Landfill at the Marina covers an area of approximately 12 acres. The majority of the site consists of an active marina (built in the 1970s). This marina covers approximately two thirds of the site. This portion of the site consists of the marina building, docks, concrete walkways, manicured lawns, tennis courts, asphalt roads, and parking lots. The southeastern portion of the site consists of a level area extending to the Ensenada Honda and is covered with secondary growth vegetation. This area is described as estuarine intertidal scrub-shrub broad-leaved evergreen (E2SS3) as shown on Figure 2-3. A small beach classified as marine intertidal unconsolidated shore sand (M2US2) is located on the southern edge of the site also shown on Figure 2-3.

The Aerial Photographic Analysis (APA) conducted as part of the Phase I ECP Report (LANTDIV, 2004) identified this area as Photo Identified (PI) Site 9, due to the observation of solid waste and scrap metal piles in 1958 (see Figure 2-3, 1958 polygon feature). A records review of historic maps and interviews conducted during the Phase I ECP confirmed the former use of this area as a landfill from approximately the 1940s to the 1960s. It is unknown whether buried waste exists at the site. The Phase I ECP physical site inspection observed only small quantities of scrap metal in the area, the majority of which is now covered by the marina. The portion of the site not covered by the marina consists of a level area described as E2SS3. There were no signs of any stains or stressed vegetation observed during the Phase II ECP investigation.

A piping system connecting two ASTs at the Marina was reported to have been used to supply gasoline and diesel to a pump island located next to the refueling dock (CH2MHill, 1999). The use of the ASTs and underground piping system associated with the refueling system reportedly was discontinued and not in operation in 1999 (CH2MHill, 1999). According to Base personnel, the underground piping system was removed after completion of the 1999 Site Characterization Report (CH2MHill, 1999). The phase II Environmental Condition of Property Report (NAVFAC Atlantic, 2005) further indicates that the piping system was removed sometime after 1999.

Figure 2-4 shows the SWMU layout and sample locations from the Phase II ECP plus the location of one existing monitoring well from the Site Characterization. The polygons from the APA have been overlaid on this and other figures to show how these historical areas related to the present site conditions. As discussed in more detail in the following section, the result of the Phase II ECP concluded that SWMU 60 has been impacted by past operations at NAPR and recommended the site be incorporated into the RCRA Corrective Action Program to permit a more detailed assessment.

2.3 Previous Investigations

Two investigations have been conducted at SWMU 60: a Site Characterization (CH2MHill, 1999) and a Phase I/II ECP (NAVFAC Atlantic, 2005). These investigations are discussed in the following subsections.

2.3.1 Site Characterization

A Site Characterization investigation was conducted in 1999 at the Marina to evaluate the degree and extent of potential impacts to soil and groundwater from petroleum products associated with the Marina's former underground petroleum piping system (CH2MHill, 1999). The piping system

was connected to two ASTs at the Marina and was used to supply gasoline and diesel to a pump island located next to the refueling dock. It should be noted that the original gasoline/diesel

ASTs were removed during construction at the Marina (after completion of the 1999 Site Characterization Report) The phase II Environmental Condition of Property Report (NAVFAC Atlantic, 2005) further indicates that the piping system was removed sometime after 1999; however, there are currently three ASTs containing Diesel and Mogas at the same location as the former ASTs. Records indicate that there was a release of petroleum products at the marina from the piping system associated with the ASTs. The piping system associated with the ASTs is no longer in service and was removed some time after the 1999 Site Characterization Report. The location of the ASTs and the former piping system are shown on Figure 2-3.

The objective of the Site Characterization was to identify the horizontal and vertical extent of soil and groundwater impacted by the underground piping system. The exact location of the underground piping system is not known; however Base personnel stated that it was located in the area between the ASTs and the refueling dock on the western shoreline of the SWMU. The Site Characterization investigation consisted of the advancement of 12 soil borings and 4 monitoring wells. Twelve soil borings (Marina-SB1 through Marina-SB12) were advanced at the site in an effort to delineate the extent of soils potentially impacted by petroleum hydrocarbons (as shown in Appendix B). Soil borings were advanced 2 to 4 feet below ground surface (bgs) with a post-hole digger. Soil samples were collected continuously in 2-foot intervals to depths between 3 and 4 feet bgs and terminated when water was encountered at approximately 3 to 4 feet.

Twenty-one soil samples screened with an Organic Vapor Analyzer (OVA) produced detectable vapors, and these samples were sent for laboratory analysis. These samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and TPH GRO and DRO.

At the time of the soil boring installations, the water table across the Marina was encountered at approximately 3 feet bgs. At select boreholes, Teflon[®] tubing was placed in the boring after the water table was encountered and a groundwater sample was collected with a peristaltic pump.

Based on the laboratory analytical data and field observations, four soil borings (Marina-SB1, SB5, SB9, and SB12) were determined to be in areas of petroleum contamination and were converted to permanent monitoring wells (Marina-MW1, MW2, MW3, and MW4 respectively). On May 13 and June 9, 1999, the groundwater samples were collected and sent for analysis for BTEX, TPH (GRO and DRO), polynuclear aromatic hydrocarbons (PAHs), and total and dissolved lead.

TPH GRO concentrations in soil samples were above the Puerto Rico Environmental Quality Board (PREQB) target level of 100 milligrams per kilogram (mg/kg) at four soil boring locations with concentrations ranging from 600 mg/kg to 3,200 mg/kg, as shown on Table B-1 in Appendix B. These borings are all located in the area where the piping associated with the ASTs and refueling operations occurred. Laboratory results from all remaining soil samples collected were below the laboratory method detection limit for TPH GRO.

Groundwater laboratory analytical data results indicated benzene was detected in monitoring well MW3 at a concentration of 190 micrograms per liter ($\mu\text{g/L}$), which is well above the PREQB limit of 5 $\mu\text{g/L}$. TPH GRO was detected at this location at a concentration of 12 mg/L, below the PREQB limit of 50 mg/L. The detection limits for TPH GRO and DRO were high (10,000 $\mu\text{g/L}$ and 25,000 $\mu\text{g/L}$, respectively) in the groundwater samples. Lead was detected at all four monitoring wells in unfiltered and filtered groundwater samples. Both filtered and unfiltered samples for all monitoring wells exceeded the PREQB target level of 15 $\mu\text{g/L}$. Unfiltered lead

ranged from 250 µg/L in MW-3 to 1,400 µg/L in MW-1 and MW-4; filtered lead sample results ranged from 270 µg/L at MW3 to 1,300 µg/L at MW4, as shown on Table B-2 in Appendix B.

In summary, based on field and laboratory data obtained from soil and groundwater sampling activities during the Site Characterization investigation, CH2MHill concluded that petroleum hydrocarbons were detected in the soil and benzene and lead were detected in the groundwater above PREQB target levels at the Marina. Since the elevated concentrations of petroleum hydrocarbons were in the GRO class of hydrocarbons, it was concluded that subsurface impacts were likely related to leaks from the underground piping system. The area of soil contamination appeared to be limited to the area between the ASTs and Ensenada Honda.

2.3.2 Phase I/II ECP Report

The Phase I/II ECP investigation included the sampling of one surface soil, three subsurface soil, two groundwater, and two surface water/sediment samples that were analyzed for Appendix IX VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), organophosphorus (OP) pesticides, chlorinated herbicides, and metals (dissolved only for groundwater samples). Analytical data from the Phase I/II ECP are presented in Appendix C, including comparisons to human health and ecological screening criteria used at that time. The analytical data for metals was also compared to the applicable facility background levels used at that time (2004).

In the surface and subsurface soil VOCs, SVOCs, and pesticides were detected below the USEPA Region III Industrial and Residential Risk Based Concentrations (RBCs). Tables C-1 through C-4 in Appendix C presents the positive detections of organics and inorganics in surface and subsurface soil. The detected constituents are primarily related to fuel and routine pesticide applications, with the exception of tetrachloroethene detected in the surface soil. There were no other organic compounds detected.

Arsenic was detected in surface and subsurface soil above the USEPA Region III Industrial and Residential RBCs, and above background values for subsurface soil used in the ECP Phase II Investigation. Vanadium was detected above USEPA Region III Residential RBCs but below the detected background values.

Groundwater samples collected at depths ranging from less than 4 feet to 9 feet bgs indicated that a few VOCs, SVOC, and inorganic compounds were present in the groundwater. All organic concentrations were low and estimated, as summarized in Tables C-5 and C-6 in Appendix C. Only barium marginally exceeded its EPA Region III Tap Water RBC at 6E-02.

Barium and vanadium were detected in surface water below the Puerto Rico Water Quality Standards and Surface Water Screening Values, as summarized in Table C-9 in Appendix C.

A summary of the sediment and surface water analytical results from the Phase II ECP are provided in Tables C-7 through C-9 in Appendix C. The ECP Phase II Investigation determined that one sediment location (6E-SW/SD01, see Figure 2-4 for previous sample locations) had concentrations of SVOCs that were higher than the Marine Sediment Screening Values. Location 6E-SW/SD01 was placed among several docks that have been used for boat parking/refueling. It should be noted that the marina was built in the 1970s after the landfill ceased operations. Furthermore, a sail boat was noted to have burned near this location while it was docked a few months before the samples were collected. SVOCs (specifically PAHs) were not detected at the other sediment location (6E-SW/SD02), which was not located in the marina. The inorganic detections in the sediment at 6E-SW/SD02 were also much lower.

The soil and groundwater samples collected during the ECP were primarily collected within areas observed to have been disturbed by landfill activities within the 1958 polygons (see Figure 2-4). One or more of these locations were adjacent to the Marina, but not within the area impacted by the AST leakage that was described in Section 2.3.

The Phase I/II ECP Report concluded that fourteen sites had been impacted by past and present operations at NAPR (including the former landfill at the Marina) and recommended that future activities should include additional sampling.

3.0 PHYSICAL CHARACTERISTICS OF STUDY AREA

The physical setting of NAPR was documented in the 1984 Initial Assessment Study (IAS) (Naval Energy and Environmental Support Activity [NEESA], 1984). This information is summarized in the paragraphs that follow.

3.1 Climatology

The climate associated with NAPR is characterized as warm and humid, with frequent showers occurring throughout the year. A major factor affecting the weather is the pattern of trade winds associated with the Bermuda High, the center of which is in the vicinity of 30° North, 30° West. The prevailing wind direction reflects the easterly trade winds. The area receives a surface flow varying between the northeast to the southeast about 75 percent of the year, and as much as 95 percent of the time in July when the easterly winds are strongest. The differential heating of the land and sea during the day tends to give a more northerly component to the flow on the northern side of the island and a more southerly component on the southern side. During the night, a land breeze causes a prevailing southeasterly flow in the north and a prevailing northeasterly flow over the southern coast. The mean annual wind velocity is 5.5 knots, with a minimum in November and a maximum in August. Gales associated with westward moving disturbances in the trade winds or hurricanes passing either north or south of the area have the highest probability of occurrence from June through October.

Uniform temperatures prevail, with small diurnal ranges as a result of insular exposure and the relatively small land areas. The warmest months are August and September, while the coolest are January and February. Mean annual maximum temperatures range from 82.0° Fahrenheit (F) in January to 88.2° F in August. The mean annual minimum temperatures vary from 64.0° F in January to 73.2° F in June. The highest maximum temperature recorded was 95.0° F, while the lowest minimum was 59.0° F. Rain usually occurs at least nine days in every month, with an average of 60 inches per year although a dry winter season occurs from December through April. About 22 thunderstorm-days occur per year, with maximum frequencies of 3 days per month from May through October.

In late summer, the mean sky cover begins a steady decrease from a monthly maximum average of 6.5-tenths coverage in September to a minimum monthly average of 4.4-tenths coverage in February. From March through August, the monthly average cloud cover increases steadily from 4.5- to 6.0 tenths coverage during the period. Over the open sea, a maximum of clouds (usually broken stratocumulus) occurs during early morning, with the skies clearing or becoming scattered with cumulus by afternoon. Completely clear or overcast skies are rare during daylight hours, while clear skies frequently occur at night.

The hurricane season is from mid-June through mid-September; maximum winds exceed 95 knots during severe hurricanes. An average of two tropical storms per year occurs in the study area, one of which usually reaches hurricane intensity.

3.2 Topography

The regional area of NAPR consists of an interrupted, narrow coastal plain with small valleys extending from the Sierra de Luquillo range, which has been severely eroded by streams into valleys several hundreds of feet deep. Slopes of up to 60° are common.

In the immediate area of NAPR, elevations range from sea level to approximately 295 feet. Immediately to the north of the NAPR boundary, the hills rise abruptly to heights of 800 to 1,050

feet above sea level, with the tallest peak located within 2 kilometers of the NAPR boundary. There is a series of three hilly areas on NAPR, two of which separate the southern airfield area from the Port/Industrial, Housing, and Personnel Support areas. The third set of hills is in the Bundy area. These ridgelines not only separate sections of NAPR, but also dictate the degree of allowable development. The ridgeline south of the airfield provides an excellent barrier, which effectively decreases the aircraft-generated noise reaching the Unaccompanied Enlisted Personnel Housing areas to an acceptable level. Relief is low along the shoreline and lagoons and mangrove swamps are common.

3.3 Geology, Hydrology, and Hydrogeology

Subsections 3.3.1 through 3.3.4 below present descriptions of the geologic, hydrologic, and hydrogeologic conditions across NAPR. These are generally applicable, but may or may not be specifically-applicable, to the SWMU 60 area. Site specific geologic, hydrologic, and hydrogeologic information can be referenced in sections 5.2.1 through 5.2.3.

3.3.1 Soils

The soil associations found at NAPR are predominantly of two types typical of humid areas, namely the Swamps-Marshes Association and the Mabi-Rio-Arriba-Cayagua Association, as well as the Descalabrado-Guayama Association, which is typical of dry areas. In addition, isolated areas of the Caguabo-Mucara-Naranjito Association, the Coloso-Toa-Bajura Association, and the Jacana Amelia-Fraternidad Association are found at NAPR.

The Swamps-Marshes and Mabi-Rio-Arriba-Cayagua associations cover over one half of NAPR's surface area and are equally distributed. Primarily the Descalabrado-Guayama and Caguabo-Mucara-Naranjito associations cover the remaining area.

The Swamps-Marshes Association consists of deep, very poorly drained soils. This association is found in level or nearly level areas that are slightly above sea level but are wet, and when the tide is high, are covered or affected by saltwater or brackish water. The soils are sandy or clayey, and contain organic materials from decaying mangrove trees. Coral, shells, and marl at varying depths underlie them. The high concentration of salt inhibits the growth of all vegetation except mangrove trees, and in small-scattered patches, other salt-tolerant plants.

The Mabi-Rio-Arriba-Cayagua Association consists generally of deep, somewhat poorly drained and moderately well drained, nearly level to moderately steep soils found on foot and side slopes, terraces, and alluvial fans. Soils of this association at NAPR are basically clayey.

The Descalabrado-Guayama Association generally consists of shallow, well drained, strongly sloping to very steep soils on volcanic uplands. Soils of this association are found primarily in the hilly areas located directly inland and adjacent to the soils of the Swamps-Marshes Association.

The Caguabo-Mucara-Naranjito Association consists generally of shallow and moderately deep, well drained, sloping to very steep soils on volcanic uplands. This association consists of soils that formed in residual material weathered from volcanic rocks. This association is represented at NAPR by soils of the Sabana series, which are found on the side slopes and the hilly terrain west of Langley Drive in the Fort Bundy area. These soils are suited for pasture and woodland. Steep slopes, susceptibility to erosion, and depth to bedrock are the main limitations for farming and for recreation and urban areas.

The Coloso-Toa-Bajura Association consists of deep, moderately well drained to poorly drained, nearly level soils found on floodplains. This soil association extends along the western boundary of NAPR and around the airfield. The soils of this association formed in fine-textured and moderately fine-textured sediment of mixed origin on floodplains. The Coloso soils are deep and somewhat poorly drained; the Toa soils are deep and moderately well drained; and the Bajura soils and Maunabo soils are deep and poorly drained. The Reilly soils, also part of this association, are shallow sand and gravel and are excessively drained; they lie adjacent to streams. The minor soils are Talante, Vivi, Fortuna, Vega Alta, and Vega Baja. The Talante, Vivi, Fortuna, and Vega Baja soils are found on floodplains, while the Vega Alta soils occupy slightly higher positions on terraces.

The Jacana-Amelia-Fraternidad Association consists generally of moderately deep and deep, well drained and moderately well drained, nearly level to strongly sloping soils on terraces, alluvial fans, and foot slopes. This association is represented at NAPR by soils of the Jacana series, which consist of moderately deep, well-drained soils found on the foot slopes and low rolling hills along Langley Drive and just east of the airfield. These soils formed in fine-textured sediment and residuum derived from basic volcanic rocks.

3.3.2 Regional Geology

The underlying geology of NAPR area is predominantly volcanic (composed of lava and tuff), as well as sedimentary (rocks derived from discontinuous beds of limestone). These rocks all range in age from early Cretaceous to middle Eocene. The volcanic rocks and interbedded limestone have been complexly faulted, folded, metamorphosed, and variously intruded by dioritic rocks. This complex geological structuring occurred sometime after the deposition of the limestone during the middle Tertiary, when Puerto Rico was separated from the other major Antillean Islands by block faulting, and was arched, uplifted, and tilted to the northeast. Culebra, Vieques, and the Virgin Islands are part of the Puerto Rican block; they are separated from the main island simply because of the drowning that resulted from the tilting.

In addition to the predominant volcanic and sedimentary rock, unconsolidated alluvial and older deposits from the Quaternary period underlie the northwestern and western sectors of the base.

The primary geologic formations on and near NAPR are various beach deposits, alluvium, quartz diorite and granodiorite, quartz keratophyre, the Daguao Formation, and the Figuera Lava. The Peña Pobre fault zone traverses NAPR.

3.3.3 Regional Hydrology

The surface waters that flow across the northeastern plain of Puerto Rico, where NAPR is located, originate on the eastern slopes of the Sierra De Luquillo Mountains. Surface runoff is channeled into various rivers and streams that eventually flow into the Caribbean Sea. The Daguao River and Quebrada Seca Stream (a tributary to Rio Daguao) collect surface waters from the hills immediately north of NAPR and, in periods of heavy rain, flooding on NAPR occurs. The Daguao-Quebrada Seca watershed comprises an area of approximately 7.6 square miles (4,900 acres), and the river falls some 700 feet from its source to sea level. Increased development in the town of Ceiba, especially in areas adjacent to NAPR's northern boundary, has significantly increased the surface runoff reaching NAPR, causing ponding and erosion in the Boxer Drive area. Boxer Drive, for a major portion of its length, is subject to surface water flooding, as are Hangar 200 and AIMD Hangar 379 and adjacent apron areas. This condition has been alleviated by the construction of a new highway (Route 3) immediately outside the fence and the realignment of Boxer Drive both with attendant storm water management features.

In the low-lying shore areas, seawater flooding results from storms, wind, and abnormally high tides. The tidal ranges in the NAPR area are rather small, with a maximum spring range of less than three feet. The tides are semidiurnal and have a usual range of about one-foot in the main harbor of NAPR.

The quality of surface waters is variable, reflecting the drainage area through which the water flows. Generally, surface waters have high turbidities and bio-organics (naturally occurring organics, such as decay products of vegetable and animal matter) due to the periodic heavy rains that can easily erode soils from steep slopes, exposed areas and disturbed streambeds. Water from alluvial aquifers along the coast of NAPR is of a calcium bicarbonate type, and has high concentrations of iron and manganese. The source of these minerals is unknown, but they may be derived from buried swamp or lagoon deposits.

A seawater-freshwater interface is present in the aquifers throughout the coastal areas of Puerto Rico, usually within a short distance inland of the coastline.

The NAPR potable water treatment plant receives raw water from the Rio Blanco through a 27-inch reinforced concrete pipe that replaced the old, open channel. The intake is located at the foot of the El Yunque rain forest. This buried raw water line traverses a distance of 14 miles from the intake to the NAPR boundary. A raw water reservoir is located at the water treatment plant and has a 45 million gallon capacity. Additionally, there are two fire protection storage reservoirs with a total capacity of 520,000 gallons.

NAPR has been served for over 30 years by the present treatment facility. The plant (Building 88) has a capacity of 4.0 million gallons per day (MGD). Water flows by gravity into a 45 million-gallon raw water storage basin from which the plant draws its supply at a rate of 1.3 MGD on average. Treatment consists of pre-chlorination, coagulation sedimentation, filtration, and post-chlorination.

3.3.4 Regional Hydrogeology

Little information exists concerning the hydrogeology of NAPR. The only known potential sources of groundwater lie in lenticular beds of clay, sand and gravel, and rock fragments, which occur at a depth of less than 30 meters. No water supply wells have been developed on site from these layers. Some wells had been developed upgradient of NAPR in Ceiba, some three kilometers from base headquarters, but were abandoned due to high levels of salinity.

In 2004, Baker conducted a Phase II ECP investigation involving 20 sites throughout NAPR (NAVFAC Atlantic, 2005). Some consistent stratigraphic trends were observed during the ECP. The site hydrogeology can be better understood in the context of NAPR regional geology. For the sake of simplicity, the NAPR regional geology can be divided into three regions:

- Upland areas
- Near-shore flat lands
- Inland flat lands

The upland areas of NAPR include the hills encompassing the Tow Way Fuel Farm and hospital areas, and the hills encompassing the area behind the Exchange, the former Atlantic Fleet Weapons Training Facility (AFWTF) Command, and Fort Bundy area. These upland areas are underlain by bedrock (predominately Gabbro) and exhibit varying degrees of weathering. Typically, the bedrock is overlain by a relatively thin residual soil (i.e., residuum). Residuum is

unconsolidated soil, originating from weathered-in-place bedrock. This residuum generally consists of sand, silt, and clay.

The near-shore areas include the mangrove swamp areas as well as the shores of Ensenada Honda and Puerca Bay. The near-shore areas are typically underlain by marine sand layers (with coral and shell fragments), silt and clay layers, and occasional peat layers. In some near-shore areas, particularly by the harbor and Camp Moscrip in the southeastern portion of the base, fill material overlays the marine layers. The fill consists of rock fragments, debris (e.g., brick), sand, silt, and clay. SWMU 60 is located within the near shore flat lands area.

The inland flat land area generally encompasses the airfield and golf course areas. The inland flat land area is typically underlain by relatively thick residuum. The residuum generally consists predominately of clay. Fill material overlays the residuum in some areas, particularly the airfield, and generally consists of sand and gravel with lesser amounts of silt and clay.

4.0 PHASE I RCRA FACILITY INVESTIGATION ACTIVITIES

This section summarizes the Phase I RFI field work, analytical, and data validation activities that were conducted during the January 2009 investigation. The work was conducted mainly in accordance with the Final Phase I RFI Work Plan for SWMU 60 (Baker, 2007). However, minor deviations from the Work Plan were made as a result of field conditions observed during the investigation. Minor deviations are explained at the end of Section 4.0. Figures 4-1 and 4-2 depict sampling locations at SWMU 60.

The field activities conducted at SWMU 60 primarily consisted of the following:

- The collection of six surface soil samples (five environmental and one duplicate) from five locations. Surface soil samples 60SB01-00, 60SB02-00, and 60SB03-00 were submitted for laboratory analysis of Appendix IX VOCs, SVOCs (including low-level polynuclear aromatic hydrocarbons [LLPAHs]), pesticides, and metals. Surface soil samples 60SB04-00 and 60SB05-00 were submitted for laboratory analysis of VOCs, SVOCs (including LLPAHs), pesticides, metals, and TPH DRO/ GRO.
- The collection of five subsurface soil samples (four environmental and one duplicate) from four locations. Sample 60SB03-01 was submitted for laboratory analysis of Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, and metals. The remaining subsurface soil samples were submitted for laboratory analysis of Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, metals, and TPH DRO/GRO.
- The collection of four open water sediment samples (three environmental and one duplicate) from three locations. 60SD01 and 60SD03 were collected from two locations along the shoreline of the Ensenada Honda. 60SD02 was collected further from the shoreline and approximately 150 feet outside of the marina area. All open water sediment samples were submitted for laboratory analysis of Appendix IX SVOCs (including LLPAHs), pesticides, and metals.
- The collection of four groundwater samples (three environmental and one duplicate) from three locations. Three groundwater samples were collected from permanent wells installed along the location of the former piping system in the eastern portion of the SWMU (60SB04 and 60SB05). The remaining sample was collected from a temporary well installed at a transitional/estuarine location (60SB02). All groundwater samples were submitted for laboratory analysis of Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, total and dissolved metals, and TPH DRO/GRO.
- Other field activities were also conducted in support of the investigation of this SWMU including utility clearance, site clearing, groundwater elevation measurement, surveying, management of investigation derived wastes, and QA/QC sampling.

Section 4.1 provides a more detailed discussion of surface and subsurface soil sampling activities. Section 4.2 discusses the permanent monitoring well installation and groundwater sampling proposed in the Work Plan. Section 4.3 discusses the temporary well installation and groundwater sampling activities. Section 4.4 discusses open water sediment sampling activities. Sections 4.5 through 4.12 discuss other field activities that were conducted in support of the investigation.

The environmental samples collected from the site were analyzed at a fixed-base laboratory and the data was validated by an independent third party. A summary matrix showing the primary environmental samples collected and the analyses conducted on each sample is shown in Table 4-1. Field duplicates and matrix spike/matrix spike duplicate (MS/MSD) samples and the analyses conducted on these samples are also shown in Table 4-1. Other QA/QC samples (trip blanks, field blanks, and equipment rinsates) collected and the analyses conducted on these samples are shown in Table 4-2. The analytical parameter lists and the contract required quantitation limits are shown in Table 4-3.

Field notes containing descriptions of the site activities, boring logs and well construction details, chain-of-custody records, and site photographs are presented in Appendix A. Appendix B includes a summary of analytical results from the Site Characterization investigation. Appendix C includes a summary of analytical results from the Phase II ECP investigation. Analytical results are presented in Appendix D. Data validation report summaries are provided in Appendix E.

Minor deviations from the work plan were made as a result of field conditions observed during the investigation. Some of those modifications include:

1. Only one subsurface soil sample was collected from borings 60SB03 and 60SB05 due to the presence of groundwater between one and three feet. No subsurface soil samples were collected from borings 60SB01 and 60SB02, due to the presence of groundwater at approximately one foot.
2. Existing well MW1/SB1 from the 1999 Site Characterization was not found in the field. Therefore, no groundwater sample was collected from this existing well.
3. Since existing well MW1/SB1 was not found in the field and elevated photoionization detector (PID) readings were observed at 60SB02, the decision was made to install a temporary monitoring well at boring location 60SB02. A groundwater sample was collected and analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, TPH DRO/GRO, and total and dissolved metals.

4.1 Surface and Subsurface Soil Sampling

Surface soil samples were collected from five locations (60SB01, 60SB02, 60SB03, 60SB04, and 60SB05, as shown on Figures 4-1 and 4-2) using Macro-Cores® during boring advancement from a depth of 0.0 to 1.0 foot bgs. Surface soil samples were collected after removing any vegetation from the topsoil/root zones. The samples were transferred directly into pre-labeled sample jars and placed on ice. Including a field duplicate from 60SB03, a total of six surface soil samples were analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, and metals. 60SB04-00 and 60SB05-00 were also analyzed for TPH DRO/GRO because of their location along the former pipeline associated with the ASTs. Samples 60SB01 through 60SB03 were not analyzed for TPH DRO/GRO since these locations are remote from and would not have been impacted by the release of petroleum products from Marina operations.

Sample collection for VOCs and GRO included the use of Terra Core kits. The Terra Core kits included one disposal syringe, one dry weight container, two-40 milliliter (ml) volatile organic analysis (VOA) vials (with stir bar) including 5 ml of deionized water, and one-40 ml VOA vials (with stir bar) including 5 ml of methanol solution. As a precautionary measure, the two vials containing the laboratory supplied deionized water were frozen in a refrigerator freezer within 24

hours following sample collection and then shipped to the laboratory in a cooler packed with ice. Table 4-1 provides a summary of the surface soil samples collected at SWMU 60.

Subsurface soil samples were collected from soil boring locations 60SB03, 60SB04, and 60SB05, as shown on Figures 4-1 and 4-2. The subsurface soil samples at 60SB04 were collected from depth intervals of 1 to 3 and 5 to 7 feet bgs. Only one subsurface soil sample was collected from borings 60SB03 and 60SB05 because groundwater was encountered between approximately one and three feet bgs. No subsurface soil samples were collected at 60SB01 and 60SB02 because shallow groundwater was encountered at approximately one foot bgs. Including one field duplicate collected from 60SB04, a total of five subsurface soil samples were collected and analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, metals, and TPH DRO/GRO. Subsurface soil sample 60SB03-01 was not analyzed for TPH DRO/GRO since this sample location is remote from and would not have been impacted by the release of petroleum products from Marina operations.

Field observations and PID readings did not indicate the presence of specific zones of contamination. The sampling depths were selected in accordance with the approved Work Plan with some modifications (i.e., only one sample collected just above the water table due to the presence of shallow groundwater). The samples were transferred directly into pre-labeled sample jars and placed on ice. All but one of the subsurface soil samples were analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, TPH DRO/GRO, and metals, as summarized on Table 4-1.

Soil borings were advanced using Direct Push Technology (DPT) (Geoprobe 66DT rig operated by JFA Geological and Environmental Scientists, P.S.C, Aguadilla, Puerto Rico). Surface soil and subsurface soil samples were collected using 4-foot Macro-Cores®. Soil boring logs are presented in Appendix A.

Soil samples were field-screened for non-specific, total VOCs using a PID equipped with an 11.7 eV probe and calibrated to isobutylene. The PID readings were recorded on the drilling logs for each boring (Appendix A). The field screening procedure for soils collected using the Geoprobe Macro-Core® (MC) Sampler (disposable plastic liner) involved making a longitudinal cut along the entire length of the Geoprobe MC liner, separating the two edges of the liner, and screening the entire length of the soil core with a PID.

4.2 Monitoring Well Installation and Groundwater Sampling

Two permanent monitoring wells were installed at SWMU 60 at soil boring locations 60SB04 and 60SB05. Permanent monitoring wells were installed using a GeoProbe 66-DT with 3-1/4-in Inside Diameter (ID) Hollow Stem Augers (HSAs). Soil borings were advanced using DPT methods (refer to Section 4.1). The wells were constructed of 2-inch ID, Schedule 40 Poly Vinyl Chloride (PVC), with flush joint threads. The wells were generally constructed with a 10-foot long well screen installed to straddle the water table. The screen was connected to a threaded, flush-joint, riser. The annular space around the well screen was backfilled with a well-graded, fine to medium sand as the HSAs were withdrawn from the borehole. The sand was extended to approximately 2 feet above the top of the screened interval at all monitoring well locations. An approximate 2-foot thick sodium bentonite seal was placed above the sand pack. The bentonite seal was hydrated with potable water. The annular space above the bentonite seal was backfilled with cement/bentonite grout (60SB04) or concrete (60SB05) to prevent surface water from infiltrating into the screened groundwater monitoring zone. An expandable, water tight locking cap or slip-cap with a vent hole was placed at the top of the casing.

Permanent monitoring wells were installed and completed with flushmount wellheads. An eight inch diameter steel manhole was placed over the risers and surrounded by concrete pads. The pads were approximately 2 feet by 2 feet (length x width) and 6 inches in thickness (with 2 inches set into the ground outside the casing), and extending 1 to 1.5 feet bgs inside the annular space around the well. All wells were equipped with a locking cap installed on the protective steel casing.

Each new permanent monitoring well was initially developed using an over-pumping technique as described in the work plan, after allowing suitable time for the cement/bentonite grout to cure (typically a minimum of 24 hours was allowed). The purpose of well development was to restore the permeability of the formation which may have been reduced by the drilling operations and to remove fine-grained materials that may have entered/accumulated in the well or filter pack.

Groundwater samples were collected using the USEPA Region II low-flow sampling technique as presented in the Work Plan. Field parameters of pH, temperature, turbidity, conductivity, dissolved oxygen, and oxidation-reduction potential were obtained with appropriate instrumentation during sampling. The groundwater samples were placed into appropriate laboratory supplied containers. The groundwater samples were filtered in the field for the dissolved metals analyses. Notes containing the groundwater parameters during well development, purging, and sample collection are provided in Appendix A, Field Log Book Notes.

Including field duplicate 60GW04D, a total of three groundwater samples were collected from the two permanent monitoring wells. Groundwater samples were transferred to pre-labeled sampling containers and placed on ice. Samples were shipped in coolers with chain-of-custody forms (presented in Appendix A), which included the requested analyses for the samples. All groundwater samples were analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), total and dissolved metals, and TPH DRO/GRO as outlined on Table 4-1.

4.3 Temporary Well Installation and Groundwater Sampling

A temporary well was constructed at location 60SB02 based on elevated PID readings in the unconsolidated material and the fact that existing well MW1/SB1 was not found in the field. A five foot section of 2-inch diameter PVC 0.010-inch slot screen was placed in the open borehole. No sand or bentonite was used to construct this temporary well. A sample was collected immediately after the screen filled with water. The temporary wells were not developed since a sand pack was not placed around the screen with a known grain size and appropriate seal.

A groundwater sample was collected from the temporary monitoring well. The groundwater sample was transferred to pre-labeled sampling containers and placed on ice. The sample was shipped in coolers with chain-of-custody forms (presented in Appendix A), which included the requested analyses for all samples. The groundwater sample was analyzed for Appendix IX VOCs, pesticides, SVOCs (including LLPAHs), total and dissolved metals, and TPH DRO/GRO as outlined on Table 4-1.

4.4 Sediment Sampling

Open water sediment samples were collected from three locations (60SD01, 60SD02, and 60SD03), as shown on Figure 4-1. The open water sediment samples were collected as described in the Work Plan. Samples were collected using either dedicated stainless steel spoons (wadeable sample location 60SD01), or a petite ponar dredge (non-wadeable sample locations 60SD02 and 60SD03). Sediment was scooped into an aluminum pan container using a disposable stainless steel spoon. The contents were noted in the field logbook, homogenized following the removal of

debris (e.g., vegetation/roots), and a portion was transferred into pre-labeled glass jars and polyethylene containers and placed on ice. Three open water sediment samples (60SD01, 60SD02, and 60SD03) and one duplicate (60SD03D) were collected.

All sediment samples were analyzed for Appendix IX SVOCs (including LLP AHs), pesticides, and metals. Samples were shipped in coolers with chain-of-custody forms (presented in Appendix A), which included the requested analyses for the samples. Table 4-1 provides a summary of the sediment samples collected at SWMU 60.

4.5 Groundwater Level Measurements

Groundwater level measurements were taken during well development and purging from SWMU 60 on January 14, 15, 17, and 18, 2009 and are provided in the field logs in Appendix A. A final round of water level measurements was taken on January 23, 2009 (groundwater was encountered in the one temporary and two permanent monitoring wells). Water levels were measured from the top of PVC riser and the groundwater elevations were calculated from the surveyed elevation of the top of riser. The elevations of the tops of the risers were surveyed on January 23, 2009 following the methods described in Section 4.9. The groundwater elevations are shown on Table 4-4 and discussed further in Section 5.0.

4.6 Utility Clearance

All boring locations were first checked for the presence of subsurface utilities. A facility map showing all utilities was obtained which indicated that there were no obvious utility concerns at the SWMU. The sampling locations were field-located using a mapping-grade Global Positioning System (GPS) and the absence of subsurface utilities was field verified. No interferences with the proposed drilling locations were encountered.

4.7 Site Clearing

Once utility clearance was achieved and the proposed sample locations were field-located using a mapping-grade GPS, site clearing activities were initiated in order to assist the drill rig and provide access routes to locations 60SB01 and 60SB02 located in the undeveloped eastern portion of the SWMU. The proposed sample locations were flagged and were not disrupted by site clearing activities.

4.8 Investigation Derived Waste

Disposable sampling tools were used for soil and groundwater sampling to the extent practicable, in order to minimize the generation of liquid investigation-derived waste (IDW) from decontamination. Surface and subsurface soil samples were collected using the Geoprobe® DPT and 4-foot Macro-Core® sleeves and groundwater samples were collected using polyethylene and silicon tubing. Wastewater from decontamination of the drill rig before and after entering the site was containerized. Soil from the two permanent wells was also collected in drums because of the elevated PID readings at these locations. IDW drums are tentatively scheduled for disposal in June 2009.

Two IDW samples were collected during this investigation. One composite aqueous sample (JAN09-IDW 02) was collected from drums containing decontamination fluid (from sampling equipment and drill rig), and one composite soil sample (JAN09-IDW 01) was collected from drums containing drill cuttings. The soil IDW samples were analyzed for toxicity characteristic leaching procedure (TCLP) VOCs and metals, ignitability, reactive sulfide, reactive cyanide, and

pH. The water IDW samples were analyzed for Appendix IX total metals, ignitability, reactive sulfide, reactive cyanide, and pH. IDW analytical results are presented in Appendix A.

4.9 Surveying

Sampling locations were surveyed using a mapping grade differential (satellite Differential Global Positioning System [DGPS] corrections from Omnistar or “real-time”) GPS unit. Prior to entering the field, an electronic "shape file" (which included each proposed soil boring location) was uploaded to the GPS data collector. Once in the field, the GPS unit was used to navigate to each sample location. Each sample location was flagged and identified using the numbering system as described in the soil sampling and analysis section of the work plan. The coordinate system used for the survey was U.S. State Plane 1983, Puerto Rico/Virgin Island 5200, and the North American Datum (NAD) 1983, with units in U.S. survey feet.

After the permanent and temporary monitoring wells were installed, their coordinates were more accurately surveyed using Real-Time Kinematic (RTK) GPS methods. RTK GPS surveying was selected specifically because of the accuracy of data it provides to produce groundwater contour mapping. RTK GPS surveying employs a GPS base station and a GPS rover that reads satellite carrier phase signals. Using the carrier phase signal in conjunction with a base station is expected to provide a horizontal accuracy of approximately 0.1 feet and an elevation accuracy of approximately 0.02 feet. The coordinate system used for the survey was U.S. State Plane 1983, Puerto Rico/Virgin Island 5200, and the NAD 1983, with units in U.S. survey feet.

Each permanent and temporary monitoring well installed at SWMU 60 was surveyed using the RTK GPS method. An elevation was obtained from the top of PVC riser for water level elevation calculations and a spot ground surface elevation was also obtained. All survey data was downloaded and processed using Trimble Geomatics Office™ (TGO), which is a software application tool used to convert survey data collected in the field into electronic files for use in office application software such as Auto Computer Aided Design and Drafting (CADD). Coordinates were obtained and input into a CADD/Geographic Information System (GIS) to produce the maps used in this RFI report.

4.10 QA/QC Sampling

The following QA/QC samples were collected during the investigation of this site:

- Field Duplicates
- Trip Blanks
- MS/MSDs
- Field Blanks
- Equipment Rinsate Blanks

4.10.1 Field Duplicates

Field duplicates were collected at the rate of ten percent of primary environmental samples in accordance with the work plan. One field duplicate surface soil sample (60SB03-00D) was collected corresponding to five surface soil samples. One subsurface soil duplicate sample (60SB04-01D) was collected corresponding to four subsurface soil samples. One field duplicate open water sediment sample (60SD03D) was collected corresponding to three open water sediment samples. One field duplicate groundwater sample (60GW04D) was collected corresponding to three groundwater samples. Field duplicates were analyzed for the same parameters as the primary samples and the results were used to evaluate the field sampling methodology.

4.10.2 Trip Blanks

One trip blank sample was included in each cooler containing samples from the site intended for VOC and GRO analysis. A total of seven trip blanks, as shown on Table 4-2, accompanied samples from this site. All seven trip blanks were analyzed for Appendix IX VOCs and TPH GRO. Trip blank samples were collected in order to evaluate whether cross contamination occurred during sample collection in the field and shipping of samples.

It should be noted that trip blanks JAN09-TB01, JAN09-TB02, and JAN09-TB03 were rejected at the laboratory due to head space. Therefore, in accordance with USEPA Region II guidance, all non-detects were rejected. This is not expected to have a significant impact on the analytical results for SWMU 60 since the results for the applicable compounds in those trip blanks were non-detect.

4.10.3 MS/MSDs

MS/MSDs were collected at the rate of approximately 5 percent of primary environmental samples from the surface and subsurface soil, open water sediment, and groundwater samples. MS/MSD (60SB03-00MS/MSD) was collected corresponding to five surface soil samples. MS/MSD (60SB04-01MS/MSD) was collected corresponding to three subsurface soil samples. MS/MSD (60GW04MS/MSD) was collected corresponding to three groundwater samples. MS/MSD (60SD01MS/MSD) was collected corresponding to three sediment samples. The MS/MSD samples were analyzed for the same parameters as the primary environmental samples and the results were used to evaluate the effect of each type of matrix on the analytical method.

4.10.4 Field Blanks

Two field blank samples (JAN09-FB01 and JAN09-FB02) were collected from laboratory-grade deionized water and NAPR potable water, respectively, as part of the multi-site field investigation. Laboratory-grade deionized water was used as source water for the equipment rinsate samples. No store bought distilled water was purchased during this investigation, so an additional field blank for store bought distilled water was not necessary. The field blank sample was analyzed for Appendix IX VOCs, SVOCs (including LLP AHs), pesticides, metals, and TPH GRO and DRO to determine whether the water used for generating the equipment rinsates was free of chemicals at levels of concern for the site.

It should be noted that field blanks JAN09-FB01 and JAN09-FB02 were collected as part of a multi-site field investigation (i.e., SWMUs 9, 60, and 70) after the collection of samples began at SWMU 60. The field blank was collected using the same batch of laboratory-grade deionized water that was used to collect equipment rinsate blanks specific to SWMU 60. Since JAN09-FB01 and JAN09-FB02 were not collected at SWMU 60 during the sampling event, it is acknowledged that the results for these field blanks only address laboratory sources of contamination and not the ambient conditions encountered in the field.

4.10.5 Equipment Rinsates

Equipment rinsate samples JAN09-ER01 and JAN09-ER02 were collected from Macro Core Liners used on January 12 and 13, 2009; equipment rinsate sample JAN09-ER04 was collected from groundwater sample tubing used on January 15, 2009; and equipment rinsate sample JAN09-ER06 was collected from a stainless steel spoon used on January 17, 2009. Equipment rinsate samples were analyzed for one or more of the following parameters (Appendix IX VOCs, SVOCs (including LLP AHs), pesticides, metals, and TPH GRO and DRO), as shown on Table

4-2. The analysis requested for each equipment rinsate sample was dependent on what sampling was conducted in the field the day the rinsate was collected, as discussed in the following paragraph.

Multiple site investigations (in addition to the Phase I RFI investigation at SWMU 60) were conducted simultaneously at NAPR during January 2009. Those investigations include the Full RFI investigation for SWMU 9 (Area B, Tank 214 Area), and The Phase I RFI investigation for SWMU 70 (Disposal Area Northwest of Landfill). One equipment rinsate was collected per day for one piece of disposable sampling equipment (i.e., stainless steel spoon, bucket auger, groundwater sampling tubing, or macro core liners) and the selected analysis for the rinsate samples corresponds to the sampling and analytical programs developed for each SWMU.

4.11 Laboratory Analysis

Fixed-base laboratory analysis was conducted by Test America, Savannah, Georgia. The list of parameters under the analytical program and the Contract Required Quantitation Limits (CRQLs) are provided in Table 4-3. Puerto Rico chemist certification documentation is provided with this RFI as Appendix E.

4.12 Data Validation

All fixed-base laboratory data was validated by Data Qual Environmental Services, LLC, of St. Louis, Missouri, an independent third party. The USEPA Region II Data Validation Standard Operating Procedures were followed. Validation reports are provided for each Sample Delivery Group (SDG) in Appendix E.

5.0 PHYSICAL RESULTS

The following sections provide a brief discussion of the current site conditions at SWMU 60 at the time of the Phase I RFI field investigation, conducted from January 12 to January 23, 2009. The site geology and hydrogeology, as ascertained from the soil boring program and other available information, is described herein.

5.1 Current Conditions

SWMU 60 covers an area of approximately 12 acres (as shown on Figure 5-1) and includes two distinct portions:

1. The active marina (built in the 1970s) covers approximately two thirds of the site. This portion of the site consists of the marina building, docks, concrete walkways, manicured lawn, tennis courts, and asphalt roads and parking.
2. The southern portion consists of a level area extending to the Ensenada Honda and is covered with secondary growth vegetation. This area is described as estuarine intertidal scrub-shrub broad-leaved evergreen (E2SS3) as shown on Figure 5-1. A small beach classified as marine intertidal unconsolidated shore sand (M2US2) is located on the southern edge of the site also shown on Figure 5-1.

A large portion of the SWMU 60 shoreline has been developed into boat slips and docks. These slips and docks are constructed of concrete and most likely were constructed using sheet piling. The remaining shoreline is comprised of sandy beach. The paved entrance road located on the eastern side of the Marina is a generalized boundary between the developed Marina area and the secondary growth undeveloped area, which contained red mangrove. It was in this undeveloped area that evidence of surface debris was observed including tires, wood, and metal. No evidence of metal or other debris was observed in the Marina area. Photographs of the site showing current conditions are provided in Appendix A.

5.2 Geology/Hydrogeology

The following sections provide a discussion of the geology and hydrogeology of SWMU 60, based on observations made during the Phase I RFI field investigation.

5.2.1 Geology

A total of five borings were advanced during the 2009 RFI field effort; two permanent groundwater monitoring wells and one temporary well were installed (see Figure 5-1). Boring logs for each borehole are presented in Appendix A. Two borings (60SB01 and 60SB02) were drilled within the undeveloped secondary growth area, and three borings were drilled in the developed Marina area. Borings 60SB04 and 60SB05 were drilled specifically near the diesel storage tank and former distribution line to the nearby slips and docks. The unconsolidated materials encountered consisted of primarily sand with varying amounts of silt, clay or gravel. A peat layer was observed in borings 60SB02 and 60SB03. It was difficult to distinguish between fill and natural deposits, but the area may consist of all fill materials brought in to construct the Marina area.

A geologic cross section was drawn depicting the geologic conditions and water levels relative to well placement and topography from borings 60SB02, 60SB03, 60SB04, and 60SB05. The cross

section depicts the location of peat and gradation of sand, silt, and clay across the SWMU. The shoreline is shown on the left side of the cross-section showing the potential for shallow groundwater flow retardation to the Ensenada Honda. A geologic cross section location map is presented as Figure 5-1 and Geologic Cross Section A-A' is shown on Figure 5-2.

5.2.2 Hydrogeology

Groundwater was observed during drilling to exist at shallow depths generally between 1.2 and 3 feet bgs. The proximity of SWMU 60 to the shoreline of the Ensenada Honda accounts for the shallow groundwater occurrence. Significant groundwater occurrence was observed in the borings at SWMU 60 within the sand-rich materials.

Groundwater levels were measured during well development and purging from SWMU 60 on January 14, 15, 17, and 18, 2009. One additional round of water levels was taken on January 23, 2009. All groundwater levels were recorded using an electronic water level meter to the nearest 0.01 foot. Water level measurements (from January 23, 2009) and calculated groundwater elevations are presented on Table 4-4 and are shown on Figure 5-3. Groundwater contours were not drawn on this figure because of uncertainty associated with the linear alignment of the wells. Expected groundwater flow is to the south and southeast towards the Ensenada Honda, although the concrete slips and docks may be causing some mounding of shallow groundwater near the shoreline where these exist.

6.0 ANALYTICAL RESULTS

This section discusses the nature of SWMU 60 contamination determined from chemical analysis of environmental samples collected during the 2009 Phase I RFI investigation. All laboratory analytical data went through a formal data validation process. Validated data tables for the Phase I RFI field effort are included in Appendix D. Relevant portions of the data validation reports for the Phase I RFI SDGs are provided in Appendix E. In addition, a summary discussion of the necessary laboratory level data adjustments to the 2009 data is presented in Section 6.6. As previously mentioned, the analytical results from the Site Characterization (CH2MHill, 1999) and the Phase II ECP (NAVFAC Atlantic, 2005) are provided in Appendices B and C, respectively.

6.1 Human Health and Ecological Screening Values

Analytical results for surface and subsurface soil, open water sediment, and groundwater are discussed in the following sections. Detected compounds for each media are compared to applicable human health and ecological screening criteria, as well as to background concentrations. The upper limit of means (defined as the mean plus two standard deviations) background levels (inorganics only) (Baker, 2008) were used to compare concentrations of inorganic constituents in soil, open water sediment, and groundwater at SWMU 60 to those present at NAPR in corresponding unimpacted media. Both surface soil background levels and subsurface soil background levels for a fine sand/silt soil type (most prevalent soil type at SWMU 60) were used in screening. The human health and ecological screening criteria, and the rationale for their use for comparison to a specific medium, are described in detail below.

6.1.1 Human Health

Applicable human health criteria for soils include USEPA Regional Industrial Screening Levels (SLs) and USEPA Regional Residential SLs (USEPA, 2008a), and the upper limit of means background levels (inorganics only) (Baker, 2008). In the absence of human health screening criteria specific to sediment, USEPA Regional Residential and Industrial Soil SLs (USEPA, 2008a) were conservatively used along with sediment background levels present in open water sediment (Baker, 2008), as applicable. Applicable human health criteria for groundwater are USEPA Regional Tap Water SLs, Federal Drinking Water Maximum Contaminant Levels (MCLs) (USEPA, 2008b), and any inorganic background levels present in the groundwater at NAPR (Baker, 2008).

6.1.1.1 Regional Screening Levels

The EPA recently developed the Regional SLs to support the risk assessment screening process, while improving consistency across EPA Regions and incorporating updated guidance in a timely manner. The Regional SL Table was developed with the Department of Energy's Oak Ridge National Laboratory under an Interagency Agreement as an update of the individual screening tables that had previously been maintained by Regions 3, 4, and 9. As recommended by the USEPA, these Regional SLs are to replace all other screening values.

The Regional SL Table contains risk-based screening levels derived from standardized equations (representing ingestion, dermal contact, and inhalation exposure pathways), calculated using the latest toxicity values, default exposure assumptions and physical and chemical properties. The SLs contained in the Regional SL Table are generic; they are calculated without site-specific information. Regional SLs should be viewed as Agency guidelines, not legally enforceable standards. The SLs for potentially carcinogenic chemicals are based on a target Incremental

Lifetime Cancer Risk (ILCR) of 1×10^{-06} . The SLs for noncarcinogens are based on a target hazard quotient (HQ) of 1.0. However, in order to account for cumulative risk from multiple chemicals in a medium, the noncarcinogenic SLs will be divided by a factor of ten, yielding a target HQ of 0.1. For potential carcinogens, the toxicity criteria applicable to the derivation of SL values are oral Cancer Slope Factors (CSFs) and inhalation unit risk (IUR) factors; for noncarcinogens, they are chronic oral reference doses (RfDs) and inhalation reference concentrations (RfCs). These toxicity criteria are subject to change as more updated information and results from the most recent toxicological/epidemiological studies become available. The SL table is updated periodically to reflect such changes. It should be noted that the most recent update available when the analytical data were screened was from September 2008 (USEPA, 2008a).

6.1.1.2 Federal Drinking Water MCLs

Federal Drinking Water MCLs are enforceable standards for public water supplies promulgated under the Safe Drinking Water Act and are designed for the protection of human health. MCL goals are calculated based on laboratory or epidemiological studies and apply to drinking water supplies consumed by a minimum of 25 persons. They are designed for prevention of human health effects associated with a lifetime exposure (70-year lifetime) of an average adult (70 kilograms [kg]) consuming 2 liters of water per day. MCLs consider both the MCL Goal and the technical feasibility of removing the contaminant from the public water supply. Accordingly, MCLs are established as close to the MCL Goal as technically feasible (USEPA, 2008b).

6.1.2 Ecological

6.1.2.1 Soil

USEPA ecological soil screening levels (Eco-SSLs) for terrestrial plants and invertebrates (available at <http://www.epa.gov/ecotox/ecossl/>) were preferentially used as soil screening values. ECO-SSLs have been developed for eight receptor groups: plants, soil invertebrates, avian herbivores, avian ground insectivores, avian carnivores, mammalian herbivores, mammalian ground insectivores, and mammalian carnivores. For a given chemical, the lowest ECO-SSL value for plants, soil invertebrates, avian herbivores, avian ground insectivores, avian carnivores, and mammalian herbivores was selected as the soil screening value. Eco-SSLs for mammalian ground insectivores were not considered for soil screening value development because there are no mammalian ground insectivores in Puerto Rico (mammalian insectivores are limited to aerial insectivores [i.e., bats]). As discussed in Guidelines for Developing Ecological Soil Screening Levels (USEPA, 2005), aerial and arboreal insectivorous birds and mammals were excluded from Eco-SSL development because they are considered inappropriate (i.e., they do not have a clear or indirect exposure pathway link to soil [indirect exposure pathways involve ingestion of prey that have direct contact with soil]). Eco-SSLs for mammalian carnivores also were not considered for soil screening value development because there are no carnivorous mammals on Puerto Rico. With the exception of bats, the terrestrial mammals represented by potentially complete exposure pathways are limited to nonindigenous, nuisance species (i.e., Norway rat, black rat, and mongoose) that have been implicated in the decline of native reptilian and bird populations (Mac et al., 1998 and United States Fish and Wildlife Service [USFWS], 1996). Eco-SSLs for mammalian herbivores are considered appropriate for soil screening value development based on the presence of fruit-eating and nectivorous bats in Puerto Rico..

For those chemicals lacking plant, soil invertebrate, avian herbivore, avian ground insectivore, avian carnivore, or mammalian herbivore Eco-SSLs, the literature-based toxicological benchmarks listed below were used as soil screening values

- USEPA Region 5 (2003) ecological screening levels (ESLs) for soil based on exposures to plants or invertebrates
- Toxicological thresholds for earthworms and microorganisms (Efroymson et al., 1997a)
- Toxicological thresholds for plants (Efroymson et al., 1997b)

Identical to the Eco-SSLs, if more than one screening value was available for a given chemical from USEPA (2003) and Efroymson et al. (1997a and 1997b), the lowest value was selected as the soil screening value. For those chemicals lacking an Eco-SSL, USEPA Region 5 ESLs based on exposures to terrestrial plants or invertebrates, and a toxicological threshold from Efroymson et al. (1997a and 1997b), the following literature-based values, listed in their order of decreasing preference, were used as soil screening values:

- Toxicity reference values for plants and invertebrates listed in USEPA, 1999.
- Soil standards developed by the Ministry of Housing, Spatial Planning and Environment (MHSPE) (MHSPE, 2000)
- Canadian soil quality guidelines (agricultural land use) developed by the Canadian Council of Ministers of the Environment (CCME, 2001 and 2007).
- Ecological-based soil screening values compiled by Friday (1998)

Soil screening values based on MHSPE soil standards represent an average of the target and intervention soil standards. Values are based on a default organic carbon content of 2.0 percent, which represents the minimum value within the adjustment range (2.0 to 30.0 percent). Soil quality guidelines developed by CCME (2001 and 2007), as well as ecological soil screening values compiled by Friday (1998) were given the lowest preference since many are based on background concentrations or detection limits, not effect-based concentrations.

In addition, the upper limit of means background levels (inorganics only) (Baker, 2008) were used to compare the soil concentrations to those present at NAPR in un-impacted soil. Both surface soil background levels and subsurface soil background levels for a fine sand/silt soil type (most prevalent soil type at SWMU 60) were used in screening.

6.1.2.2 Sediment

The marine and estuarine bulk sediment toxicological benchmarks listed below were preferentially used as sediment screening values:

- Effects-Range low (ER-L) marine and estuarine sediment quality guidelines (SQGs) (Long and Morgan, 1991 and Long et al., 1995)
- Threshold Effects Level (TEL) marine SQGs (MacDonald, 1994)

- Apparent Effects Threshold (AET) marine sediment quality guidelines (Buchman, 2008)

A description of ER-L, TEL, and AET values and the methods used in their derivation are provided in the paragraphs that follow.

ER-L marine and estuarine SQGs. Long and Morgan (1991) developed effects-based sediment quality guidelines using literature-based data from Equilibrium Partitioning (EqP) modeling, spiked-sediment toxicity tests, and matched sediment chemistry and biological effects measures. For a given chemical, the data were arranged in ascending order of concentration with each data entry assigned an "effects" or "no effects" descriptor, and the 10th percentile and 50th percentile concentrations of the "effects" data were calculated. The 10th and 50th percentiles of the "effects" data represent the ER-L and Effects Range-Median (ER-M), respectively. The ER-L and the ER-M delineate three concentration ranges for a given chemical. The concentration range below the ER-L value represents a minimal effects range (i.e., the concentration range in which effects would be rarely observed). Concentrations equal to or greater than the ER-L but less than the ER-M represent a possible effects range within which effects would occasionally occur, while concentrations greater than the ER-M represent a probable-effects range within which effects would frequently occur. The ER-L and ER-M values were recalculated by Long et al. (1995) after omitting a small amount of freshwater data included in the original calculations (Long and Morgan 1991) and incorporating more recent marine and estuarine data from the literature. With the exception of antimony, ER-Ls based on marine only SQGs from Long et al. (1995) were considered for use as sediment screening values. In the case of antimony, an ER-L value is not available from Long et al. (1995). Therefore the ER-L value reported by Long and Morgan (1991) was considered as a potential sediment screening value.

TEL marine SQGs for Florida costal waters. The updated and revised data set used by Long et al. (1995) also was used by MacDonald (1994) to calculate sediment quality assessment guidelines (TELs and Probable Effect Levels [PELs]) for Florida coastal waters. Unlike the methodology used by Long et al. (1991) to derive ER-L and ER-M values, the derivation of TELs and PELs took into consideration the "no effects" data set. Specifically, TELs were derived by calculating the geometric mean of the 15th percentile in the "effects" data set and the 50th percentile in the "no effects" data set, while PELs were derived by calculating the geometric mean of the 50th percentile in the "effects" data set and the 85th percentile in the "no effects" data set.

Identical to ER-Ls and ER-Ms, TELs and PELs delineate three concentration ranges for a given chemical. The TEL represents the upper limit of the range of sediment concentrations dominated by "no effects" data. Within this range, concentrations are not considered to represent significant hazards to sediment-associated biota. The PEL represents the lower limit of the range of sediment concentrations that are usually or always associated with adverse biological effects. The range of concentrations that could be associated with biological effects is delineated by the TEL and PEL. Within this range of concentrations, adverse biological effects are possible. Only TELs were considered for use as sediment screening values.

AET marine SQGs. The AET method, developed by Tetra Tech, Inc (1986), associates chemical concentrations in sediments with adverse biological effects (lethal and sub-lethal toxicity as measured using sediment toxicity tests or changes in benthic macroinvertebrate abundance and community structure as measured by *in situ* biological surveys). For a given chemical and measurement of biological effect (biological indicator), the AET value represents the sediment concentration above which statistically significant biological effects are always observed. The

AET values selected as sediment screening values represent the lowest AET value reported by Buchman (2008) from a suite of seven biological indicators (amphipod mortality, oyster larval abnormality, Microtox luminescence, infaunal community impacts, bivalve larvae mortality/abnormality, Echinoderm larvae mortality/abnormality, and juvenile polychaete growth). It is noted that the AET values developed by Buchman (2008) are interim values subject to change.

Minimum, chemical-specific AET values are used by the Washington State Department of Ecology (1995) as sediment management standards for Puget Sound. Minimum AET values also are used by the United States Army Corps of Engineers (USACE) (USEPA/USACE, 1998) as “reason to believe” guidance for screening levels for the Dredged Material Management Program (DMMP). The DMMP screening levels are implemented for use in Puget Sound and Grays Harbor/Willapa Bay in the State of Washington. Current Washington State Department of Ecology sediment management standards and USACE DMMP screening levels do not reflect the interim AET values reported by Buchman (2008).

For a given chemical, when more than one toxicological threshold was available from the sources listed above (i.e., Long et al., 1995, MacDonald, 1994, and Buchman, 2008), the minimum value was conservatively selected as the sediment screening value. For those chemicals lacking a literature-based, bulk-sediment toxicological threshold, EqP-based screening values were either developed using USEPA methodology (USEPA, 1993 and 1996) [see Appendix F] or identified from the literature (Di Toro and McGrath, 2000). For a given chemical, when an EqP-based value was derived in accordance with USEPA (1993 and 1996) methodology and a value also was available from Di Toro and McGrath (2000), the minimum value was selected as the sediment screening value. It is noted that consideration was given to the following literature-based freshwater toxicological thresholds for chemicals lacking marine and estuarine bulk sediment values: (1) consensus-based SQGs for freshwater (MacDonald et al., 2000), (2) SQAGs for Florida inland waters (MacDonald et al., 2003), (3) Ontario Ministry of the Environment Lowest Effect Level (LEL) Provincial sediment quality guidelines (PSQGs) (Persaud et al., 1993), and (4) Canadian interim freshwater sediment quality guidelines (ISQGs) (CCME, 2002). However, no values were available from these sources.

6.1.2.3 Groundwater

As discussed in Section 5.2.2, groundwater flow at SWMU 60 is believed to be connected to the Ensenada Honda. Therefore, groundwater analytical data were screened against marine toxicological thresholds. Puerto Rico Water Quality Standards (PRWQS) for Class SB coastal and estuarine waters listed in the Puerto Rico Water Quality Standards Regulation (PRWQSR) dated March 31, 2010 (Puerto Rico Environmental Quality Board [PREQB], 2010) were preferentially used as groundwater screening values. PRWQS for Class SB coastal and estuarine waters were selected based on the classifications contained within Rule 1302.1 of the PRWQSR. For those chemicals lacking PRWQS for Class SB coastal and estuarine waters, groundwater screening values were identified from the following information listed in their order of decreasing preference:

- Chronic saltwater NAWQC (USEPA, 2009a)
- Final Chronic Values (FCVs) for saltwater contained in ECO Update Volume 3, Number 2 (USEPA, 1996)

- USEPA Region 4 chronic screening values for saltwater contained in Ecological Risk Assessment Bulletins – Supplement to Risk Assessment Guidance for Superfund (RAGS) (USEPA 2001)
- Minimum chronic toxicity test endpoints (No Observed Effect Concentration [NOEC], No Observed Effect Level [NOEL], and Maximum Acceptable Toxicant Concentration (MATC) values based on reproduction, growth, or survival) for marine species reported in the ECOTOXicology (ECOTOX) Release 4.0 Database System (USEPA, 2007b)
- Chronic Lowest Observable Effect Levels (LOELs) for saltwater contained in National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQUIRTs) (Buchman, 2008) with a safety factor of 5 (Wentsel et al., 1996)

The order of preference was selected based on their level of protection. For example, NAWQC and FCVs would be expected to offer a greater degree of protection than a single species NOEC, MATC, or LOEL since their derivation considers a larger toxicological database. In the absence of the above-mentioned NAWQC, FCVs, USEPA Region 4 chronic screening values, chronic test endpoints (NOEC, NOEL, and MATC values), and chronic LOELs, screening values were derived from the literature-based acute saltwater values listed below:

- Acute LOELs for saltwater contained in NOAA SQUIRTs (Buchman, 2008)
- Acute toxicity test endpoints (NOEC, Lowest Observed Effect Concentration [LOEC], median lethal concentration [LC₅₀], and median effective concentration [EC₅₀] values) for marine species contained in the ECOTOX Release 4.0 Database System (USEPA, 2007b)
- LC₅₀ values for saltwater species contained in Superfund Chemical Matrix (USEPA, 2004)

Chronic-based screening values were extrapolated from acute NOEC, NOEL, LOEC, LOEL, LC₅₀, and EC₅₀ values as follows:

- A safety factor of 30 was used to convert an acute NOEC or NOEL to a chronic-based screening value (Wentsel et al., 1996)
- A safety factor of 50 was used to convert an acute LOEC or LOEL to a chronic-based screening value (Wentsel et al., 1996)
- A safety factor of 100 was used to convert an EC₅₀ or LC₅₀ to a chronic-based screening value (Wentsel et al., 1996)

When acute toxicity data were used to extrapolate a chronic screening value, NOECs/NOELs were given preference over LOECs/LOELs, LOECs/LOELs were given preference over LC₅₀ and EC₅₀ values, and EC₅₀ values were given preference over LC₅₀ values. When more than one value was available from the literature for a given test endpoint (e.g., NOEC), the minimum value was conservatively used to extrapolate a chronic screening value.

For those chemicals lacking saltwater toxicological thresholds and literature values, screening values were identified or developed from the literature-based freshwater values listed below in their order of decreasing preference:

- PRWQS for Class SD surface waters listed in the PRWQSR (PREQB, 2010).
- Chronic freshwater NAWQC (USEPA, 2009)
- FCVs for freshwater contained in ECO Update Volume 3, Number 2 (USEPA, 1996)
- USEPA Region 4 chronic screening values for freshwater contained in Ecological Risk Assessment Bulletins – Supplement to RAGs (USEPA 2001) and USEPA Region 5 ESLs (<http://www.epa.gov/reg5rcra/ca/ESL.pdf>) (USEPA, 2003)
- Minimum chronic toxicity test endpoints (NOEC, NOEL, and MATC values) for freshwater species reported in the ECOTOX Database System (USEPA, 2007b)
- Great Lakes basin Tier II Secondary Chronic Values (SCVs) listed in the Great Lakes Initiative Toxicity Data Clearinghouse (<http://www.epa.gov/gliclearinghouse/>) (USEPA, 2007c)
- Chronic LOELs for freshwater contained in NOAA SQUIRTs (Buchman, 2008) with a safety factor of 10 (Wentzel et al., 1996)

Identical to the saltwater values, the order of preference for selecting freshwater values is based on their level of protection. It is noted that USEPA Region 4 and Region 5 screening values were given equal preference. When a value was available from both sources, the minimum value was selected as the surface water screening value. In the absence of the above-mentioned freshwater FCVs, freshwater USEPA Region 4 and Region 5 screening values, freshwater chronic test endpoints, Great Lakes Basin Tier II SCVs, and freshwater chronic LOELs, screening values were derived from the acute literature values listed below:

- Acute LOELs for freshwater contained in NOAA SQUIRTs (Buchman, 2008)
- Acute toxicity test endpoints (NOEC, NOEL, LOEL, LOEC, LC₅₀, EC₅₀ values) for freshwater species contained in the ECOTOX Database System (USEPA, 2007b)
- LC₅₀ values for freshwater species contained in Superfund Chemical Matrix (USEPA, 2004)

Chronic-based screening values were extrapolated from acute NOEC, NOEL, LOEC, LOEL, LC₅₀, and EC₅₀ values using the safety factors from Wentzel et al. (1996) identified above.

When acute toxicity data were used to extrapolate a chronic screening value, NOECs/NOELs were given preference over LOECs/LOELs, LOECs/LOELs were given preference over LC₅₀ and EC₅₀ values, and EC₅₀ values were given preference over LC₅₀ values. When more than one value was available from the literature for a given test endpoint (e.g., NOEC), the minimum value was conservatively used to extrapolate a chronic screening value. In some cases, acute and/or chronic saltwater and freshwater LOELs for chemical classes (e.g., PAHs) were available from the literature (Buchman, 2008). A LOEL based on a chemical class was selected as the screening value only if that chemical lacks saltwater and freshwater literature-based benchmarks and/or toxicity test endpoints.

The total recoverable screening values selected for arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, and zinc are PRWQS for Class SB costal and estuarine waters, while the total recoverable screening value selected for mercury is a USEPA saltwater NAWQC (CCC Value). PRWQSR has adopted USEPA total recoverable NAWQC as PREWQS for arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc (the PRWQSR for these eight metals are identical to the total recoverable CCC values listed in National Recommended Water Quality Criteria [USPEA, 2009]). Because groundwater collected at SWMU 60 will be analyzed for total recoverable and dissolved metals, dissolved screening values also were identified from the literature. PRWQS expressed in terms of the dissolved metal in the water column are not available from PRWQSR. However, USEPA saltwater CCC values for arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc, as well as mercury, can be expressed as dissolved or total recoverable concentrations (USEPA 2009). Therefore, screening values for these nine metals, expressed in terms of the dissolved metal in the water column, were derived by multiplying total USEPA CCC values by the saltwater conversion factors listed below (USEPA, 2009):

- Arsenic: 1.000
- Cadmium: 0.994
- Chromium: 0.993
- Copper: 0.830
- Lead: 0.951
- Mercury: 0.850
- Nickel: 0.990
- Selenium: 0.998
- Zinc: 0.946

Total recoverable screening values were conservatively used to screen dissolved analytical data for those metals lacking screening values expressed as dissolved concentrations (i.e., antimony, barium, beryllium, cobalt, silver, thallium, tin, and vanadium).

NAPR base wide groundwater background criteria (inorganics only) were also used in the comparison (Baker, 2008), when available.

6.2 Surface Soil

Five surface soil samples (60SB01-00 through 60SB05-00) and one duplicate sample (60SB03-00D) were collected and analyzed during the 2009 Phase I RFI investigation at SWMU 60. All of the surface soil samples were analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, and metals. Samples collected from locations 60SB04 and 60SB05 were also analyzed for TPH DRO/GRO since it was believed that these locations may have been impacted by the release of petroleum products from the underground piping system associated with Marina fueling operations. The detected results for the surface soil data set are provided in Table 6-1. Results are compared to appropriate media specific criteria as described in Section 6.1. Figure 6-1 presents the locations of the detected inorganic compounds above human health and ecological screening criteria and NAPR basewide background values. The complete surface soil data set is provided in Appendix D.

VOCs were not detected in the surface soil samples collected at SWMU 60.

As shown on Table 6-1, fifteen SVOCs were detected in the surface soil samples. With the exception of one low, estimated concentration of dimethyl phthalate detected in sample 60SB04-00, all detected SVOCs were PAHs. Most PAH concentrations were estimated concentrations. In general, the highest concentrations of PAHs were encountered in sample 60SB04-00. Of the detected PAHs, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene exceeded their residential soil Regional SLs at 60SB04-00. Benzo(a)pyrene also exceeded its residential soil Regional SL in 60SB02-00, 60SB03-00 and its duplicate, 60SB03-00D. However, there were no exceedances of the ecological soil screening values of low or high molecular weight PAHs.

One pesticide, 4,4'-DDE, was detected in sample 60SB03-00 and its duplicate, 60SB03-00D. The 4,4'-DDE concentrations were estimated and well below the listed criteria.

TPH DRO was detected in samples 60SB04-00 and 60SB05-00. TPH GRO was also detected in 60SB05-00 at a very low (i.e., near the detection limit), estimated concentration. The DRO and GRO concentrations were well below the total TPH screening value of 100 mg/kg.

Sixteen metals were detected in the surface soil samples at SWMU 60 including:

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Copper
- Lead
- Mercury
- Nickel
- Selenium
- Silver
- Tin
- Vanadium
- Zinc

Beryllium, cadmium, lead, and silver were detected at various locations but did not exceed corresponding residential or industrial soil Regional SLs, background screening values, or ecological surface soil screening values at any location. However, it should be noted that the cadmium and lead results were qualified as rejected (R) in sample 60SB03-00 and its duplicate, 60SB03-00D. Sample 60SB03-00 and the duplicate sample (60SB03-00D) exhibited relative percent differences greater than 120% for cadmium (151%) and lead (143%). Based on Region II guidelines, results for these analytes were rejected.

Antimony exceeded its residential soil Regional SL and background screening level in sample 60SB03-00 and its duplicate, 60SB03-00D. Arsenic exceeded both of the Regional SLs in all of the surface soil samples. Arsenic also exceeded its background screening level in samples 60SB01-00, 60SB02-00, 60SB03-00, and 60SB05-00. Cobalt was detected at concentrations exceeding its residential soil Regional SL in all samples, as well as its ecological surface soil screening value in four of the samples (60SB03-00, 60SB03-00D, 60SB04-00, and 60SB05-00). However, all cobalt concentrations were less than background.

Copper was detected in all samples and exceeded the ecological surface soil screening values in four of the samples (60SB03-00, 60SB03-00D, 60SB04-00, and 60SB05-00), as well as its residential soil Regional SL in sample 60SB03-00. Copper also exceeded its background screening level in sample 60SB03-00 and its duplicate, 60SB03-00D. Vanadium was detected at concentrations exceeding its ecological surface soil screening value in all samples, as well as its residential soil Regional SL in all samples. However, all vanadium concentrations were less than background. Mercury, tin, and zinc exceeded corresponding ecological surface soil screening values and background screening levels at location 60SB03.

Barium, chromium, and nickel were detected in all samples and exceeded only corresponding background screening values in location 60SB03. Barium also exceeded background at location 60SB04.

Based on the exceedances of background and regulatory screening concentrations of metals (primarily arsenic, copper, mercury, tin, and zinc) and PAHs in the surface soil, it appears that contamination has occurred in the surface soil at SWMU 60 due to human activities. Although surface soil contamination appears to be primarily focused on two locations (60SB03 and 60SB04), information obtained to date indicates that the lateral extent of this contamination has not yet been fully defined.

Three metals had detection limits that exceeded screening values in surface soil. Arsenic had a detection limit of 1 mg/kg and exceeded the residential soil Regional SL of 0.39 mg/kg. Selenium had a detection limit of 2.5 mg/kg and exceeded the ecological soil screening value of 0.52 mg/kg and the NAPR Basewide background screening concentration of 1.48 mg/kg. Tin had a detection limit of 10 mg/kg and exceeded the NAPR Basewide background screening concentration of 3.76 mg/kg. Detection limits for TPH DRO and GRO also exceeded screening values. TPH DRO had a detection limit of 3,300 mg/kg which exceeded the residential soil Regional SL of 100 mg/kg. TPH GRO had a detection limit of 2,500 mg/kg which exceeded the residential soil Regional SL of 100 mg/kg.

6.3 Subsurface Soil

For the subsurface soil evaluation, human health screening criteria (residential and industrial SLs) are only used for samples from the 1 to 10 foot depth interval. Similarly, ecological screening criteria are used only for subsurface soil samples from the 1 to 3 foot depth interval. NAPR basewide background screening values were used for all subsurface soil samples. Therefore, the subsurface soil analytical results are presented in tables and figures from 1 to 7 ft bgs for comparison to human health screening criteria and 1 to 3 feet bgs for comparison to ecological screening criteria.

Four subsurface soil samples (60SB03-01, 60SB04-01, 60SB04-03, and 60SB05-01) and one duplicate sample (60SB04-01D) were collected and analyzed during the 2009 Phase I RFI investigation at SWMU 60. The majority of subsurface soil samples were analyzed for Appendix IX VOCs, SVOCs (including LLPAs), pesticides, metals, and TPH DRO/GRO, as summarized on Table 4-1. Sample 60SB03-01 was not analyzed for TPH DRO/GRO since it was not believed that this location would have been impacted by the release of petroleum products from Marina operations. The detected results for the subsurface soil data are provided in Tables 6-2 and 6-3. Figures 6-2 and 6-3 present the locations of detected inorganic compounds above the applicable human health screening and ecological criteria, and NAPR basewide background values in subsurface soil. The complete data set is provided in Appendix D.

Table 6-2 presents the comparison of subsurface soil analytical results from 1 to 7 feet bgs (the maximum depth for this investigation) to human health screening criteria, as well as NAPR background screening values. Four VOCs, carbon disulfide, ethylbenzene, methylene chloride, and total xylenes, were detected in the subsurface soil. All VOCs were detected at locations 60SB04 and 60SB05 and primarily detected at low, estimated concentrations that were well below the listed criteria.

As shown on Table 6-2, fourteen SVOCs (all PAHs), were detected in the subsurface soil samples. The majority of these compounds were detected at low, estimated concentrations and all were below the listed criteria, with the exception of benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene. Benzo(a)pyrene exceeded the residential soil Regional SL in samples 60SB03-01 and 60SB04-01D. Benzo(b)fluoranthene and dibenz(a,h)anthracene exceeded corresponding residential soil Regional SLs in sample 60SB03-01.

Two pesticides (4,4'-DDD and 4,4'-DDE) were detected in the subsurface soil samples. The 4,4'-DDD and 4,4'-DDE concentrations were well below human health screening criteria.

TPH DRO was detected in the three samples (plus one duplicate) for which it was analyzed (TPH DRO was not analyzed for in sample 60SB03-01). TPH GRO was detected in two of the three samples for which it was analyzed (TPH GRO was not analyzed for in sample 60SB03-01 and was not detected in sample 60SB04-03). TPH GRO concentrations exceeded the screening value of 100 mg/kg in all four samples for which it was analyzed. TPH DRO exceeded the screening value of 100 mg/kg in one sample, 60SB05-01. The detected TPH DRO and GRO concentrations exceeded the total TPH screening value of 100 mg/kg in all four samples for which it was analyzed.

Sixteen metals were detected in the subsurface soil at SWMU 60 including:

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Copper
- Lead
- Mercury
- Nickel
- Selenium
- Silver
- Tin
- Vanadium
- Zinc

As shown on Table 6-2, beryllium, selenium, and silver were detected at various locations but did not exceed corresponding residential or industrial soil Regional SLs or background screening values at any location.

Antimony exceeded its residential soil Regional SL and background screening level in sample 60SB03-01. Arsenic exceeded both of the Regional SLs in all of the subsurface soil samples. Arsenic also exceeded its background screening level in sample 60SB03-01. Cobalt and vanadium were detected at concentrations exceeding corresponding residential soil Regional SLs in all samples. However, all cobalt and vanadium concentrations were less than background. Copper, lead, and zinc exceeded both their residential soil Regional SLs and background screening values in sample 60SB03-01. Lead also exceeded its background screening value only at locations 60SB04 and 60SB05.

Barium, cadmium, chromium, mercury, nickel, and tin were detected in one or more subsurface soil samples and exceeded only corresponding background screening values.

Table 6-3 presents the comparison of subsurface soil analytical results from 1 to 3 feet bgs to ecological soil screening criteria, as well as NAPR background screening values. Of the four VOCs detected in subsurface soil samples, none exceeded corresponding ecological soil screening values. As noted in Table 6-3, there is no ecological soil screening value for carbon disulfide. However, as previously mentioned, carbon disulfide was detected only once at location 60SB05 at a concentration well below the human health screening criterion.

As previously noted, fourteen PAHs were detected in the subsurface soil samples. There were no exceedances of low or high molecular weight PAHs.

4,4'-DDD was detected in the subsurface soil at concentrations below ecological soil screening criteria. 4,4'-DDE exceeded the ecological soil screening criteria in one sample, 60SB-01.

The detected TPH DRO and GRO concentrations exceeded the total TPH screening value of 100 mg/kg in the samples for which it was analyzed in the subsurface soil samples collected from 1 to 3 feet bgs. TPH GRO concentrations exceeded the screening value of 100 mg/kg in all three samples. TPH DRO exceeded the screen value of 100 mg/kg for one sample, 60SB05-001.

As previously noted, sixteen metals were detected in the subsurface soil at SWMU 60. As shown on Table 6-3, beryllium and silver were detected at various locations but did not exceed corresponding ecological soil or background screening values at any location. The following metals exceeded both ecological soil and background screening values in sample 60SB03-01: antimony, arsenic, barium, chromium, copper, lead, mercury, nickel, tin, and zinc. Cobalt and vanadium were detected in one or more samples at concentrations exceeding corresponding ecological screening values but did not exceed background screening values. Selenium also exceeded the ecological soil screening value in sample 60SB04-01D. Cadmium was detected in one sample (60SB03-01) at a concentration exceeding only its background screening value.

Based on these exceedances, the extent of potential subsurface soil contamination has not been fully defined.

Three metals had detection limits that exceeded screening values in subsurface soil. Arsenic had a detection limit of 1 mg/kg and exceeded the residential soil Regional SL of 0.39 mg/kg. Selenium had a detection limit of 2.5 mg/kg and exceeded the ecological soil screening value of 0.52 mg/kg and the NAPR Basewide background screening concentration of 1.19 mg/kg. Tin had a detection limit of 10 mg/kg and exceeded the NAPR Basewide background screening concentration of 3.47 mg/kg. Detection limits for TPH DRO and GRO also exceeded screening values. TPH DRO had a detection limit of 3,300 mg/kg which exceeded the residential soil

Regional SL of 100 mg/kg. TPH GRO had a detection limit of 2,500 mg/kg which exceeded the residential soil Regional SL of 100 mg/kg.

6.4 Open Water Sediment

Three open water sediment samples (60SD01 through 60SD03) and one duplicate sample (60SD03D) were collected and analyzed during the 2009 Phase I RFI at SWMU 60. The open water sediment samples were analyzed for Appendix IX SVOCs (including LLPAHs), pesticides, and metals, as summarized in Table 4-1. The detected results for the open water sediment data are provided in Table 6-4. Figure 6-4 presents the locations of detected organic and inorganic compounds above the applicable human health and ecological screening criteria and NAPR basewide background values in sediment. The complete data set is provided in Appendix D.

Nineteen SVOCs, including fifteen PAHs were detected in the open water sediment. PAHs were found at all locations. Most PAH concentrations were also estimated concentrations. It should be noted that the PAHs were predominantly encountered in sample 60SD01. The following PAHs exceeded one or both of their soil Regional SLs in sample 60SD01: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene. Benzo(a)pyrene also exceeded its residential soil Regional SL in sample 60SD02. The following SVOCs exceeded their ecological soil screening values in sample 60SD01: acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, dimethyl phthalate, fluoranthene, and pyrene. Dibenz(a,h)anthracene also exceeded its ecological screening value in sample 60SD02.

Pesticides were not detected in the open water sediment samples collected at SWMU 60.

As shown in Table 6-4, thirteen metals were detected in the open water sediment at SWMU 60 including:

- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Copper
- Lead
- Mercury
- Nickel
- Selenium
- Vanadium
- Zinc

Barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, and zinc were detected in one or more samples but did not exceed corresponding residential or industrial soil Regional SLs, background screening values, or ecological sediment screening values at any location. Arsenic exceeded both the residential and industrial soil Regional SLs at all locations. Arsenic also exceeded its background screening value in samples 60SD01 and 60SD02. Cobalt was detected in all four samples and exceeded its residential soil Regional SL screening criterion in three samples: 60SD01, 60SD02, and 60SD03D. Copper was detected in all four samples and exceeded its ecological screening value in two samples: 60SD01 and 60SD02. Vanadium was

detected in all four samples and exceeded its residential soil Regional SL in sample 60SD02. However, none of the cobalt, copper, or vanadium concentrations exceeded their background screening values.

Based on these exceedances, the extent of potential sediment contamination has not been fully defined.

Five SVOCs had detection limits that exceeded screening values in open water sediment. Acenaphthylene had a detection limit of 6.7 µg/kg which exceeded the ecological sediment screening value of 5.87 µg/kg. The detection limit of 330 µg/kg for Bis(2-ethylhexyl)phthalate, Dimethyl phthalate, Di-n-octyl phthalate, and phenol exceeded the ecological sediment screening values of 182 µg/kg, 6 µg/kg, 61 µg/kg, and 130 µg/kg respectively. Arsenic had a detection limit of 1 mg/kg which exceeded the residential soil Region SL of 0.39 mg/kg. Selenium had a detection limit of 2.5 mg/kg which exceeded the ecological sediment screening value of 1 mg/kg and the NAPR Basewide Background screening concentration of 1.51 mg/kg.

6.5 Groundwater

Three groundwater samples (60GW02, 60GW04, and 60GW05) and one duplicate sample (60GW04D) were collected and analyzed during the 2009 Phase I RFI at SWMU 60. The groundwater samples were analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), pesticides, total and dissolved metals, and TPH DRO/GRO, as outlined on Table 4-1. The detected results for the groundwater data set are provided in Table 6-5. Figure 6-5 presents the location of detected organic and inorganic compounds above the applicable NAPR basewide background value and either the human health or ecological screening value. The complete data set is provided in Appendix D.

Five VOCs (2-hexanone, acetone, carbon disulfide, ethyl benzene, and total xylenes) were detected in the groundwater. All VOCs were detected at low, estimated concentrations and were well below the listed criteria.

Fifteen SVOCs, including thirteen PAHs, were detected in the groundwater. PAHs were found at two of three locations (60SB02 and 60SB05). Most PAH concentrations were also estimated concentrations. It should be noted that the PAHs were predominantly encountered at location 60SB05. The following PAHs exceeded one or both of their tap water Regional SLs in sample 60GW05: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene. Benzo(a)anthracene also exceeded its ecological screening value in sample 60GW05.

Pesticides were not detected in the groundwater.

TPH DRO was detected in all samples. TPH GRO was detected in sample 60GW05. The DRO and GRO concentrations were well below the total TPH screening value of 50 mg/L.

Four total metals were detected in the groundwater samples, including:

- Arsenic
- Barium
- Lead
- Nickel

Total lead was detected at one location but did not exceed corresponding Regional tap water SLs, MCLs, background screening values, or ecological groundwater screening values. Total arsenic was detected in sample 60GW04 and its duplicate, 60GW04D, at concentrations exceeding tap water Regional SL, MCL, background screening value, and ecological groundwater screening value. Total barium was detected in all samples and exceeded its tap water Regional SL and background screening value in 60GW02. Total nickel was detected in one sample (60GW05) at a concentration exceeding its ecological groundwater screening value. However, nickel did not exceed its background screening value for groundwater.

Three dissolved metals were detected in the groundwater samples, including:

- Arsenic
- Barium
- Nickel

Dissolved arsenic was detected in groundwater in one of four samples (60GW04D) at a concentration exceeding tap water Regional SL, MCL, background screening value, and ecological groundwater screening value. Dissolved barium was detected in three of four samples (60GW02, 60GW04D, and 60GW05) and exceeded its tap water Regional SL and background screening value in 60GW02. Dissolved nickel was detected in one sample (60GW05) at a concentration exceeding its ecological groundwater screening value. However, nickel did not exceed its background screening value for groundwater.

Based on these exceedances, the extent of potential groundwater contamination has not been fully defined.

Detection limits of seven SVOCs exceeded screening values. The detection limit of 0.2 µg/L for Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Dibenz(a,h)anthracene, Indeno[1,2,3-cd]pyrene, and Naphthalene exceeded the Regional Tap Water SLs of 0.029 µg/L, 0.0029 µg/L, 0.029 µg/L, 0.0029 µg/L, 0.029 µg/L, and 0.14 µg/L respectively. The detection limit of Benzo[a]anthracene also exceeded the ecological groundwater screening value of 0.025 µg/L. Bis(2-ethylhexyl)phthalate had a detection limit of 10 µg/L which exceeded the Regional Tap Water SL of 4.8 µg/L and the USEPA MCL of 6 µg/L. In addition, arsenic had a detection limit of 10 µg/L which exceeded the Regional Tap Water SL of 0.045. Nickel had a detection limit of 40 µg/L which exceeded the ecological groundwater screening value of 8.28 µg/L. TPH DRO had a detection limit of 100 mg/L which exceeded the Regional Tap Water SL of 50 mg/L.

6.6 Laboratory Data Validation Summary

A discussion of the compounds detected in the field QA/QC samples is presented in Section 6.6.1. A summary of the data validation findings is provided in Section 6.6.2. Data validation reports are included in Appendix E. In addition, the Puerto Rican Chemist Certification for each STL SDG is presented in Appendix E.

6.6.1 Summary of Detected Compounds in Field QA/QC Samples

Field generated QA/QC samples consisted of trip blanks, equipment rinsates, field blanks, and environmental duplicates. The blanks were analyzed for all fractions requested in this investigation. However, trip blanks were only analyzed for VOCs and TPH GRO. Table 6-6 presents the detected compounds found in the trip blanks, equipment rinsates, and field blanks.

Detections in the trip blanks included 2-butanone, acetone, and chloromethane. TPH GRO was not detected in any of the trip blanks.

Four equipment rinsate samples were collected as indicated in Table 4-2. Three VOCs (2-butanone, acetone, and toluene); seven SVOCs (acetophenone, benzyl alcohol, bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, diethyl phthalate, di-n-butyl phthalate, and phenol); and ten metals (antimony, arsenic, chromium, cobalt, copper, lead, nickel, silver, vanadium, and zinc) were detected in one or more of the rinsate samples, as shown in Table 6-6. Also, TPH DRO was detected in three equipment rinsate samples. However, as noted in the paragraph below, TPH DRO was also detected in field blank sample JAN09-FB01 at a concentration of 0.25 mg/L, representing laboratory grade deionized water. Therefore, the detections in the equipment rinsate samples are likely from the source water, not the sampling equipment.

Two field blank samples were collected as follows: JAN09-FB01, representing laboratory grade deionized water, and JAN09-FB02, representing NAPR potable water. Detections in the field blank included: four VOCs (2-butanone, chlorodibromomethane, chloroform, and dichlorobromomethane); four SVOCs (benzyl alcohol, butyl benzyl phthalate, di-n-butyl phthalate, and phenol); eight metals (antimony, arsenic, chromium, cobalt, copper, lead, vanadium, and zinc); and TPH DRO and GRO.

Positive results in these QC blanks, which are associated with specific SDGs, represent potential blank contamination within those SDGs. It should be noted that the laboratory reported to the Method Detection Limit (MDL) for this project. Therefore, blank flagging actions were modified to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as nondetect (U) at the reported concentrations when affected by blank contamination.

6.6.2 Validation Summary

Laboratory analyses were performed by Test America Laboratories (Savannah, Georgia). Validation services were provided by DataQual Environmental Services, LLC located in St. Louis, Missouri. Data was validated by the designated laboratory SDG. Data validation summaries for each SDG are provided in Appendix D. The validation indicated that all sample preparation and analysis was performed within Region II and/or method holding time requirements. However, some issues were identified and qualifiers added as described here. Cadmium and lead results were rejected in surface soil sample 60SB03-00 and its duplicate sample (found in SDG NAPR43887-1) because the relative percent difference between the two were greater than 120 percent. Zinc was rejected in subsurface soil sample 60SB04-01 (found in SDG NAPR43887-1) because the relative percent difference was not acceptable for Region II guidelines. In accordance with Region II guidelines, the results for these metals were rejected. Groundwater sample 60GW04D (found in SDG NAPR44002-1) was received at the laboratory with headspace; therefore, as in accordance with Region II guidelines, the positive results were qualified as estimated (J) and nondetected results were qualified as rejected (R). QA/QC sample JAN09-FB02 (found in SDG NAPR44077-3) exhibited noncompliant surrogate recovery and as a result, positive SVOC results were qualified as estimated (J) and nondetected results were qualified as rejected (R). Trip blank samples JAN09-TB01 (SDG NAPR43887-2), JAN09-TB02 (SDG NAPR43925-1), JAN09-TB03 (SDG NAPR43961-2) were received at the laboratory with head space; and therefore, all non-detects were rejected. The analytical results for sample 60GW04 were re-evaluated by the validator using the information in the field log books. Based on the revised validation narrative, all non-detected compounds were rejected and all positive results in the VOA and GRO fractions were estimated.

Changes in the results due to the application of the data validation objectives are not expected to significantly compromise the data quality objectives for this SDG. Consequently, the data, as qualified by the validator is acceptable for its intended use.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The objectives of this Phase I RFI are to:

- Determine if contaminants are present at SWMU 60 from past activities, to the extent practical, from the completion of field activities (surface soil, subsurface soil, sediment, and groundwater sampling) as described in the 2007 Phase I RFI Work Plan (Baker, 2007);
- Screen media for potential human health risks posed by the site; and
- Screen media for potential ecological risks posed by the site.

It is evident from the analyses of samples obtained during the Phase I RFI investigation that surface soil, subsurface soil, sediment, and groundwater have been impacted from past activities that have occurred at SWMU 60.

Exceedances of PAHs were identified in the surface soil at 60SB04 and in the groundwater at 60SB05 in the vicinity of the former pipeline system. Exceedances of arsenic, copper, mercury, tin, and zinc were identified in the surface soil, primarily at location 60SB03 in the center of the SWMU.

Exceedances of PAHs were also identified in the subsurface soil at locations 60SB03 and 60SB04. TPH DRO and GRO were detected in subsurface soil at locations 60SB04 and 60SB05 at concentrations exceeding the total TPH screening value. Several metals exceeded human health, ecological, and background screening criteria in the subsurface soil at location 60SB03.

Exceedances of several PAHs were identified in the open water sediment primarily at location 60SD01. One PAH, benzo(a)pyrene, was also detected at a concentration exceeding its ecological screening criterion at location 60SD02. Exceedances of arsenic were identified in the open water sediment at locations 60SD01 and 60SD02.

In addition to the exceedances of PAHs in the groundwater at 60SB05, total and dissolved arsenic were detected at concentrations exceeding human health, ecological, and background screening criteria at location 60SB04. Exceedances of total and dissolved barium were also identified in the groundwater at location 60SB02.

7.2 Recommendations

Based on the results of this Phase I RFI, minor impact to the environment appears to have occurred at SWMU 60. A Full RFI Investigation is recommended in order to delineate the site contamination above screening levels in surface soil, subsurface soil, open water sediment, and groundwater. The Full RFI should focus around Phase I RFI boring locations 60SB01 through 60SB05 and open water sediment locations 60SD01 and 60SD02. Also, additional data will be collected during the Full RFI to better define groundwater flow patterns at SWMU 60, as well as determine the interaction between Ensenada Honda and shallow groundwater. Tidal influence and the E2SS3 wetland unit east of the SWMU 60 boundary will also be investigated during the Full RFI. The potential for human health and ecological risk should also be further evaluated. Specifically, the Full RFI should include further investigation of PAHs and metals in the surface

and subsurface soil, sediment, and groundwater, define the likely source area(s), and determine the potential for unacceptable risks to human health and/or the environment. Based on the recommendation that SWMU 60 move forward to a Full RFI, a statistical background analysis for inorganic chemicals exceeding one or more of the screening values (human health or ecological) was not included as part of this Phase I RFI (as stated in the work plan). The background statistical analysis may be included as part of the human health and ecological risk assessments conducted for the Full RFI.

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TABLES

TABLE 4-1

**SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM - ENVIRONMENTAL SAMPLES
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Media	Site ID	Sample ID	Sample Depth (ft bgs)	Sample Date	Analysis Requested							Comment
					App IX VOCs	App IX SVOCs w/ LLPAs	Appendix IX Pesticides	TPH DRO	TPH GRO	Appendix IX Metals	Appendix IX Metals (Dissolved)	
Surface Soil	60SB01	60SB01-00	0.0 - 1.0	01/12/09	X	X	X			X		
	60SB02	60SB02-00	0.0 - 1.0	01/12/09	X	X	X			X		
	60SB03	60SB03-00	0.0 - 1.0	01/13/09	X	X	X			X		
		60SB03-00D	0.0 - 1.0	01/13/09	X	X	X			X		Duplicate
	60SB03-00MS/MSD	0.0 - 1.0	01/13/09	X	X	X			X		Matrix Spike/Matrix Spike Duplicate	
	60SB04	60SB04-00	0.0 - 1.0	01/13/09	X	X	X	X	X	X		
60SB05	60SB05-00	0.0 - 1.0	01/13/09	X	X	X	X	X	X			
Subsurface Soil	60SB03	60SB03-01	1.0-3.0	01/13/09	X	X	X			X		
	60SB04	60SB04-01	1.0-3.0	01/13/09	X	X	X	X	X	X		
		60SB04-01D	1.0-3.0	01/13/09	X	X	X	X	X	X		Duplicate
		60SB04-01MS/MSD	1.0-3.0	01/13/09	X	X	X	X	X	X		Matrix Spike/Matrix Spike Duplicate
	60SB04-03	5.0-7.0	01/13/09	X	X	X	X	X	X			
60SB05	60SB05-01	1.0-3.0	01/13/09	X	X	X	X	X	X			
Sediment	60SD01	60SD01	0.0-0.5	01/17/09		X	X			X		
	60SD02	60SD02	0.0-0.5	01/17/09		X	X			X		
	60SD03	60SD03	0.0-0.5	01/17/09		X	X			X		
	60SD03D	60SD03D	0.0-0.5	01/17/09		X	X			X		Duplicate
Groundwater	60SB02	60GW02	NA	01/18/09	X	X	X	X	X	X	X	Temporary well
	60SB04	60GW04	NA	01/15/09	X	X	X	X	X	X	X	
		60GW04D	NA	01/15/09	X	X	X	X	X	X	X	Duplicate
	60SB04MS/MSD	NA	01/15/09	X	X	X	X	X	X	X	X	Matrix Spike/Matrix Spike Duplicate
60SB05	60GW05	NA	01/18/09	X	X	X	X	X	X	X		

Notes:

ft bgs - feet below ground surface.

NA - Not Applicable.

Low Level PAH's were included with SVOC analysis

TABLE 4-2

**SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM - QA/QC SAMPLES
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Media	Sample ID	Sample Date	Analysis Requested									Comment		
			App IX VOCs	App IX SVOCs w/ LL PAHs	App IX Pesticides	App IX Metals	TPH GRO	TPH DRO	TCLP Volatiles	RCI	TCLP Metals			
Trip Blanks	JAN09-TB01	01/12/09	X					X						
	JAN09-TB02	01/13/09	X					X						
	JAN09-TB03	01/14/09	X					X						
	JAN09-TB04	01/15/09	X					X						
	JAN09-TB06	01/17/09	X					X						
	JAN09-TB07	01/18/09	X					X						
	JAN09-TB09	01/20/09	X					X						
Equipment Rinsate Blanks	JAN09-ER01	01/12/09	X	X	X	X	X	X						Macro Core Liner
	JAN09-ER02	01/13/09	X	X	X	X	X	X						Macro Core Liner
	JAN09-ER04	01/15/09	X	X	X	X	X	X						Polyethylene and Silicon Tubing
	JAN09-ER06	01/17/09	X	X	X	X	X	X						Stainless Steel Spoon
Field Blanks	JAN09-FB01	01/14/09	X	X	X	X	X	X						Lab Grade Deionized Water
	JAN09-FB02	01/20/09	X	X	X	X	X	X						NAPR Potable Water
IDW	JAN09-IDW01	01/22/09								X	X	X		Solid
	JAN09-IDW02	01/22/09				X					X			Aqueous

Notes:

Low Level PAH's were included with SVOC analysis

Since multiple SWMUs were investigated at the same time as SWMU 60, the QA/QC samples collected may be applicable to more than one SWMU. PCBs were analyzed in JAN09-ER06 and field blank samples listed on this table; however, PCB results are not applicable to the investigation at SWMU 60. Therefore, PCBs will not be included on this table or in the QA/QC discussion for SWMU 60.

RCI - Reactivity, Corrosivity, Ignitability

TCLP - Toxicity Characteristic Leaching Procedure

TABLE 4-3

PARAMETER LISTS AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE 1 RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

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

TABLE 4-3

**PARAMETER LISTS AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE 1 RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Appendix IX - VOCs (cont.)	Quantitation Limits*		Method Number (Description)
	Water (µg/L)	Low Soil (µg/kg)	
1,1,1-Trichloroethane	1.0	5.0	8260B (5030) (low level)
1,1,2-Trichloroethane	1.0	5.0	8260B (5030) (low level)
Trichloroethene	1.0	5.0	8260B (5030) (low level)
Trichlorofluoromethane	1.0	5.0	8260B (5030) (low level)
1,2,3-Trichloropropane	1.0	5.0	8260B (5030) (low level)
Vinyl Acetate	2.0	10	8260B (5030) (low level)
Vinyl Chloride	1.0	10	8260B (5030) (low level)
Xylene	2.0	10	8260B (5030) (low level)
Appendix IX - SVOCs	Quantitation Limits*		Method Number (Description)
	Water (µg/L)	Low Soil (µg/kg)	
<i>Acenaphthene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
<i>Acenaphthylene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
Acetophenone	10	330	8270C
2-Acetylaminofluorene	10	330	8270C
4-Aminobiphenyl	20	330	8270C
Aniline	20	660	8270C
<i>Anthracene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
Aramite	10	330	8270C
<i>Benzo(a)anthracene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
<i>Benzo(b)fluoranthene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
<i>Benzo(k)fluoranthene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
<i>Benzo(g,h,i)perylene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
<i>Benzo(a)pyrene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
Benzyl alcohol	10	330	8270C
Bis(2-chloroethoxyl)methane	10	330	8270C
Bis(2-chloroethyl)ether	10	330	8270C
Bis(2-ethylhexyl)phthalate	10	330	8270C
4-Bromophenyl phenyl ether	10	330	8270C
Butylbenzylphthalate	10	330	8270C
4-Chloroaniline	20	660	8270C
4-Chloro-3-methylphenol	10	330	8270C
2-Chloronaphthalene	10	330	8270C
2-Chlorophenol	10	330	8270C
4-Chlorophenyl phenyl ether	10	330	8270C
<i>Chrysene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
3&4 Methylphenol	10	330	8270C
2-Methylphenol	10	330	8270C
Diallate	10	330	8270C
Dibenzofuran	10	330	8270C
Di-n-butyl phthalate	10	330	8270C
<i>Dibenzo(a,h)anthracene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
o-Dichlorobenzene	10	330	8270C
m-Dichlorobenzene	10	330	8270C
p-Dichlorobenzene	10	330	8270C
3,3'-Dichlorobenzidine	20	660	8270C

TABLE 4-3

**PARAMETER LISTS AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE 1 RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Appendix IX - SVOCs (Cont.)	Quantitation Limits*		Method Number (Description)
	Water (µg/L)	Low Soil (µg/kg)	
2,4-Dichlorophenol	10	330	8270C
2,6-Dichlorophenol	10	330	8270C
Diethylphthalate	10	330	8270C
p-(Dimethylamino)azobenzene	10	330	8270C
7,12-Dimethyl benz(a)anthracene	10	330	8270C
3,3-Dimethyl benzidine	20	1,700	8270C
2,4-Dimethylphenol	10	330	8270C
alpha, alpha-Dimethylphenethylamine	2,000	67,000	8270C
Dimethyl phthalate	10	330	8270C
m-Dinitrobenzene	10	330	8270C
4,6-Dinitro-2-methylphenol	50	1,700	8270C
2,4-Dinitrophenol	50	1,700	8270C
2,4-Dinitrotoluene	10	330	8270C
2,6-Dinitrotoluene	10	330	8270C
Di-n-octylphthalate	10	330	8270C
1,4-Dioxane	10	330	8270C
Dinoseb	10	330	8270C
Ethylmethanesulfonate	10	330	8270C
Fluoranthene	0.2	6.7	8270C
Fluorene	0.2	6.7	8270C
Hexachlorobenzene	10	330	8270C
Hexachlorobutadiene	10	330	8270C
Hexachlorocyclopentadiene	10	330	8270C
Hexachloroethane	10	330	8270C
Hexachlorophene	5,000	170,000	8270C
Hexachloropropene	10	330	8270C
Indeno(1,2,3-cd)pyrene	0.2	6.7	8270C
Isophorone	10	330	8270C
Isosafrole	10	330	8270C
Methapyrilene	2,000	67,000	8270C
3-Methylcholanthrene	10	330	8270C
Methyl methanesulfonate	10	330	8270C
1-Methylnaphthalene	0.2	6.7	8270C
2-Methylnaphthalene	0.2	6.7	8270C
Naphthalene	0.2	6.7	8270C
1,4-Naphthoquinone	10	330	8270C
1-Naphthylamine	10	330	8270C
2-Naphthylamine	10	330	8270C
2-Nitroaniline	50	1,700	8270C
3-Nitroaniline	50	1,700	8270C
4-Nitroaniline	50	1,700	8270C
Nitrobenzene	10	330	8270C
2-Nitrophenol	10	330	8270C
4-Nitrophenol	50	1,700	8270C
4-Nitroquinoline-1-oxide	20	3,300	8270C
n-Nitrosodi-n-butylamine	10	330	8270C

TABLE 4-3

**PARAMETER LISTS AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE 1 RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Appendix IX - SVOCs (Cont.)	Quantitation Limits*		Method Number (Description)
	Water (µg/L)	Low Soil (µg/kg)	
n-Nitrosodiethylamine	10	330	8270C
n-Nitrosodimethylamine	10	330	8270C
n-Nitrosomethylethylamine	10	330	8270C
n-Nitrosomorpholine	10	330	8270C
n-Nitrosopiperidine	10	330	8270C
n-Nitrosopyrrolidine	10	330	8270C
5-Nitro-o-toluidine	10	330	8270C
bis-(2-chloroisopropyl)ether	10	330	8270C
Pentachlorobenzene	10	330	8270C
Pentachloronitrobenzene	10	330	8270C
Pentachlorophenol	50	1,700	8270C
Phenacetin	10	330	8270C
<i>Phenanthrene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
Phenol	10	330	8270C
1,4-Phenylenediamine	2,000	1,700	8270C
2-Picolin	10	330	8270C
Pronamide	10	330	8270C
<i>Pyrene</i>	<i>0.2</i>	<i>6.7</i>	<i>8270C</i>
Pyridine	50	330	8270C
Safrole	10	330	8270C
1,2,4,5-Tetrachlorobenzene	10	330	8270C
2,3,4,6-Tetrachlorophenol	10	330	8270C
o-Toluidine	20	330	8270C
1,2,4-Trichlorobenzene	10	330	8270C
2,4,5-Trichlorophenol	10	330	8270C
2,4,6-Trichlorophenol	10	330	8270C
1,3,5-Trinitrobenzene	10	330	8270C
Pesticides	Quantitation Limits*		Method Number
	Water (µg/L)	Low Soil (µg/kg)	
Aldrin	0.05	1.7	8081A
Alpha-BHC	0.05	1.7	8081A
beta-BHC	0.05	1.7	8081A
delta-BHC	0.05	1.7	8081A
gamma-BHC	0.05	1.7	8081A
Chlordane	0.5	17	8081A
Chlorobenzilate	0.5	17	8081A
4,4'-DDT	0.1	3.3	8081A
4,4'-DDE	0.1	3.3	8081A
4,4'-DDD	0.1	3.3	8081A
Dieldrin	0.1	3.3	8081A
Endosulfan I	0.05	1.7	8081A
Endosulfan II	0.1	3.3	8081A
Endosulfan sulfate	0.1	3.3	8081A
Endrin	0.1	3.3	8081A
Isodrin	0.05	3.3	8081A

TABLE 4-3

**PARAMETER LISTS AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE 1 RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Pesticides (cont.)	Quantitation Limits*		Method Number
	Water (µg/L)	Low Soil (µg/kg)	
Kepone	1.0	170	8081A
Toxaphene	5.0	170	8081A
Endrin Aldehyde	0.1	3.3	8081A
Heptachlor	0.05	1.7	8081A
Heptachlor epoxide	0.05	1.7	8081A
Methoxychlor	0.5	17	8081A
Appendix IX - Metals (Total and Dissolved)	Quantitation Limits*		Method Number (Description)
	Water (µg/L)	Low Soil (mg/kg)	
Antimony	20	2.0	6010 (Inductively Coupled Plasma)
Arsenic	10	1.0	6010 (Inductively Coupled Plasma)
Barium	10	1.0	6010 (Inductively Coupled Plasma)
Beryllium	4.0	0.4	6010 (Inductively Coupled Plasma)
Cadmium	5.0	0.5	6010 (Inductively Coupled Plasma)
Chromium	10	1.0	6010 (Inductively Coupled Plasma)
Cobalt	10	1.0	6010 (Inductively Coupled Plasma)
Copper	20	2.0	6010 (Inductively Coupled Plasma)
Lead	5.0	0.5	6010 (Inductively Coupled Plasma)
Mercury	0.2	0.02	7470/7471 (Cold Vapor AA)
Nickel	40	4.0	6010 (Inductively Coupled Plasma)
Selenium	10	2.5	6010 (Inductively Coupled Plasma)
Silver	10	1.0	6010 (Inductively Coupled Plasma)
Thallium	25	2.5	6010 (Inductively Coupled Plasma)
Tin	50	10.0	6010 (Inductively Coupled Plasma)
Vanadium	10	1.0	6010 (Inductively Coupled Plasma)
Zinc	20	2.0	6010 (Inductively Coupled Plasma)
Total Petroleum Hydrocarbons	Reporting Limits*		Method Number
	Water (µg/L)	Low Soil (µg/kg)	
TPH DRO	100	3300	8015B
TPH GRO	50	250	8015B

Notes:

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.

µg/L - micrograms per liter

µg/kg - micrograms per kilogram

mg/kg - milligrams per kilogram

Denotes LLPAH's included with SVOC analysis

TABLE 4-4
GROUNDWATER ELEVATION SUMMARY
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Well Identification	Northing	Easting	Total Well Depth (ft bgs)	Ground Surface Elevation (ft)⁽¹⁾	Screen Interval (ft bgs)	Elevation Top of PVC Casing (ft)⁽¹⁾	Depth to Groundwater on 01/23/2009 (ft)⁽²⁾	Groundwater Elevation (ft)^(1,3)
60SB01	801983.8	936618.9	8.0	--	--	--	--	--
60SB02	802165.2	936698.5	8.0	--	2.0 to 7.0	105.19	5.62	99.57
60SB03	802165.1	936698.2	8.0	102.40	--	--	--	--
60SB04	802322.2	936257.7	15.5	102.65	5.5 to 15.5	102.38	2.53	99.85
60SB05	802362.9	936222.8	15.0	102.62	5.0 to 15.0	102.29	2.52	99.77

Notes:

- ⁽¹⁾ Datum: Mean Sea Level plus 100 feet
- ⁽²⁾ Measured from top of PVC
- ⁽³⁾ Groundwater Elevation = Elevation of top of PVC - Depth to Groundwater

ft = feet

bgs = below ground surface

TABLE 6-1

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID Sample ID Date Depth Range (ft bgs)	Regional Screening Levels Residential	<i>Regional Screening Levels Industrial</i>	Selected Ecological Soil Screening Values	<u>NAPR</u> <u>Basewide</u> <u>Background</u> ⁽¹⁾	60SB01 60SB01-00 1/12/2009 0.0-1.0	60SB02 60SB02-00 1/12/2009 0.0-1.0	60SB03 60SB03-00 1/13/2009 0.0-1.0	60SB03 60SB03-00D 1/13/2009 0.0-1.0	60SB04 60SB04-00 1/13/2009 0.0-1.0	60SB05 60SB05-00 1/13/2009 0.0-1.0
Volatile Organic Compounds (ug/kg)										
<i>None Detected</i>										
Semivolatile Organic Compounds (ug/kg)										
2-Methylnaphthalene	31,000 ⁽²⁾	410,000 ⁽²⁾	NE	NE	2.9 U	2.3 U	2 U	1.9 U	2 U	150
Acenaphthylene	340,000 ⁽²⁾⁽³⁾	3,300,000 ⁽²⁾⁽³⁾	NE	NE	2.9 U	2.3 U	2 U	1.9 U	4.4 J	2.3 U
Anthracene	1,700,000 ⁽²⁾	17,000,000 ⁽²⁾	NE	NE	2.9 U	2.3 U	2 U	1.9 U	7.9 J	2.3 U
Benzo[a]anthracene	150	2,100	NE	NE	2.9 U	17	16 J	10 J	95	4 J
Benzo[a]pyrene	15	210	NE	NE	3 J	30	18 J	17 J	160	7.6 J
Benzo[b]fluoranthene	150	2,100	NE	NE	5.1 J	52	42 J	35 J	460	2.3 UJ
Benzo[g,h,i]perylene	170,000 ⁽²⁾⁽³⁾	1,700,000 ⁽²⁾⁽³⁾	NE	NE	2.9 UJ	17 J	23 J	17 J	100 J	10
Chrysene	15,000	210,000	NE	NE	2.9 U	16	18 J	11 J	230	4.6 J
Dibenz(a,h)anthracene	15	210	NE	NE	0.98 UJ	0.76 UJ	4.9 J	0.63 UJ	34 J	0.76 U
Dimethyl phthalate	NE	NE	NE	NE	11 U	8.6 U	7.4 U	7 U	12 J	8.5 U
Fluoranthene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	NE	NE	1.2 J	7.9 J	21 J	7.5 J	84	3.1 J
Indeno[1,2,3 cd]pyrene	150	2,100	NE	NE	5.7 UJ	13 J	12 J	8.8 J	97 J	4.4 U
Naphthalene	3,600	18,000	NE	NE	2.9 U	2.3 U	2.1 J	1.9 U	2 U	7.1 J
Phenanthrene	170,000 ⁽²⁾	1,700,000 ⁽²⁾	NE	NE	2.9 U	2.3 U	9 J	2.8 J	2.5 J	2.8 J
Pyrene	170,000 ⁽²⁾	1,700,000 ⁽²⁾	NE	NE	2.9 U	16	27 J	17 J	180	5.5 J
PAHs (ug/kg)										
Low molecular weight PAHs	NE	NE	29,000 ⁽⁶⁾⁽⁸⁾	NE	21.5	24	42.1	21.7	107	172
High molecular weight PAHs	NE	NE	18,000 ⁽⁷⁾⁽⁸⁾	NE	29.3	164	163	118	1358	41.5
Pesticides (ug/kg)										
4,4' DDE	1,400	5,100	93 ⁽⁹⁾	NE	0.55 U	7.5 U	67 J	20 J	15 U	17 U
Metals (mg/kg)										
Antimony	3.1 ⁽²⁾	41 ⁽²⁾	10 ⁽¹⁰⁾	3.17	0.77	0.96 U	22 J	11 J	0.42 U	0.69
Arsenic	0.39	1.6	18 ⁽¹¹⁾	2.65	3.2	5	6.1 J	2.6 J	1.7	3.3

TABLE 6-1

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID Sample ID Date Depth Range (ft bgs)	Regional Screening Levels Residential	<i>Regional Screening Levels Industrial</i>	Selected Ecological Soil Screening	<u>NAPR</u> <u>Basewide</u> <u>Background</u> ⁽¹⁾	60SB01 60SB01-00 1/12/2009 0.0-1.0	60SB02 60SB02-00 1/12/2009 0.0-1.0	60SB03 60SB03-00 1/13/2009 0.0-1.0	60SB03 60SB03-00D 1/13/2009 0.0-1.0	60SB04 60SB04-00 1/13/2009 0.0-1.0	60SB05 60SB05-00 1/13/2009 0.0-1.0
Metals (mg/kg)										
Barium	1,500 ⁽²⁾	19,000 ⁽²⁾	330 ⁽⁸⁾	199	27 J	35 J	<u>250</u> J	140 J	<u>220</u> J	76 J
Beryllium	16 ⁽²⁾	200 ⁽²⁾	21 ⁽¹²⁾	0.590	0.084 U	0.11 U	0.24	0.18	0.25	0.26
Cadmium	7 ⁽²⁾	80 ⁽²⁾	0.77 ⁽⁹⁾	1.02	0.16 J	0.18 UJ	4.2 R	0.59 R	0.15 J	0.18
Chromium	290	5,600	26 ⁽⁹⁾	49.8	21	19	<u>51</u> J	<u>33</u> J	26	24 J
Cobalt	2.3 ⁽²⁾	30 ⁽²⁾	13 ⁽¹¹⁾	46.2	9.5 J	6 J	25 J	20 J	26 J	16 J
Copper	310 ⁽²⁾	4,100 ⁽²⁾	28 ⁽⁹⁾	168	33 J	24 J	470 J	230 J	110 J	73 J
Lead	40 ⁽⁴⁾	80 ⁽⁴⁾	11 ⁽⁹⁾	22	5 J	7.3 J	520 R	86 R	8.1 J	9.3 J
Mercury	1 ⁽²⁾	4.3 ⁽²⁾	0.1 ⁽¹³⁾	0.109	0.05 J	0.035 J	<u>0.18</u> J	0.082 J	0.071 J	0.052
Nickel	150 ⁽²⁾	2,000 ⁽²⁾	38 ⁽¹¹⁾	20.7	9.9	7	<u>26</u>	15 J	15 J	9.9 J
Selenium	39 ⁽²⁾	510 ⁽²⁾	0.52 ⁽¹¹⁾	1.48	0.24 J	0.71 U	<u>0.54</u> J	0.34 J	0.29 J	<u>0.55</u> J
Silver	39 ⁽²⁾	510 ⁽²⁾	4.2 ⁽⁹⁾	NE	0.16 U	0.12 U	0.61	0.21 U	0.082 U	0.05 U
Tin	4,700 ⁽²⁾	61,000 ⁽²⁾	50 ⁽¹⁴⁾	3.76	6 U	24 U	<u>61</u> J	<u>19</u> J	4.2 U	5.2 U
Vanadium	39 ⁽²⁾	520 ⁽²⁾	7.8 ⁽⁹⁾	259	43	45	160	130	170	140 J
Zinc	2,300 ⁽²⁾	31,000 ⁽²⁾	46 ⁽⁹⁾	115	43 J	23 U	<u>910</u> J	<u>260</u> J	<u>58</u> J	<u>61</u> J
TPH DRO and GRO (mg/kg)										
Diesel Range Organics	100	NE	NE	NE	NA	NA	NA	NA	19	44
Gasoline Range Organics	100	NE	NE	NE	NA	NA	NA	NA	0.058 UJ	0.08 J
Total TPH	100 ⁽⁵⁾	NE	NE	NE	NA	NA	NA	NA	19	44.1 J

**SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Notes/Qualifiers:

- J - Estimated: The analyte was positively identified; the quantitation is an estimation
- U - Undetected at the Method Detection Limit
- UJ - Reported quantitation limit is qualified as estimated
- R - Rejected data; data is not usable
- ft bgs - feet below ground surface
- ug/kg - micrograms per kilogram
- mg/kg - milligrams per kilogram
- NE - Not Established
- NA - Not Analyzed
- NAPR - Naval Activity Puerto Rico
- USEPA - United States Environmental Protection Agency

- (1) NAPR basewide background surface soil screening value (upper limit of the means concentration [mean plus two standard deviations]) (Baker, 2008).
- (2) Noncarcinogenic Regional Screening Levels based on a target hazard quotient of 0.1 for conservative screening purposes.
- (3) Pyrene used as a surrogate for screening purposes for benzo[g,h,i] perylened phenanthrene; acenaphthene used as a surrogate for acenaphthylene.
- (4) USEPA Action Level for lead in soils.
- (5) Total TPH value represents the Puerto Rico Environmental Quality Board recommended screening value for soils.
- (6) Low molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of fewer than four rings. The low molecular weight PAH compounds analyzed for in SWMU 60 soil were 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene. Maximum reporting limits were used for non-detected PAHs.
- (7) High molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of four or more rings. The high molecular weight PAH compounds analyzed for in SWMU 60 soil were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene. Maximum reporting limits were used for non-detected PAHs.
- (8) Invertebrate-based ecological soil screening level (USEPA, 2005a [barium]; USEPA, 2007a [PAHs]).
- (9) Avian-based ecological soil screening level for ground insectivores (USEPA, 2007b [DDT and metabolites]; USEPA, 2005b [cadmium]; USEPA, 2008 [chromium]; USEPA, 2007c [copper]; USEPA, 2005c [lead]; USEPA, 2006 [silver]; USEPA, 2005d [vanadium]; USEPA, 2007d [zinc]).
- (10) Mammalian-based ecological soil screening level for herbivores (USEPA, 2005e [antimony]).
- (11) Plant-based ecological soil screening level (USEPA, 2005f [arsenic]; USEPA, 2005g [cobalt]; USEPA, 2007e [nickel]; USEPA, 2007f [selenium]).
- (12) Avian-based ecological soil screening level for ground herbivores (USEPA, 2005h [beryllium]).
- (13) Toxicological threshold for earthworms (Efroymsen et al., 1997a).
- (14) Toxicological threshold for plants.

**SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Table References:

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- Efroymsen, R.A., M.E. Will, and G.W. Suter II. 1997a. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revisions. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-126/R2.
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- USEPA. 2007a. Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs) (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-78.
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- USEPA. 2007c. Ecological Soil Screening Levels for Copper (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-68.
- USEPA. 2007d. Ecological Soil Screening Levels for Zinc (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-73.
- USEPA. 2007e. Ecological Soil Screening Levels for Nickel (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-76.
- USEPA. 2007f. Ecological Soil Screening Levels for Selenium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-72.
- USEPA. 2006. Ecological Soil Screening Levels for Silver (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWEER Directive 9285.7-77.

**SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Table References (cont.):

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- USEPA. 2005b. Ecological Soil Screening Levels for Cadmium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-62.
- USEPA. 2005c. Ecological Soil Screening Levels for Lead (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-70.
- USEPA. 2005d. Ecological Soil Screening Levels for Vanadium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-75.
- USEPA. 2005e. Ecological Soil Screening Levels for Antimony (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-61.
- USEPA. 2005f. Ecological Soil Screening Levels for Arsenic (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-62.
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- USEPA. 2005h. Ecological Soil Screening Levels for Beryllium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-64.

TABLE 6-2

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Site ID Sample ID Date Depth Range (ft bgs)	Regional Screening Levels Residential	<i>Regional Screening Levels Industrial</i>	<u>NAPR</u> <u>Basewide</u> <u>Background</u> ⁽¹⁾	60SB03 60SB03-01 1/13/2009 1.0-3.0	60SB04 60SB04-01 1/13/2009 1.0-3.0	60SB04 60SB04-01D 1/13/2009 1.0-3.0	60SB04 60SB04-03 1/13/2009 5.0-7.0	60SB05 60SB05-01 1/13/2009 1.0-3.0
Volatile Organic Compounds (ug/kg)								
Carbon disulfide	82,000 ⁽²⁾	370,000 ⁽²⁾	NE	1.4 U	1.2 U	1.3 U	7.6	2 J
Ethylbenzene	5,400	27,000	NE	0.88 U	0.75 U	0.84 U	1.5 J	46
Methylene Chloride	11,000	53,000	NE	1.2 U	1 U	1.4 J	1.4 U	3.3 J
Xylenes, Total	63,000 ⁽²⁾	270,000 ⁽²⁾	NE	2.7 U	2.3 U	2.6 U	3.3 U	34
Semivolatile Organic Compounds (ug/kg)								
2-Methylnaphthalene	31,000 ⁽²⁾	410,000 ⁽²⁾	NE	2.6 J	21 U	2.1 U	28 U	38
Acenaphthylene	340,000 ⁽²⁾⁽³⁾	3,300,000 ⁽²⁾⁽³⁾	NE	4.3 J	21 U	2.1 U	28 U	2 U
Anthracene	1,700,000 ⁽²⁾	17,000,000 ⁽²⁾	NE	5.5 J	21 U	2.6 J	28 U	2 U
Benzo[a]anthracene	150	2,100	NE	57	21 UJ	42 J	28 U	2 U
Benzo[a]pyrene	15	210	NE	100	21 UJ	55 J	28 U	2 U
Benzo[b]fluoranthene	150	2,100	NE	180	21 UJ	83 J	28 U	2 UJ
Benzo[g,h,i]perylene	170,000 ⁽²⁾⁽³⁾	1,700,000 ⁽²⁾⁽³⁾	NE	110 J	21 UJ	39 J	28 UJ	2 U
Chrysene	15,000	210,000	NE	56	21 UJ	35 J	28 U	2 U
Dibenz(a,h)anthracene	15	210	NE	29 J	7 UJ	0.71 UJ	9.4 UJ	0.68 U
Fluoranthene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	NE	48	4.6 UJ	22 J	6.2 U	1.3 J
Indeno[1,2,3-cd]pyrene	150	2,100	NE	63 J	40 UJ	18 J	54 UJ	3.9 U
Naphthalene	3,600	18,000	NE	2 J	21 U	2.1 U	28 U	5.9 J
Phenanthrene	170,000 ⁽²⁾⁽³⁾	1,700,000 ⁽²⁾⁽³⁾	NE	21	21 U	11 J	28 U	3.8 J
Pyrene	170,000 ⁽²⁾	1,700,000 ⁽²⁾	NE	93	21 UJ	55 J	28 U	3.6 J
Pesticides (ug/kg)								
4,4'-DDD	2,000	7,200	NE	38 J	40 J	18 U	23 U	3.4 J
4,4'-DDE	1,400	5,100	NE	380	21 J	16 U	62 J	14

TABLE 6-2

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Site ID Sample ID Date Depth Range (ft bgs)	Regional Screening Levels Residential	<i>Regional Screening Levels Industrial</i>	<u>NAPR Basewide Background</u> ⁽¹⁾	60SB03 60SB03-01 1/13/2009 1.0-3.0	60SB04 60SB04-01 1/13/2009 1.0-3.0	60SB04 60SB04-01D 1/13/2009 1.0-3.0	60SB04 60SB04-03 1/13/2009 5.0-7.0	60SB05 60SB05-01 1/13/2009 1.0-3.0
Metals (mg/kg)								
Antimony	3.1 ⁽²⁾	41 ⁽²⁾	7.44	<u>120</u>	0.39 U	0.42 U	2.8	0.97 U
Arsenic	0.39	1.6	6.66	<u>33</u>	2.5	3	4.3	3.5
Barium	1,500 ⁽²⁾	19,000 ⁽²⁾	207	<u>550</u> J	41 J	43 J	45 J	110 J
Beryllium	16 ⁽²⁾	200 ⁽²⁾	0.933	0.14 U	0.12	0.23	0.12 U	0.24 U
Cadmium	7 ⁽²⁾	80 ⁽²⁾	0.57	<u>6.5</u> J	0.14 J	0.096 UJ	<u>0.61</u> J	0.22 U
Chromium	290	5,600	47.9	<u>180</u>	45	38	20	20 J
Cobalt	2.3 ⁽²⁾	30 ⁽²⁾	63.1	<u>22</u> J	15 J	26 J	9 J	13 J
Copper	310 ⁽²⁾	4,100 ⁽²⁾	120	<u>3,400</u> J	42 J	49 J	44 J	81 J
Lead	40 ⁽⁴⁾	80 ⁽⁴⁾	6.2	<u>1,600</u> J	4.2 J	<u>7.4</u> J	<u>26</u> J	<u>11</u> J
Mercury	1 ⁽²⁾	4.3 ⁽²⁾	0.067	<u>0.38</u> J	0.046 J	0.023 J	0.052 J	0.045
Nickel	160 ⁽²⁾	2,000 ⁽²⁾	26.5	<u>90</u>	14 J	14 J	8 J	11 J
Selenium	39 ⁽²⁾	510 ⁽²⁾	1.19	0.67 U	0.46 J	0.71	0.75 J	0.63 U
Silver	39 ⁽²⁾	510 ⁽²⁾	NE	2.7	0.063 U	0.066 U	0.094 U	0.084 U
Tin	4,700 ⁽²⁾	61,000 ⁽²⁾	3.47	<u>390</u>	4.4 U	4.7 U	<u>6.8</u> J	21 U
Vanadium	39 ⁽²⁾	520 ⁽²⁾	256	87	200	190	99	96 J
Zinc	2,300 ⁽²⁾	31,000 ⁽²⁾	92	<u>2,600</u> J	29 R	46 J	49 J	83 J
TPH DRO and GRO (mg/kg)								
Diesel Range Organics	100	NE	NE	NA	290	440	840	110
Gasoline Range Organics	100	NE	NE	NA	0.11 J	0.23 J	0.11 U	2,600
Total TPH	100 ⁽⁵⁾	NE	NE	NA	290.11 J	440.23 J	840	2,710

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Notes/Qualifiers:

J - Estimated: The analyte was positively identified; the quantitation is an estimation

U - Undetected at the Method Detection Limit

UJ - Reported quantitation limit is qualified as estimated

R - Data is rejected and not usable

ft bgs - feet below ground surface

ug/kg - micrograms per kilogram

mg/kg - milligrams per kilogram

NE - Not Established

NAPR - Naval Activity Puerto Rico

USEPA - United States Environmental Protection Agency

- (1) NAPR basewide background soil screening value (upper limit of the means concentration [mean plus two standard deviations]) for Subsurface Soil Background Fine Sand/Silt Table 3-7 (Baker, 2008)
- (2) Noncarcinogenic RSLs based on a target hazard quotient of 0.1 for conservative screening purposes
- (3) Pyrene used as a surrogate for screening purposes for benzo[g,h,i] perylened phenanthrene; acenaphthene used as a surrogate for acenaphthylene.
- (4) USEPA Action Level for lead in soils
- (5) Total TPH value represents the Puerto Rico Environmental Quality Board recommended screening value for soils

TABLE 6-3

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
 SWMU 60 - FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAPR, CEIBA, PUERTO RICO**

Site ID	Selected	<u>NAPR</u>	60SB03	60SB04	60SB04	60SB05
Sample ID	Ecological	<u>Basewide</u>	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
Date	Soil	<u>Background</u> ⁽¹⁾	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	Screening Values		1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0
Volatile Organic Compounds (ug/kg)						
Carbon disulfide	NE	NE	1.4 U	1.2 U	1.3 U	2 J
Ethylbenzene	5,003 ⁽²⁾	NE	0.88 U	0.75 U	0.84 U	46
Methylene Chloride	1,004 ⁽²⁾	NE	1.2 U	1 U	1.4 J	3.3 J
Xylenes, Total	1000 ⁽²⁾	NE	2.7 U	2.3 U	2.6 U	34
Semivolatile Organic Compounds (ug/kg)						
2-Methylnaphthalene	NE	NE	2.6 J	21 U	2.1 U	38
Acenaphthylene	NE	NE	4.3 J	21 U	2.1 U	2 U
Anthracene	NE	NE	5.5 J	21 U	2.6 J	2 U
Benzo[a]anthracene	NE	NE	57	21 UJ	42 J	2 U
Benzo[a]pyrene	NE	NE	100	21 UJ	55 J	2 U
Benzo[b]fluoranthene	NE	NE	180	21 UJ	83 J	2 UJ
Benzo[g,h,i]perylene	NE	NE	110 J	21 UJ	39 J	2 U
Chrysene	NE	NE	56	21 UJ	35 J	2 U
Dibenz(a,h)anthracene	NE	NE	29 J	7 UJ	0.71 UJ	0.68 U
Fluoranthene	NE	NE	48	4.6 UJ	22 J	1.3 J
Indeno[1,2,3-cd]pyrene	NE	NE	63 J	40 UJ	18 J	3.9 U
Naphthalene	NE	NE	2 J	21 U	2.1 U	5.9 J
Phenanthrene	NE	NE	21	21 U	11 J	3.8 J
Pyrene	NE	NE	93	21 UJ	55 J	3.6 J
PAHs (ug/kg)						
Low molecular weight PAHs	29,000 ⁽³⁾⁽⁵⁾	NE	422	157	183	23.2
High molecular weight PAHs	18,000 ⁽⁴⁾⁽⁵⁾	NE	690	194	330	20.2
Pesticides (ug/kg)						
4,4'-DDD	93 ⁽⁶⁾	NE	38 J	40 J	18 U	3.4 J
4,4'-DDE	93 ⁽⁶⁾	NE	380	21 J	16 U	14

TABLE 6-3

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Site ID	Selected	NAPR	60SB03	60SB04	60SB04	60SB05
Sample ID	Ecological	Basewide	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
Date	Soil	Background ⁽¹⁾	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	Screening Values		1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0
Metals (mg/kg)						
Antimony	10 ⁽⁷⁾	7.44	<u>120</u>	0.39 U	0.42 U	0.97 U
Arsenic	18 ⁽⁸⁾	6.66	<u>33</u>	2.5	3	3.5
Barium	330 ⁽⁵⁾	207	<u>550</u> J	41 J	43 J	110 J
Beryllium	21 ⁽⁹⁾	0.933	0.14 U	0.12	0.23	0.24 U
Cadmium	0.77 ⁽⁶⁾	0.57	<u>6.5</u> J	0.14 J	0.096 UJ	0.22 U
Chromium	26 ⁽⁶⁾	47.9	<u>180</u>	45	38	20 J
Cobalt	13 ⁽⁸⁾	63.1	22 J	15 J	26 J	13 J
Copper	28 ⁽⁶⁾	120	<u>3,400</u> J	42 J	49 J	81 J
Lead	11 ⁽⁶⁾	6.2	<u>1,600</u> J	4.2 J	7.4 J	11 J
Mercury	0.1 ⁽¹⁰⁾	0.067	<u>0.38</u> J	0.046 J	0.023 J	0.045
Nickel	38 ⁽⁸⁾	26.5	<u>90</u>	14 J	14 J	11 J
Selenium	0.52 ⁽⁸⁾	1.19	0.67 U	0.46 J	0.71	0.63 U
Silver	4.2 ⁽⁶⁾	NE	2.7	0.063 U	0.066 U	0.084 U
Tin	50 ⁽¹¹⁾	3.47	<u>390</u>	4.4 U	4.7 U	21 U
Vanadium	7.8 ⁽⁶⁾	256	87	200	190	96 J
Zinc	46 ⁽⁶⁾	92	<u>2,600</u> J	29 R	46 J	83 J
TPH DRO and GRO (mg/kg)						
Diesel Range Organics	100	NE	NA	290	440	110
Gasoline Range Organics	100	NE	NA	0.11 J	0.23 J	2,600
Total TPH	100 ⁽¹²⁾	NE	NA	290 J	440 J	2,710

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Notes/Qualifiers:

- J - Estimated: The analyte was positively identified; the quantitation is an estimation
- U - Undetected at the Method Detection Limit
- UJ - Reported quantitation limit is qualified as estimated
- R - Data is rejected and not usable
- ft bgs - feet below ground surface
- ug/kg - micrograms per kilogram
- mg/kg - milligrams per kilogram
- NA - Not Analyzed
- NE - Not Established
- NAPR - Naval Activity Puerto Rico
- USEPA - United States Environmental Protection Agency

- (1) NAPR basewide background soil screening value (upper limit of the means concentration [mean plus two standard deviations]) for Subsurface Soil Background Fine Sand/Silt Table 3-7 (Baker, 2008).
- (2) The screening value shown is an average of the target and intervention soil standards. The value is based on a default organic carbon content of 0.02 (2 percent), which represents a minimum value (adjustment range is 2 to 30 percent). [MHSPE, 2000].
- (3) Low molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of fewer than four rings. The low molecular weight PAH compounds analyzed for in SWMU 60 soil were 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene. Maximum reporting limits were used for non-detected PAHs. Rejected data was not used.
- (4) High molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of four or more rings. The high molecular weight PAH compounds analyzed for in SWMU 60 soil were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene. Maximum reporting limits were used for non-detected PAHs.
- (5) Invertebrate-based ecological soil screening level (USEPA, 2005a [barium]; USEPA, 2007a [PAHs]).
- (6) Avian-based ecological soil screening level for ground insectivores (USEPA, 2007b [DDT and metabolites], USEPA, 2005b [cadmium]; USEPA, 2008 [chromium]; USEPA, 2007c [copper]; USEPA, 2005c [lead]; USEPA, 2006 [silver]; USEPA, 2005d [vanadium]; USEPA, 2007d [zinc]).
- (7) Mammalian-based ecological soil screening level for herbivores (USEPA, 2005e [antimony]).
- (8) Plant-based ecological soil screening level (USEPA, 2005f [arsenic]; USEPA, 2005g [cobalt]; USEPA, 2007e [nickel]; USEPA, 2007f [selenium]).
- (9) Avian-based ecological soil screening level for herbivores (USEPA, 2005h [beryllium]).
- (10) Toxicological threshold for earthworms (Efroymson et al., 1997a).
- (11) Toxicological threshold for plants.
- (12) Total TPH value represents the Puerto Rico Environmental Quality Board recommended screening value for soils.

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Table References:

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

USEPA. 2007e. Ecological Soil Screening Levels for Nickel (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-76.

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USEPA. 2006. Ecological Soil Screening Levels for Silver (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWEER Directive 9285.7-77.

**SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Table References (cont.):

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- USEPA. 2005b. Ecological Soil Screening Levels for Cadmium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-62.
- USEPA. 2005c. Ecological Soil Screening Levels for Lead (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-70.
- USEPA. 2005d. Ecological Soil Screening Levels for Vanadium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-75.
- USEPA. 2005e. Ecological Soil Screening Levels for Antimony (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-61.
- USEPA. 2005f. Ecological Soil Screening Levels for Arsenic (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-62.
- USEPA. 2005g. Ecological Soil Screening Levels for Cobalt (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-67.
- USEPA. 2005h. Ecological Soil Screening Levels for Beryllium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-64.

TABLE 6-4

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID Sample ID Date Depth Range (ft bgs)	Regional Screening Levels Residential	<i>Regional Screening Levels Industrial</i>	Selected Ecological Sediment Screening Values	<u>NAPR</u> <u>Basewide</u> <u>Background</u> ⁽¹⁾	60SD01 60SD01 1/17/2009 0.0-0.5	60SD02 60SD02 1/17/2009 0.0-0.5	60SD03 60SD03 1/17/2009 0.0-0.5	60SD03 60SD03D 1/17/2009 0.0-0.5
Semivolatile Organic Compounds (ug/kg)								
Acenaphthene	340,000 ⁽²⁾	3,300,000 ⁽²⁾	6.71 ⁽⁵⁾	NE	5.4 J	4.2 UJ	3.6 UJ	3.1 U
Acenaphthylene	340,000 ⁽²⁾⁽³⁾	3,300,000 ⁽²⁾⁽³⁾	5.87 ⁽⁵⁾	NE	30	4.2 UJ	3.6 UJ	3.1 U
Anthracene	1,700,000 ⁽²⁾	17,000,000 ⁽²⁾	46.9 ⁽⁵⁾	NE	42	4.2 UJ	3.6 UJ	3.1 U
Benzo[a]anthracene	150	2,100	74.8 ⁽⁵⁾	NE	210	25 J	5.2 J	5.4 J
Benzo[a]pyrene	15	210	88.8 ⁽⁵⁾	NE	450	39 J	9.4 J	11 J
Benzo[b]fluoranthene	150	2100	1,800 ⁽⁶⁾	NE	700	55 J	9.2 J	15
Benzo[g,h,i]perylene	170,000 ⁽²⁾⁽³⁾	1,700,000 ⁽²⁾⁽³⁾	670 ⁽⁷⁾	NE	120	21 J	3.6 UJ	3.1 U
Benzo[k]fluoranthene	1,500	21,000	1,800 ⁽⁶⁾	NE	630	52 J	12 J	10 J
Bis(2-ethylhexyl) phthalate	35,000	120,000	182 ⁽⁵⁾	NE	120	49 UJ	25 UJ	19 U
Chrysene	15,000	210,000	108 ⁽⁵⁾	NE	470	34 J	9.5 J	9.5 J
Dibenz(a,h)anthracene	15	210	6.22 ⁽⁵⁾	NE	75	13 J	1.2 UJ	1 U
Dimethyl phthalate	NE	NE	6 ⁽⁸⁾	NE	14 J	16 UJ	14 UJ	12 U
Di-n-octyl phthalate	NE	NE	61 ⁽⁹⁾	NE	7.5 J	8.2 UJ	7 UJ	6.1 U
Fluoranthene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	113 ⁽⁵⁾	NE	370	41 J	0.81 UJ	0.7 U
Fluorene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	21.2 ⁽⁵⁾	NE	5.4 J	4.2 UJ	3.6 UJ	3.1 U
Indeno[1,2,3-cd]pyrene	150	2100	600 ⁽¹⁰⁾	NE	130	16 J	7 UJ	6.1 U
Phenanthrene	170,000 ⁽²⁾⁽³⁾	1,700,000 ⁽²⁾⁽³⁾	86.7 ⁽⁵⁾	NE	24	4.2 UJ	6.1 J	5.4 J
Phenol	1,800,000 ⁽²⁾	18,000,000 ⁽²⁾	130 ⁽⁷⁾	NE	7.9 U	88 J	10 UJ	8.8 U
Pyrene	170,000 ⁽²⁾	1,700,000 ⁽²⁾	153 ⁽⁵⁾	NE	950	48 J	16 J	12 J
Pesticides (ug/kg)								
<i>None Detected</i>								

TABLE 6-4

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID Sample ID Date Depth Range (ft bgs)	Regional Screening Levels Residential	<i>Regional Screening Levels Industrial</i>	Selected Ecological Sediment Screening	<u>NAPR Basewide Background</u> ⁽¹⁾	60SD01 60SD01 1/17/2009 0.0-0.5	60SD02 60SD02 1/17/2009 0.0-0.5	60SD03 60SD03 1/17/2009 0.0-0.5	60SD03 60SD03D 1/17/2009 0.0-0.5
Metals (mg/kg)								
Arsenic	0.39	1.6	7.24 ⁽⁵⁾	7.0	14	14 J	2.9 J	3
Barium	1,500 ⁽²⁾	19,000 ⁽²⁾	48 ⁽¹¹⁾	24.93	13	12 J	8.3 J	12 J
Beryllium	16 ⁽²⁾	200 ⁽²⁾	NA	0.55	0.08 J	0.12 J	0.037 UJ	0.03 U
Cadmium	7 ⁽²⁾	81 ⁽²⁾	0.676 ⁽⁵⁾	1.23	0.46	0.065 UJ	0.064 UJ	0.051 U
Chromium	290	5,600	52.3 ⁽⁵⁾	50.05	23	27 J	6.6 J	9.6 J
Cobalt	2.3 ⁽²⁾	30 ⁽²⁾	10 ⁽¹²⁾	22.35	4.5	4.6 J	1.6 J	3.4 J
Copper	310 ⁽²⁾	4,100 ⁽²⁾	18.7 ⁽⁵⁾	132.44	60	54 J	7.1 J	9.5
Lead	40 ⁽⁴⁾	80 ⁽⁴⁾	30.2 ⁽⁵⁾	25.4	6.3	7.9 J	2 J	1.8
Mercury	1 ⁽²⁾	4.3 ⁽²⁾	0.13 ⁽⁵⁾	0.17	0.064	0.097 J	0.024 J	0.0083 J
Nickel	150 ⁽²⁾	2,000 ⁽²⁾	15.9 ⁽⁵⁾	17.31	5.7	7.8 J	2.5 J	3.9 J
Selenium	39 ⁽²⁾	510 ⁽²⁾	1 ⁽¹¹⁾	1.51	0.24 J	0.45 J	0.25 UJ	0.2 U
Vanadium	39 ⁽²⁾	520 ⁽²⁾	57 ⁽¹²⁾	230.43	38	43 J	11 J	15
Zinc	2,300 ⁽²⁾	31,000 ⁽²⁾	124 ⁽⁵⁾	96.9	66	43 J	9.8 J	12

**SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Notes/Qualifiers:

J - Estimated: The analyte was positively identified; the quantitation is an estimation

U - Undetected at the Method Detection Limit

UJ - Reported quantitation limit is qualified as estimated

ft bgs - feet below ground surface

ug/kg - micrograms per kilogram

mg/kg - milligrams per kilogram

NE - Not Established

NAPR - Naval Activity Puerto Rico

USEPA - United States Environmental Protection Agency

⁽¹⁾ NAPR basewide background sediment screening value (upper limit of the means concentration [mean plus two standard deviations]) (Baker, 2008)

⁽²⁾ Noncarcinogenic RSLs based on a target hazard quotient of 0.1 for conservative screening purposes

⁽³⁾ Pyrene used as a surrogate for screening purposes for benzo[g,h,i] perylene phenanthrene; acenaphthene used as a surrogate for acenaphthylene.

⁽⁴⁾ USEPA Action Level for lead in soils

⁽⁵⁾ Threshold Effect Level (MacDonald, 1994)

⁽⁶⁾ Minimum Apparent Effects Threshold (Echinoderm larvae and infaunal community impacts) [Buchman 2008]

⁽⁷⁾ Minimum Apparent Effects Threshold (Echinoderm larvae) [Buchman 2008]

⁽⁸⁾ Threshold Effect Concentration [MacDonald et al., 2003]

⁽⁹⁾ Minimum Apparent Effects Threshold (bivalve and larvalmax) [Buchman, 2008]

⁽¹⁰⁾ Minimum Apparent Effects Threshold (Microtox) [Buchman, 2008]

⁽¹¹⁾ Minimum Apparent Effects Threshold (amphipod) [Buchman, 2008]

⁽¹²⁾ Minimum Apparent Effects Threshold (Neanthes bioassays) [Buchman, 2008]

**SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

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TABLE 6-5

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID Sample ID Date	Regional Tap Water Screening Levels	USEPA MCLs	Ecological Groundwater Screening Values	NAPR Basewide Background ⁽¹⁾	60SB02 60GW02 1/18/2009	60SB04 60GW04 1/15/2009	60SB04 60GW04D 1/15/2009	60SB05 60GW05 1/18/2009
Volatile Organic Compounds (ug/L)								
2-Hexanone	4.7	NE	99 ⁽⁴⁾⁽⁵⁾	NE	0.68 U	0.68 R	1.2 J	0.68 U
Acetone	2,200 ⁽²⁾	NE	1,000 ⁽⁶⁾	NE	5 U	6 J	5 R	5 U
Carbon disulfide	100 ⁽²⁾	NE	15 ⁽⁴⁾⁽⁷⁾	NE	0.6 U	0.94 J	1.1 J	0.6 U
Ethylbenzene	1.5	700	4.3 ⁽⁸⁾	NE	0.3 U	0.3 R	0.3 R	0.96 J
Xylenes, Total	20 ⁽²⁾	10,000	27 ⁽⁴⁾⁽⁹⁾	NE	0.87 U	0.87 R	0.87 R	2.3 J
Semivolatile Organic Compounds (ug/L)								
2-Methylnaphthalene	15 ⁽²⁾	NE	6 ⁽¹⁰⁾	NE	0.022 UJ	0.11 U	0.11 U	0.78
3 & 4 Methylphenol	NE	NE	33.6 ⁽¹¹⁾	NE	0.5 J	0.73 U	0.73 U	0.39 J
Benzo[a]anthracene	0.029	NE	0.025 ⁽⁴⁾⁽⁵⁾	NE	0.049 UJ	0.24 U	0.24 U	0.066 J
Benzo[a]pyrene	0.0029	0.2	10 ⁽¹²⁾	NE	0.017 UJ	0.083 U	0.083 U	0.064 J
Benzo[b]fluoranthene	0.029	NE	6 ⁽¹³⁾	NE	0.02 UJ	0.1 U	0.1 UJ	0.078 J
Benzo[g,h,i]perylene	NE	NE	6 ⁽¹³⁾	NE	0.049 UJ	0.24 UJ	0.24 UJ	0.093 J
Benzo[k]fluoranthene	0.29	NE	6 ⁽¹³⁾	NE	0.034 UJ	0.17 UJ	0.17 UJ	0.082 J
Bis(2-ethylhexyl) phthalate	4.8	6	360 ⁽¹⁴⁾	NE	0.38 UJ	1.7 UJ	1.7 UJ	0.73 J
Chrysene	2.9	NE	10 ⁽¹⁵⁾	NE	0.049 UJ	0.24 U	0.24 U	0.072 J
Dibenz(a,h)anthracene	0.0029	NE	6 ⁽¹⁶⁾	NE	0.021 UJ	0.11 UJ	0.11 UJ	0.098 J
Fluoranthene	150 ⁽²⁾	NE	11 ⁽¹⁷⁾	NE	0.04 J	0.092 U	0.092 U	0.031 J
Fluorene	150 ⁽²⁾	NE	10 ⁽¹⁸⁾	NE	0.025 UJ	0.13 U	0.13 U	0.027 J
Indeno[1,2,3-cd]pyrene	0.029	NE	6 ⁽¹⁶⁾	NE	0.049 UJ	0.24 UJ	0.24 UJ	0.087 J
Naphthalene	0.14	NE	23.5 ⁽⁸⁾	NE	0.025 UJ	0.13 U	0.13 U	1.5
Pyrene	110 ⁽²⁾	NE	0.248 ⁽¹⁹⁾	NE	0.039 J	0.11 U	0.11 U	0.033 J

TABLE 6-5

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID Sample ID Date	Regional Tap Water Screening Levels	USEPA MCLs	Ecological Groundwater Screening Values	NAPR Basewide Background ⁽¹⁾	60SB02 60GW02 1/18/2009	60SB04 60GW04 1/15/2009	60SB04 60GW04D 1/15/2009	60SB05 60GW05 1/18/2009
Pesticides (ug/L)								
<i>None Detected</i>								
Total Metals (ug/L)								
Arsenic	0.045	10	36 ⁽²⁰⁾	18.89	5.6 U	54	63	5.6 U
Barium	730 ⁽²⁾	2,000	16,667 ⁽²¹⁾	686	1,000	53 J	47 J	210
Lead	NE	15	8.52 ⁽²²⁾	26.25	4.3 J	3 U	3 U	3 U
Nickel	73 ⁽²⁾	NE	8.28 ⁽²²⁾	95.74	6.4 U	14 U	12 U	12 J
Dissolved Metals (ug/L)								
Arsenic	0.045	10	36 ⁽²⁰⁾	14.03	5.6 U	41 U	50	5.6 U
Barium	730 ⁽²⁾	2,000	16,667 ⁽²¹⁾	260	820	40 U	54 J	200
Nickel	73 ⁽²⁾	NE	8.28 ⁽²²⁾	84.1	6.4 U	6.4 U	8.8 U	11 J
TPH DRO and GRO (mg/L)								
Diesel Range Organics	50	NE	NE	NE	1.1	0.5	0.48	0.34
Gasoline Range Organics	50	NE	NE	NE	0.012 U	0.012 U	0.012 U	0.093
Total TPH	50 ⁽³⁾	NE	NE	NE	1.1	0.50	0.48	0.43

TABLE 6-5

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Notes:

- U - Not detected at the Method Detection Limit
- J - Analyte present - Reported value is estimated
- UJ - Reported quantitation limit is qualified as estimated
- R - Data is rejected and not usable
- NE - Not Established
- mg/l - micrograms per liter
- ug/l - micrograms per liter
- NAPR - Naval Activity Puerto Rico
- USEPA - United States Environmental Protection Agency

- (1) NAPR basewide background groundwater screening value (upper limit of the means concentration [mean plus two standard deviations]) (Baker, 2008)
- (2) Noncarcinogenic RSLs based on a target hazard quotient of 0.1 for conservative screening purposes
- (3) Total TPH value represents the Puerto Rico Environmental Quality Board recommended screening value for groundwater
- (4) USEPA Region 5 ecological screening level [USEPA, 2003]
- (5) The chemical lacks a marine/estuarine surface water screening value/literature-based toxicity value. The value shown is a freshwater screening value/toxicity value.
- (6) Minimum acute value (96-hr LC₅₀ for *Lumbriculus variegatus* [Oligochaete]) with a safety factor of 100 [USEPA, 2007a]
- (7) The safety factors applied to acute endpoints (i.e., LC₅₀, EC₅₀, NOEC, and LOEL values) and chronic endpoints (i.e., LOELs) are those recommended by Wentzel et al. (1996).
- (8) USEPA Region 4 chronic screening value [USEPA, 2001]
- (9) The value shown is for o-xylene.
- (10) Minimum acute value (96-hr LC₅₀ for *Penaeus aztecus* [brown shrimp]) with a safety factor of 100 [USEPA, 2007a]
- (11) USEPA Region 5 ecological screening level (the value shown is for 4-methylphenol)
- (12) Acute value (LC₅₀) with a safety factor of 100 [USEPA, 2004]
- (13) Acute LOEL for chemical class with a safety factor of 50 (value for high molecular weight PAHs) [Buchman, 2008]
- (14) Proposed Criteria Continuous Concentration [Buchman, 2008]
- (15) Acute value (LC₅₀) with a safety factor of 100 [USEPA, 2004]
- (16) Acute LOEL for chemical class with a safety factor of 50 (value for high molecular weight PAHs) [Buchman, 2008]
- (17) Final Chronic Value [USEPA, 1996]
- (18) Minimum acute value (96-hr LC₅₀ for *Nereis arenaceodentata* [polychaete]) with a safety factor of 100 [USEPA, 2007a]

TABLE 6-5

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Notes (cont.):

- ⁽¹⁹⁾ Minimum acute value (48-hr LC₅₀ for *Americamysis bahia* [opossum shrimp]) with a safety factor of 100
- ⁽²⁰⁾ Total recoverable Criteria Continuous Concentration for trivalent arsenic [USEPA, 2006]
- ⁽²¹⁾ Minimum acute value (96-hr NOEC for *Cyprinodon variegatus* [sheepshead minnow]) with a safety factor of 30 [USEPA, 2007a]
- ⁽²²⁾ Total recoverable Criteria Continuous Concentration [USEPA, 2006]

References:

Buchman, M.F. 2008. NOAA Screening Quick Reference Tables. NOAA OR&R Report 08-1. National Oceanic and Atmospheric Administration, Office of Response and Restoration Division, Seattle, WA.

United States Environmental Protection Agency (USEPA). 2007a. ECOTOX User Guide: Ecotoxicology Database System. Version 4.0. <http://www.epa.gov/ecotox/>. Accessed May 14, 2003, July 2, 2008, January 8, 2009, and April 1, 2009.

USEPA. 2006. National Recommended Water Quality Criteria. Office of Water and Office of Science and Technology, Washington, D.C.

USEPA. 2004. Superfund Chemical Data Matrix. <http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm>.

USEPA. 2003. USEPA Region 5 Ecological Screening Levels Table. <http://www.epa.gov/reg5rcra/ca/ESL.pdf>.

USEPA. 2001. Region 4 Ecological Risk Assessment Bulletins - Supplement to RQGS. Waste Management Division, Atlanta, GA. <http://www.epa.gov/region04/waste/ots/ecolbul.htm>.

USEPA. 1996. Ecotox Thresholds. Eco Update, Volume 3, Number 2. Office of Solid Waste and Emergency Response, Washington, D.C. EPA/F-95/038.

TABLE 6-6

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - QUALITY ASSURANCE/QUALITY CONTROL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Sample ID	Trip Blank Samples						
	JAN09-TB01	JAN09-TB02	JAN09-TB03	JAN09-TB04	JAN09-TB06	JAN09-TB07	JAN09-TB09
Date	1/13/2009	1/14/2009	1/14/2009	1/15/2009	1/17/2009	1/18/2009	1/20/2009
Volatile Organic Compounds (ug/L)							
2-Butanone (MEK)	0.6 R	0.74 J	0.6 U				
Acetone	5 R	9.8 J	5 U	5 U	5 U	5 U	5 U
Chlorodibromomethane	0.3 R	0.3 R	0.3 U				
Chloroethane	1 R	1 R	1 U	1 U	1 U	1 UJ	1 UJ
Chloroform	0.29 R	0.29 R	0.29 U				
Chloromethane	0.28 R	0.28 R	0.28 U	0.28 U	0.28 U	0.28 U	0.33 J
Dichlorobromomethane	0.34 R	0.34 R	0.34 U				
Toluene	0.31 R	0.31 R	0.31 U				
TPH DRO and GRO (mg/L)							
Gasoline Range Organics	0.012 R	0.012 R	0.012 R	0.012 U	0.012 U	0.012 U	0.012 U

TABLE 6-6

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - QUALITY ASSURANCE/QUALITY CONTROL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Sample ID	Equipment Blanks				Field Blank Samples	
	JAN09-ER01 Date	JAN09-ER02 Date	JAN09-ER04 Date	JAN09-ER06 Date	JAN09-FB01 Date	JAN09-FB02 Date
	1/12/2009	1/13/2009	1/15/2009	1/17/2009	1/14/2009	1/20/2009
Volatile Organic Compounds (ug/L)						
2-Butanone (MEK)	0.9 J	0.83 J	0.6 U	0.6 U	0.75 J	0.6 U
Acetone	5 U	5.7 J	5 U	5 U	5 U	5 U
Chlorodibromomethane	0.3 U	4.1				
Chloroethane	1 U	1 U	1 U	1 UJ	1 U	1 U
Chloroform	0.29 U	53				
Chloromethane	0.28 U	0.28 U				
Dichlorobromomethane	0.34 U	13				
Toluene	0.31 U	0.31 U	1.2	0.45 J	0.31 U	0.31 U
Semivolatile Organic Compounds (ug/L)						
Acetophenone	0.97	1.2	0.19 U	0.21 J	0.19 U	0.19 U
Benzyl alcohol	3.8	5.8	0.65 J	1.6	3.6	0.16 R
Bis(2-ethylhexyl) phthalate	0.34 U	0.34 U	0.34 UJ	0.43 J	0.34 U	0.34 U
Butyl benzyl phthalate	0.8 J	0.91 J	0.17 U	0.17 J	1	0.17 U
Diethyl phthalate	1.4	2.4	0.18 U	0.18 U	0.18 U	0.18 U
Di-n-butyl phthalate	1.3	1.7	0.11 UJ	0.21 J	3.5	0.11 R
Phenol	0.2 J	0.14 U	0.14 U	0.14 UJ	0.5 J	0.14 U
Metals (ug/L)						
Antimony	1.2 J	1.9 J	1.1 J	0.51 J	1.2 J	1.1 J
Arsenic	0.45 J	0.63 J	0.7 J	0.29 J	0.54 J	0.74 J
Chromium	0.6 U	1.4 J	0.86 J	0.6 U	0.94 J	0.79 J
Cobalt	0.029 U	0.034 J				
Copper	1.2 U	6.1	1.2 U	1.2 U	1.2 U	18
Lead	0.15 U	0.65 J	0.15 U	0.15 U	0.15 U	0.6 J
Nickel	0.32 U	1.5	0.33 J	0.32 U	0.32 U	0.32 U
Silver	0.09 U	0.099 J	0.09 U	0.09 U	0.09 U	0.09 U
Vanadium	0.99 J	1 J	0.99 J	0.8 U	1.1 J	2.7 J
Zinc	6.5 U	14 J	6.5 U	6.5 U	7.2 J	30
TPH DRO and GRO (mg/L)						
Diesel Range Organics	0.41	0.36	0.028 U	0.038 J	0.25	0.028 U
Gasoline Range Organics	0.012 U	0.016 J				

TABLE 6-6

Revised: July 22, 2011

**SUMMARY OF DETECTED LABORATORY RESULTS - QUALITY ASSURANCE/QUALITY CONTROL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Notes/Qualifiers:

- J - Estimated: The analyte was positively identified; the quantitation is an estimation
- U - Undetected at the Method Detection Limit
- UJ - Reported quantitation limit is qualified as estimated
- R - Data is rejected and not usable
- mg/L - micrograms per liter
- ug/L - micrograms per liter
- NA - Not Analyzed

There were no pesticides detected in the equipment rinsate or the field blank samples

FIGURES

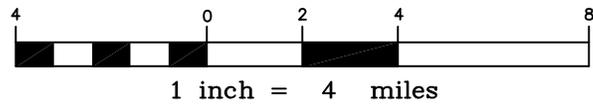
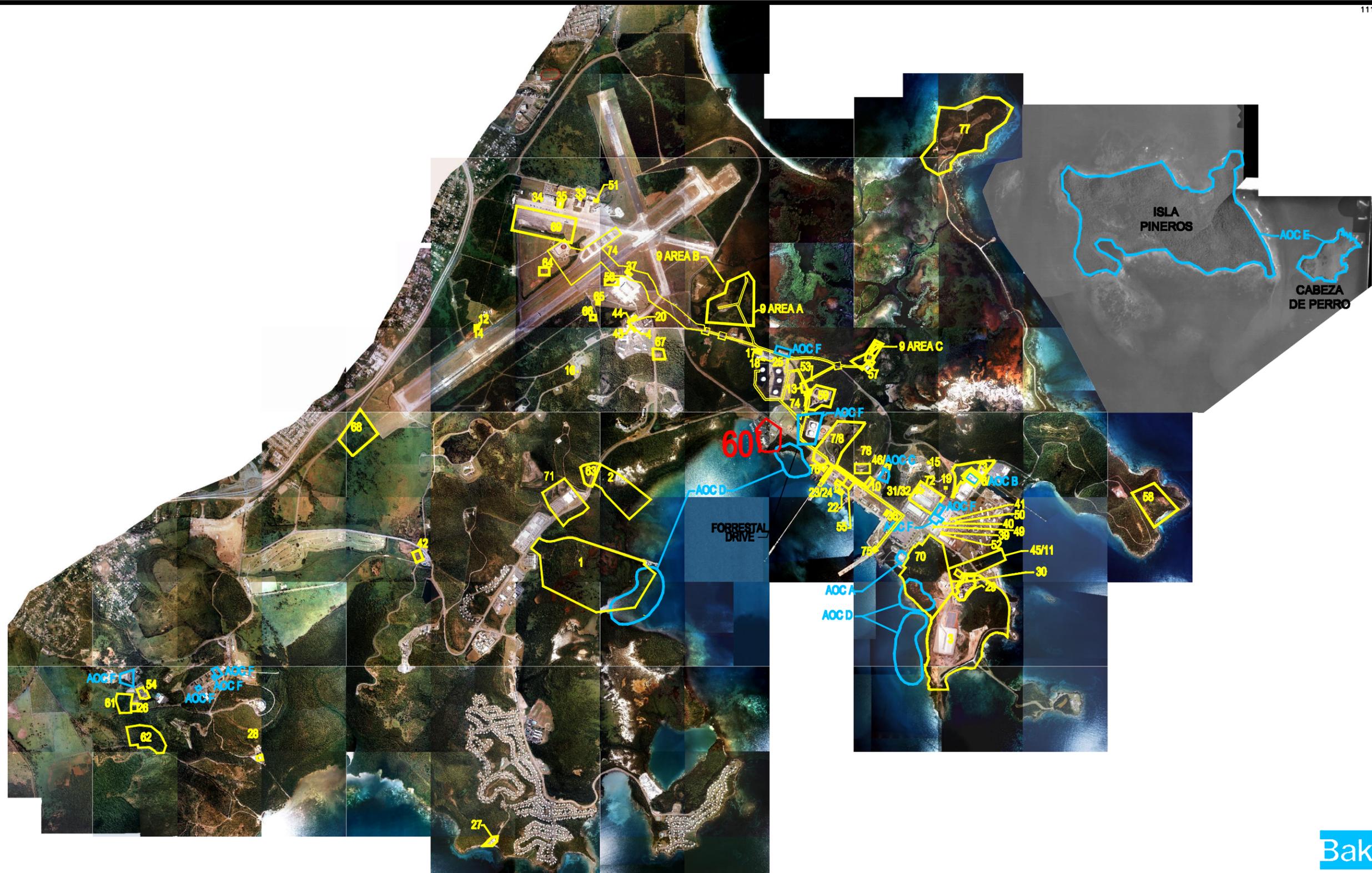


FIGURE 2-1
 REGIONAL LOCATION MAP
 SWMU 60-FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT



Baker

LEGEND

- SWMUs

60 - AREA TO WHICH THIS INVESTIGATION PERTAINS

- AOCs

AOC D - AOCs

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

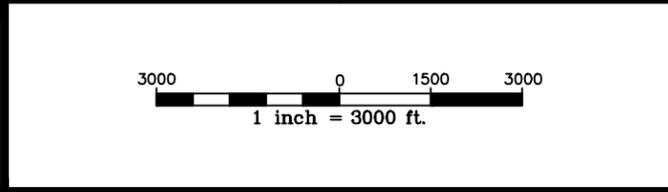
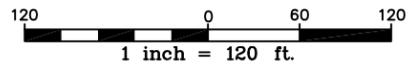


FIGURE 2-2
 SWMU/AOC LOCATION MAP
 SWMU 60-FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO



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

LEGEND

- -SWMU BOUNDARY
- ▭ -1958 POLYGON FEATURE
- ▭ -ESTUARINE WETLAND BOUNDARY
- ▭ -GASOLINE/DIESEL AST
- -APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM

COWARDIAN WETLAND CLASSIFICATION

- E2SS3 -ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
- M2US2 -MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

FIGURE 2-3
 SITE LAYOUT
 SWMU 60-FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT

NAVAL ACTIVITY PUERTO RICO

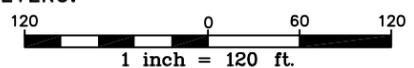


COWARDIAN WETLAND CLASSIFICATION

E2SS3 - ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.

M2US2 - MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

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



- LEGEND**
- 1958 POLYGON FEATURE
 - ESTUARINE WETLAND BOUNDARY
 - ⊙ - EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)
 - △ - EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊗ - EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊗ - EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)
 - ⊕ - EXISTING MONITORING WELL LOCATION
 - * - UNABLE TO LOCATE, POINTS BASED ON HISTORICAL FIGURE
 - GASOLINE/DIESEL AST
 - APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM
 - - SWMU BOUNDARY

FIGURE 2-4
SITE LAYOUT SITE CHARACTERIZATION/
ECP SAMPLE LOCATION MAP
WITH 2000 AERIAL PHOTOGRAPH
SWMU 60-FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT

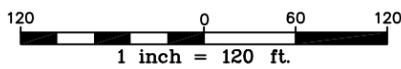
NAVAL ACTIVITY PUERTO RICO



COWARDIAN WETLAND CLASSIFICATION

- E2SS3 - ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
- M2US2 - MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

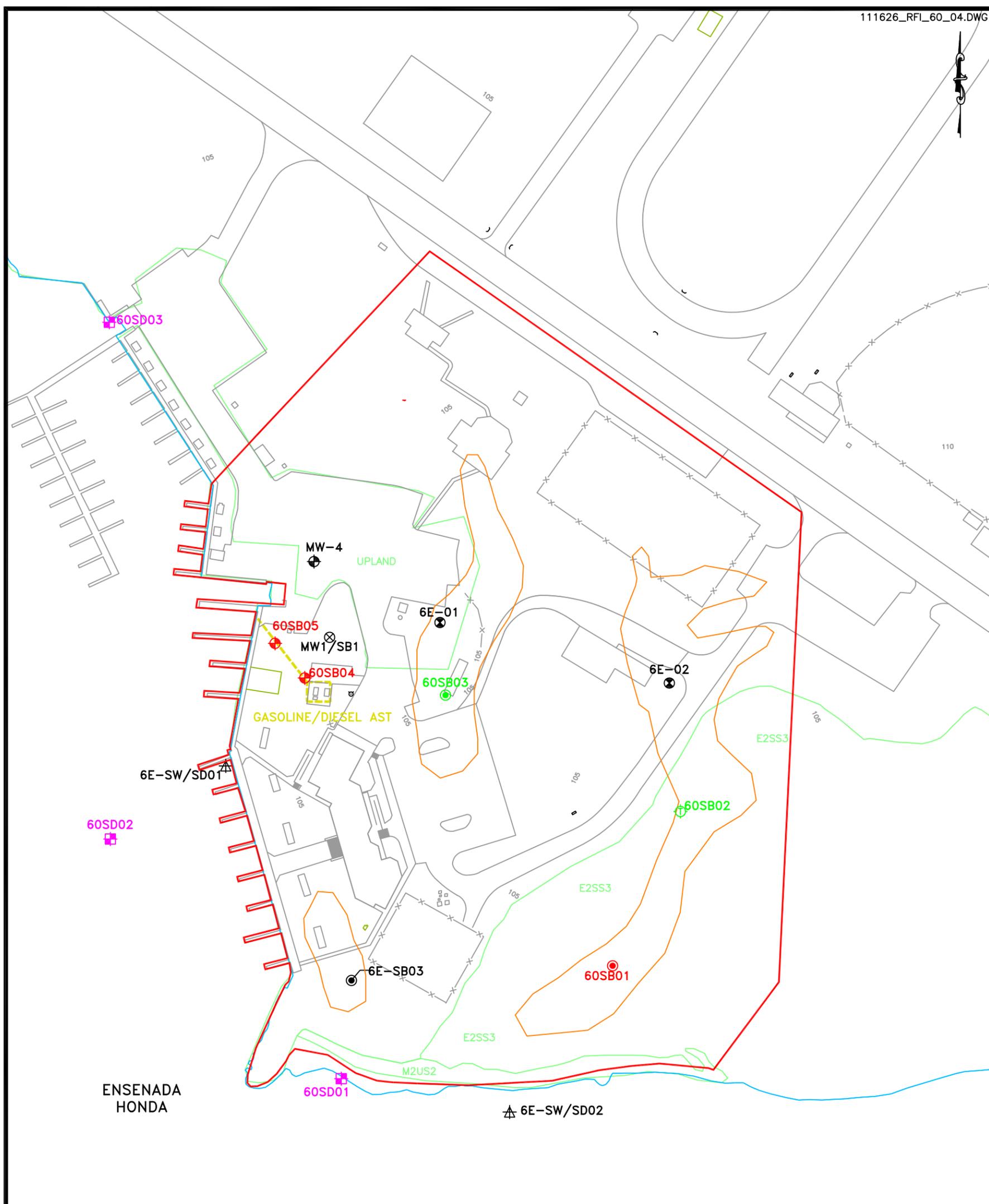
SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.



- LEGEND**
- 1958 POLYGON FEATURE
 - ESTUARINE WETLAND BOUNDARY
 - ⊙ - EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊕ - EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊗ - EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊗ - EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)
 - ⊕ - EXISTING MONITORING WELL LOCATION
 - - SURFACE SOIL SAMPLE LOCATION
 - ⊙ - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - ⊕ - SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION
 - ⊗ - SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY)
 - ⊕ - SEDIMENT SAMPLE LOCATION
 - GASOLINE/DIESEL AST
 - APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM
 - - SWMU BOUNDARY

FIGURE 4-1
SAMPLE LOCATION MAP
WITH 2000 AERIAL PHOTOGRAPH
SWMU 60-FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT

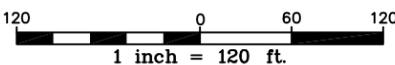
NAVAL ACTIVITY PUERTO RICO



COWARDIAN WETLAND CLASSIFICATION

E2SS3 - ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
 M2US2 - MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

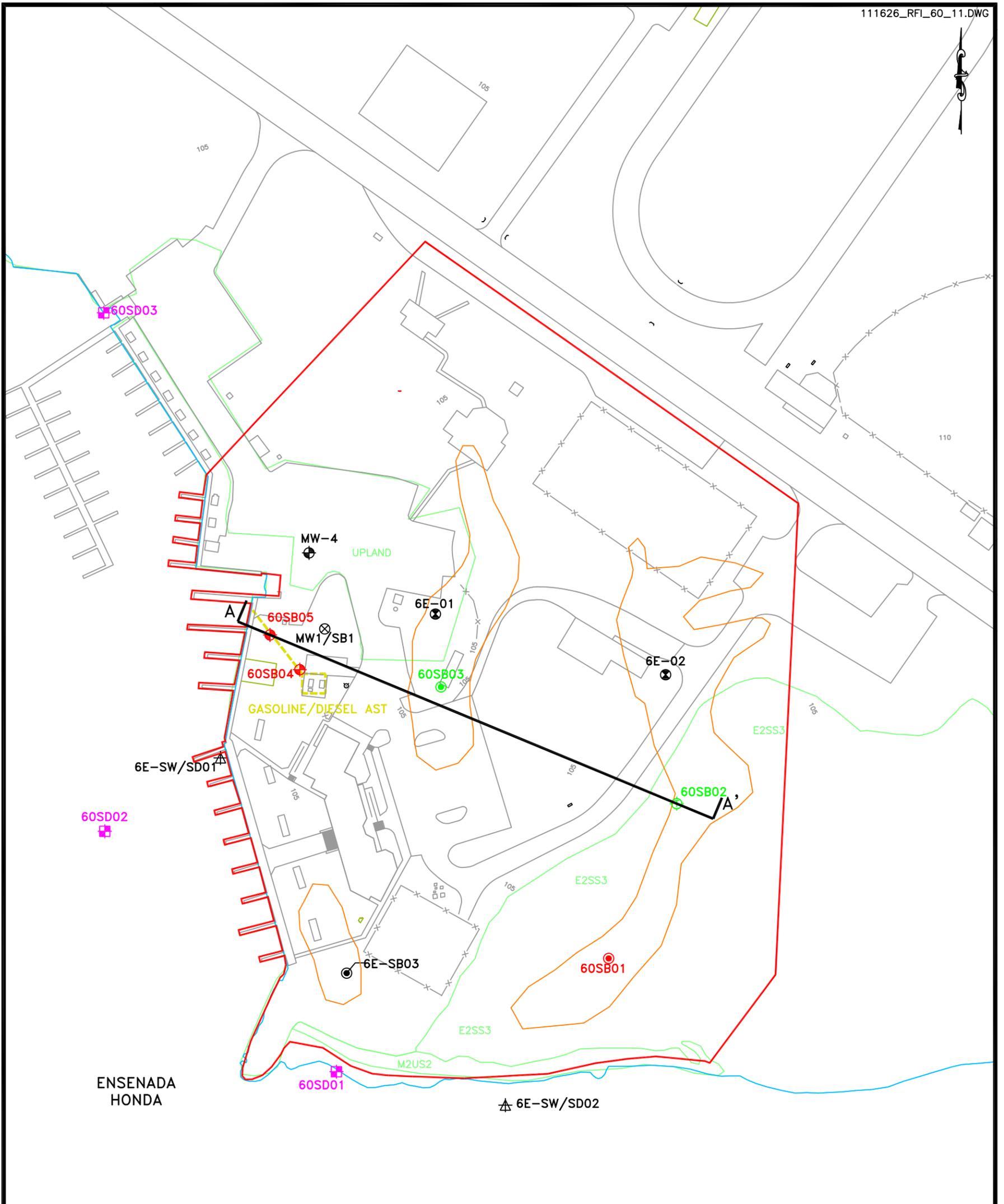
SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.



- LEGEND**
- - 1958 POLYGON FEATURE
 - - SWMU BOUNDARY
 - - ESTUARINE WETLAND BOUNDARY
 - - EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)
 - ▲ - EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊗ - EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊗ - EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)
 - ⊕ - EXISTING MONITORING WELL LOCATION
 - - SURFACE SOIL SAMPLE LOCATION
 - - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - - SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION
 - - SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY)
 - - SEDIMENT SAMPLE LOCATION
 - - GASOLINE/DIESEL AST
 - - - APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM

FIGURE 4-2
SAMPLE LOCATION MAP
SWMU 60-FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT

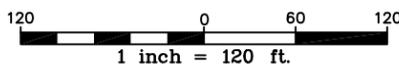
NAVAL ACTIVITY PUERTO RICO



COWARDIAN WETLAND CLASSIFICATION

E2SS3 - ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
 M2US2 - MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

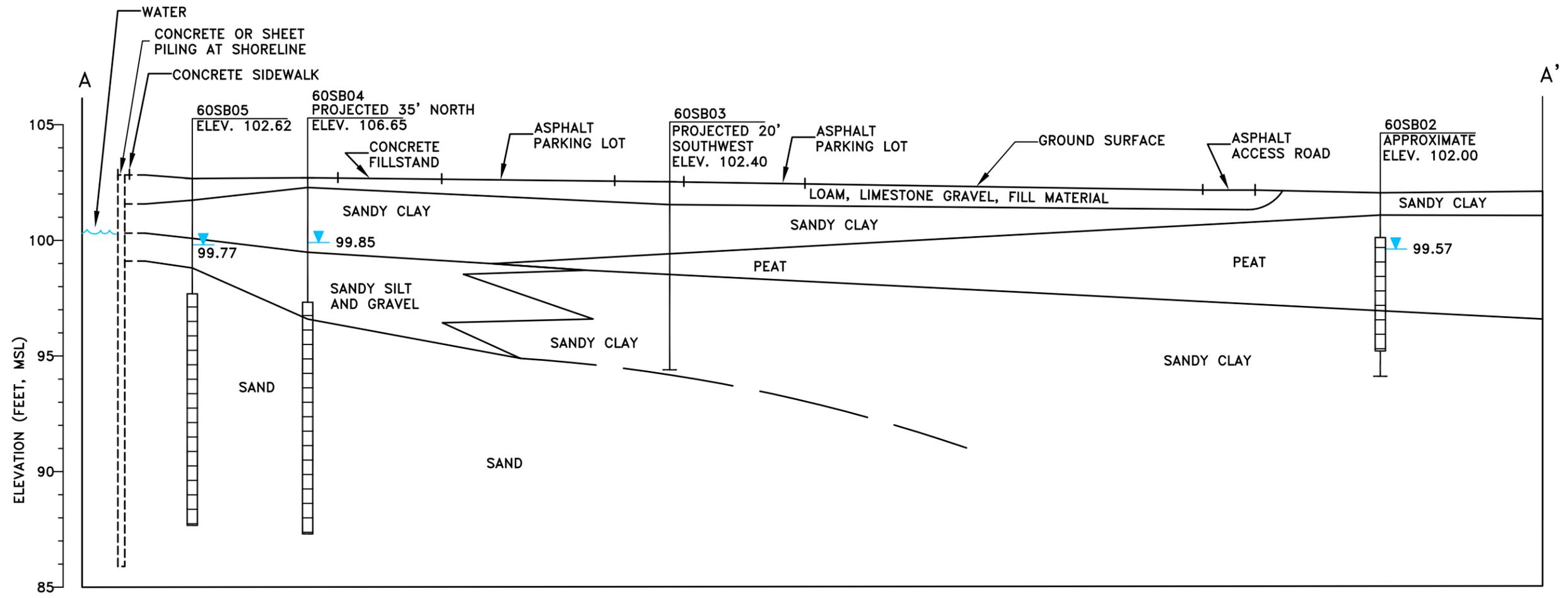
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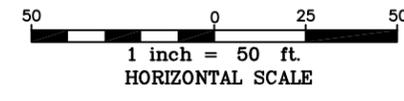
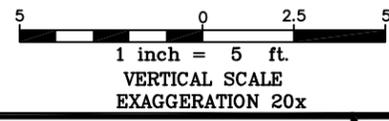
- | | |
|--|--|
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|--|--|

FIGURE 5-1
GEOLOGIC CROSS SECTION LOCATION
SWMU 60-FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT

NAVAL ACTIVITY PUERTO RICO



GEOLOGIC CROSS-SECTION A-A'
LOOKING NORTHEAST

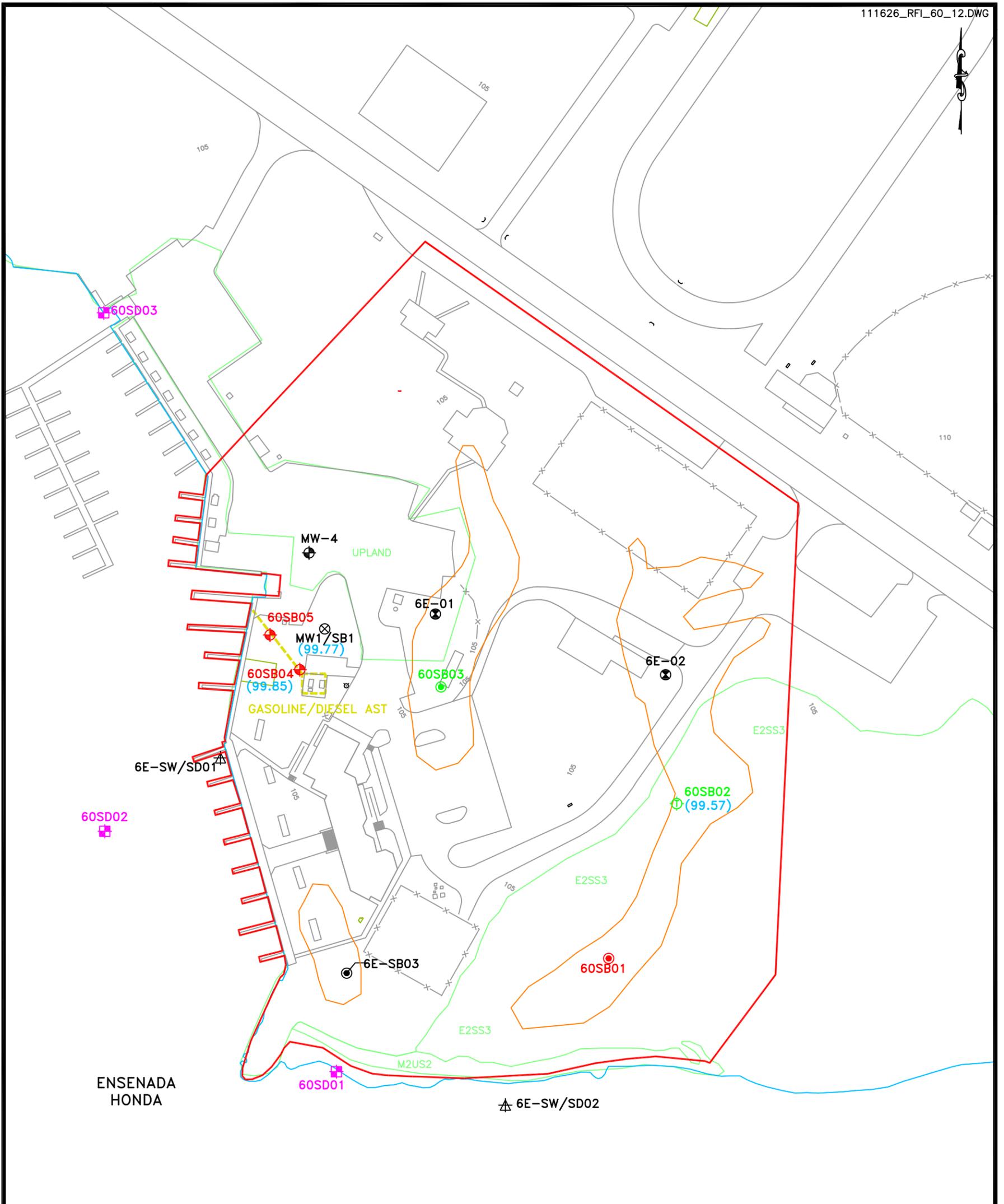


LEGEND	
ft.	FEET
MSL	MEAN SEA LEVEL
---	ESTIMATED
E.L.	GROUND SURFACE, ft. msl
▼	GROUNDWATER ELEVATION ft. msl 01/23/09
I	WELL RISER
□	WELL SCREEN INTERVAL
---	PROJECTED

THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

FIGURE 5-2
GEOLOGIC CROSS-SECTION A-A'
SWMU 60-FORMER LANDFILL
AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO

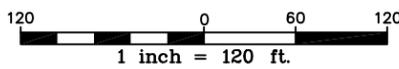
ALL ELEVATIONS SHOWN ARE MEAN SEA LEVEL PLUS 100 FEET



COWARDIAN WETLAND CLASSIFICATION

E2SS3 - ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
M2US2 - MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

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



- LEGEND**
- 1958 POLYGON FEATURE
 - ESTUARINE WETLAND BOUNDARY
 - - EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)
 - ▲ - EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊙ - EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)
 - ⊗ - EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)
 - ⊕ - EXISTING MONITORING WELL LOCATION
 - - SURFACE SOIL SAMPLE LOCATION
 - - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
 - - SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION
 - ⊙ - SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY)
 - - SEDIMENT SAMPLE LOCATION
 - GASOLINE/DIESEL AST
 - APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM
 - (99.85) - GROUNDWATER ELEVATION (FT, MSL)

FIGURE 5-3
GROUNDWATER ELEVATION MAP
SWMU 60-FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT

NAVAL ACTIVITY PUERTO RICO

Site ID	60SB05
Sample ID	60SB05-00
Date	1/13/2009
Depth Range (ft bgs)	0.0-1.0
Metals (mg/kg)	
Arsenic	3.3

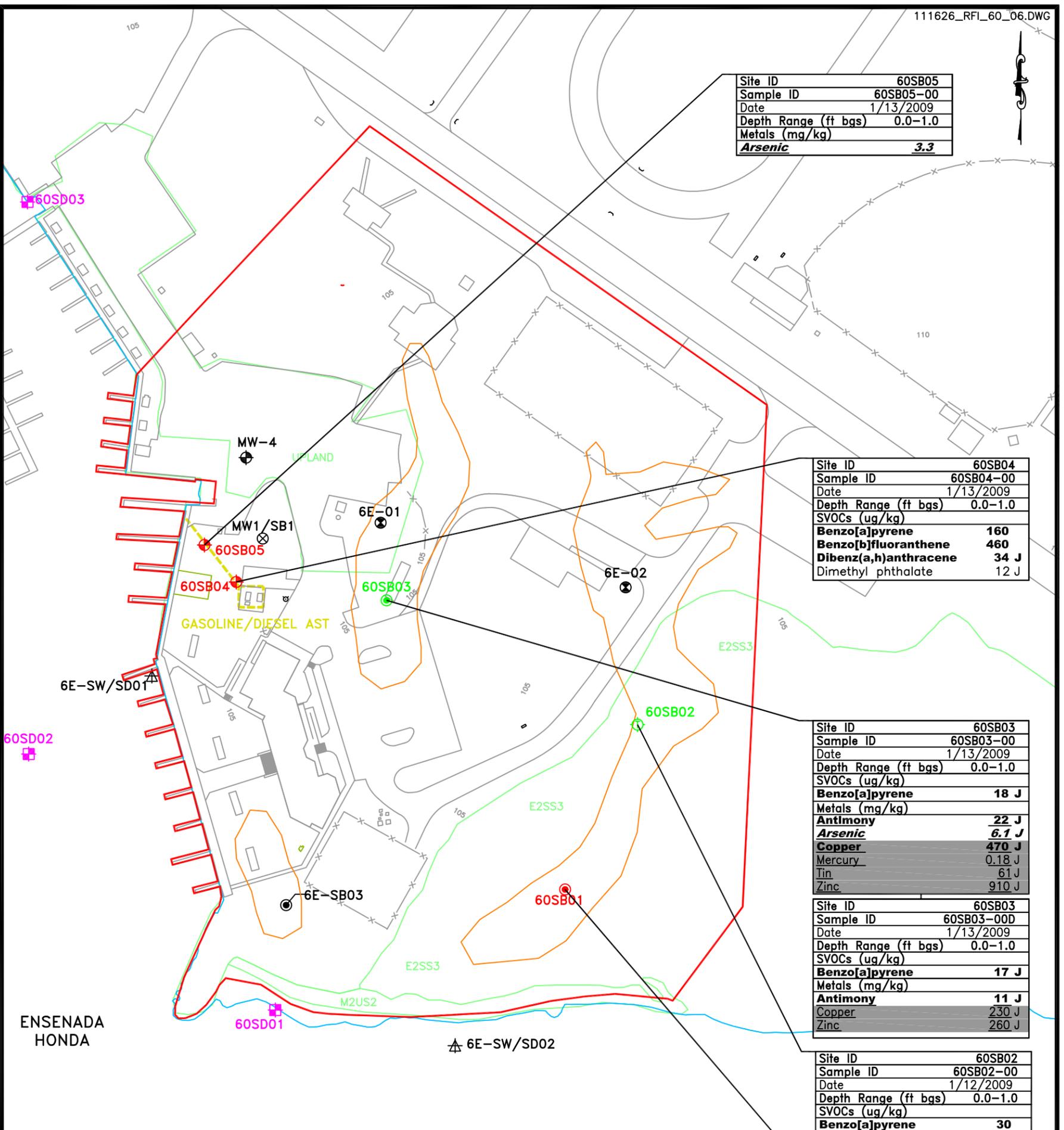
Site ID	60SB04
Sample ID	60SB04-00
Date	1/13/2009
Depth Range (ft bgs)	0.0-1.0
SVOCs (ug/kg)	
Benzo[a]pyrene	160
Benzo[b]fluoranthene	460
Dibenz(a,h)anthracene	34 J
Dimethyl phthalate	12 J

Site ID	60SB03
Sample ID	60SB03-00
Date	1/13/2009
Depth Range (ft bgs)	0.0-1.0
SVOCs (ug/kg)	
Benzo[a]pyrene	18 J
Metals (mg/kg)	
Antimony	22 J
Arsenic	6.1 J
Copper	470 J
Mercury	0.18 J
Tin	61 J
Zinc	910 J

Site ID	60SB03
Sample ID	60SB03-00D
Date	1/13/2009
Depth Range (ft bgs)	0.0-1.0
SVOCs (ug/kg)	
Benzo[a]pyrene	17 J
Metals (mg/kg)	
Antimony	11 J
Copper	230 J
Zinc	260 J

Site ID	60SB02
Sample ID	60SB02-00
Date	1/12/2009
Depth Range (ft bgs)	0.0-1.0
SVOCs (ug/kg)	
Benzo[a]pyrene	30
Metals (mg/kg)	
Arsenic	5

Site ID	60SB01
Sample ID	60SB01-00
Date	1/12/2009
Depth Range (ft bgs)	0.0-1.0
Metals (mg/kg)	
Arsenic	3.9



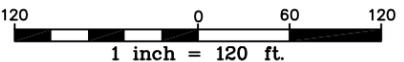
Notes/Qualifiers:

- ft bgs -feet below ground surface
 - ug/kg -micrograms per kilogram
 - mg/kg -milligrams per kilogram
 - J -Estimated value
 - BOLD** -Exceeds Ecological Soil Screening Criteria
 - ITALICS* -Exceeds Regional Screening Levels for Residential Soil
 - UNDERLINE -Exceeds Regional Screening Levels for Industrial Soil
 - (1) -Exceeds Basewide Background Screening Values
 - (1) -background not established for SVOCs screening criteria not available for dimethyl phthalate.
- If screening criteria/background values were not available, detected concentrations were retained as COPCs.

COWARDIAN WETLAND CLASSIFICATION

- E2SS3 -ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
- M2US2 -MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

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



	-1958 POLYGON FEATURE		-SWMU BOUNDARY
	-ESTUARINE WETLAND BOUNDARY		-EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)
	-EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)		-EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)
	-EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)		-EXISTING MONITORING WELL LOCATION
	-SURFACE SOIL SAMPLE LOCATION		-SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
	-SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION		-SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY)
	-SEDIMENT SAMPLE LOCATION		-GASOLINE/DIESEL AST
	-APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM		

FIGURE 6-1
 SURFACE SOIL EXCEEDANCES OF HUMAN HEALTH, ECOLOGICAL AND BACKGROUND SCREENING CRITERIA⁽¹⁾
 SWMU 60-FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO

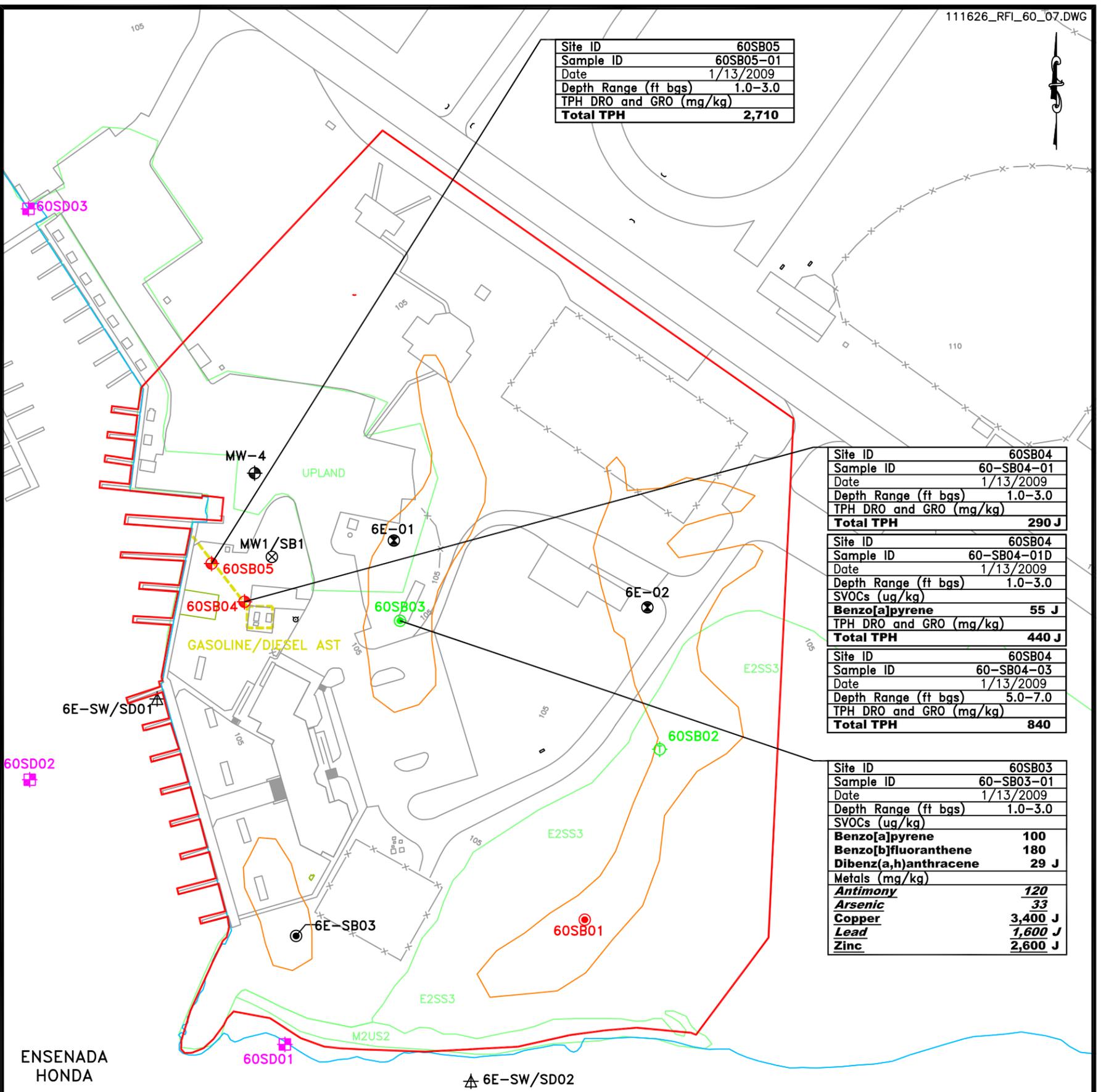
Site ID	60SB05
Sample ID	60SB05-01
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
TPH DRO and GRO (mg/kg)	
Total TPH	2,710

Site ID	60SB04
Sample ID	60-SB04-01
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
TPH DRO and GRO (mg/kg)	
Total TPH	290 J

Site ID	60SB04
Sample ID	60-SB04-01D
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
SVOCs (ug/kg)	
Benzo[a]pyrene	55 J
TPH DRO and GRO (mg/kg)	
Total TPH	440 J

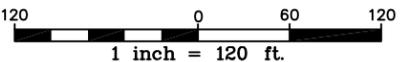
Site ID	60SB04
Sample ID	60-SB04-03
Date	1/13/2009
Depth Range (ft bgs)	5.0-7.0
TPH DRO and GRO (mg/kg)	
Total TPH	840

Site ID	60SB03
Sample ID	60-SB03-01
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
SVOCs (ug/kg)	
Benzo[a]pyrene	100
Benzo[b]fluoranthene	180
Dibenz(a,h)anthracene	29 J
Metals (mg/kg)	
Antimony	120
Arsenic	33
Copper	3,400 J
Lead	1,600 J
Zinc	2,600 J



Notes/Qualifiers:
 ft bgs -feet below ground surface
 ug/kg -micrograms per kilogram
 mg/kg -milligrams per kilogram
 J -Estimated value
BOLD -Exceeds Regional Residential Screening Criteria or PREQB Total TPH Screening Values
ITALICS -Exceeds Regional Screening Levels for Industrial Soil
UNDERLINE -Exceeds Basewide Background Screening Values
 (1) -Background Not Established For SVOCs or TPH.
 If screening criteria/background values were not available, detected concentrations were retained as COPCs.

COWARDIAN WETLAND CLASSIFICATION
E2SS3-ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
M2US2-MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND



	-1958 POLYGON FEATURE	LEGEND		-SWMU BOUNDARY
	-ESTUARINE WETLAND BOUNDARY			-EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)
	-EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)			-EXISTING SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)
	-EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)			-EXISTING MONITORING WELL LOCATION
	-SURFACE SOIL SAMPLE LOCATION			-SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
	-SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION			-SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY)
	-SEDIMENT SAMPLE LOCATION			-GASOLINE/DIESEL AST
	-APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM			

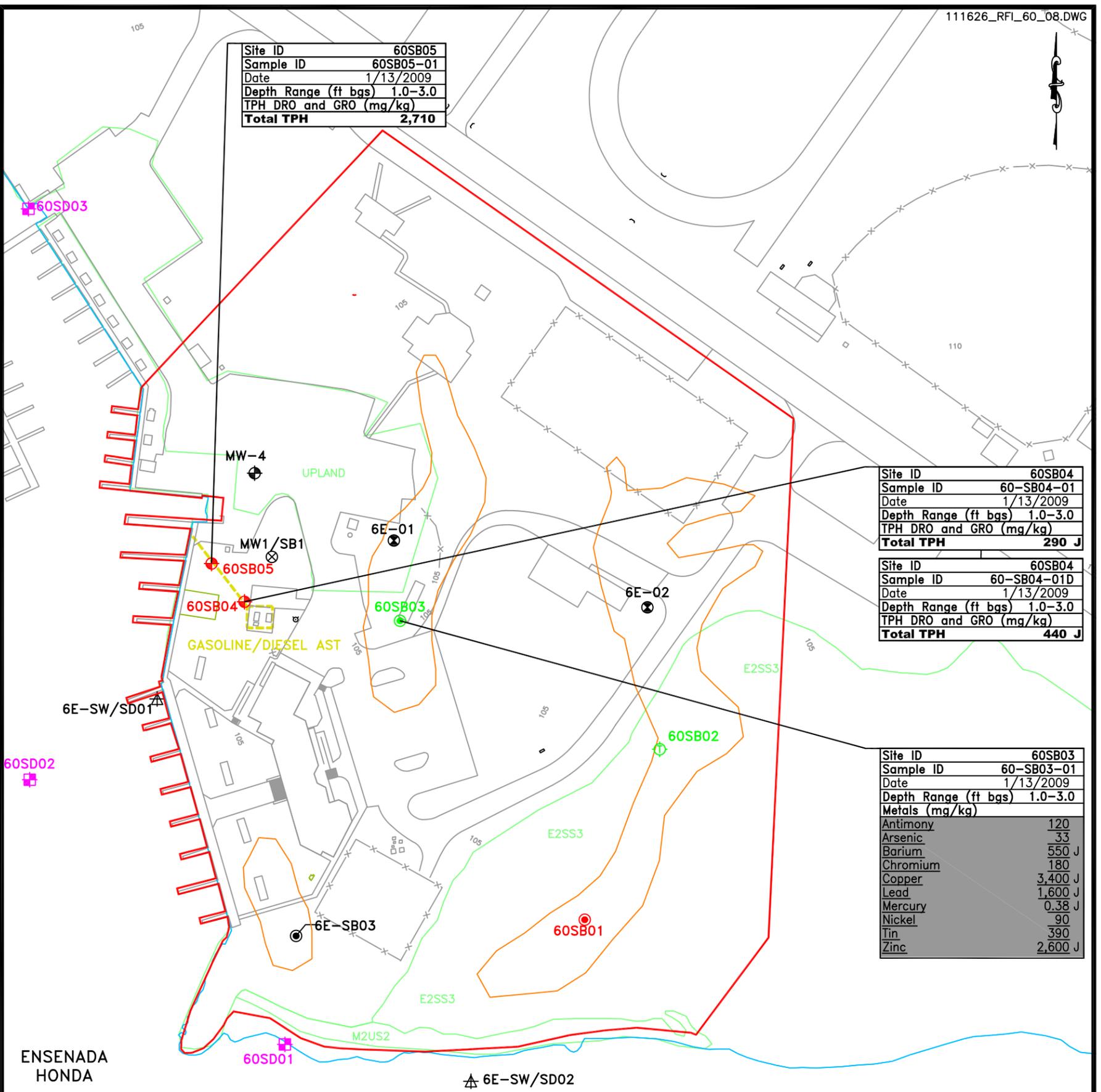
FIGURE 6-2
 SUBSURFACE SOIL (1-7 ft bgs)
 EXCEEDANCES OF HUMAN HEALTH AND
 BACKGROUND SCREENING CRITERIA⁽¹⁾
 SWMU 60-FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO

Site ID	60SB05
Sample ID	60SB05-01
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
TPH DRO and GRO (mg/kg)	
Total TPH	2,710

Site ID	60SB04
Sample ID	60-SB04-01
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
TPH DRO and GRO (mg/kg)	
Total TPH	290 J

Site ID	60SB04
Sample ID	60-SB04-01D
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
TPH DRO and GRO (mg/kg)	
Total TPH	440 J

Site ID	60SB03
Sample ID	60-SB03-01
Date	1/13/2009
Depth Range (ft bgs)	1.0-3.0
Metals (mg/kg)	
Antimony	120
Arsenic	33
Barium	550 J
Chromium	180
Copper	3,400 J
Lead	1,600 J
Mercury	0.38 J
Nickel	90
Tin	390
Zinc	2,600 J



Notes/Qualifiers:

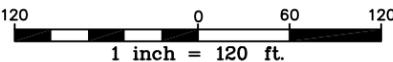
- ft bgs -feet below ground surface
- ug/kg -micrograms per kilogram
- mg/kg -milligrams per kilogram
- J -Estimated value
- Exceeds Ecological Soil Screening Criteria
- BOLD** -Exceeds PREQB Screening Criteria for Total TPH
- UNDERLINE -Exceeds Basewide Background Screening Values
- (1) -Background Not Established For TPH

If screening criteria/background values were not available, detected concentrations were retained as COPCs.

COWARDIAN WETLAND CLASSIFICATION

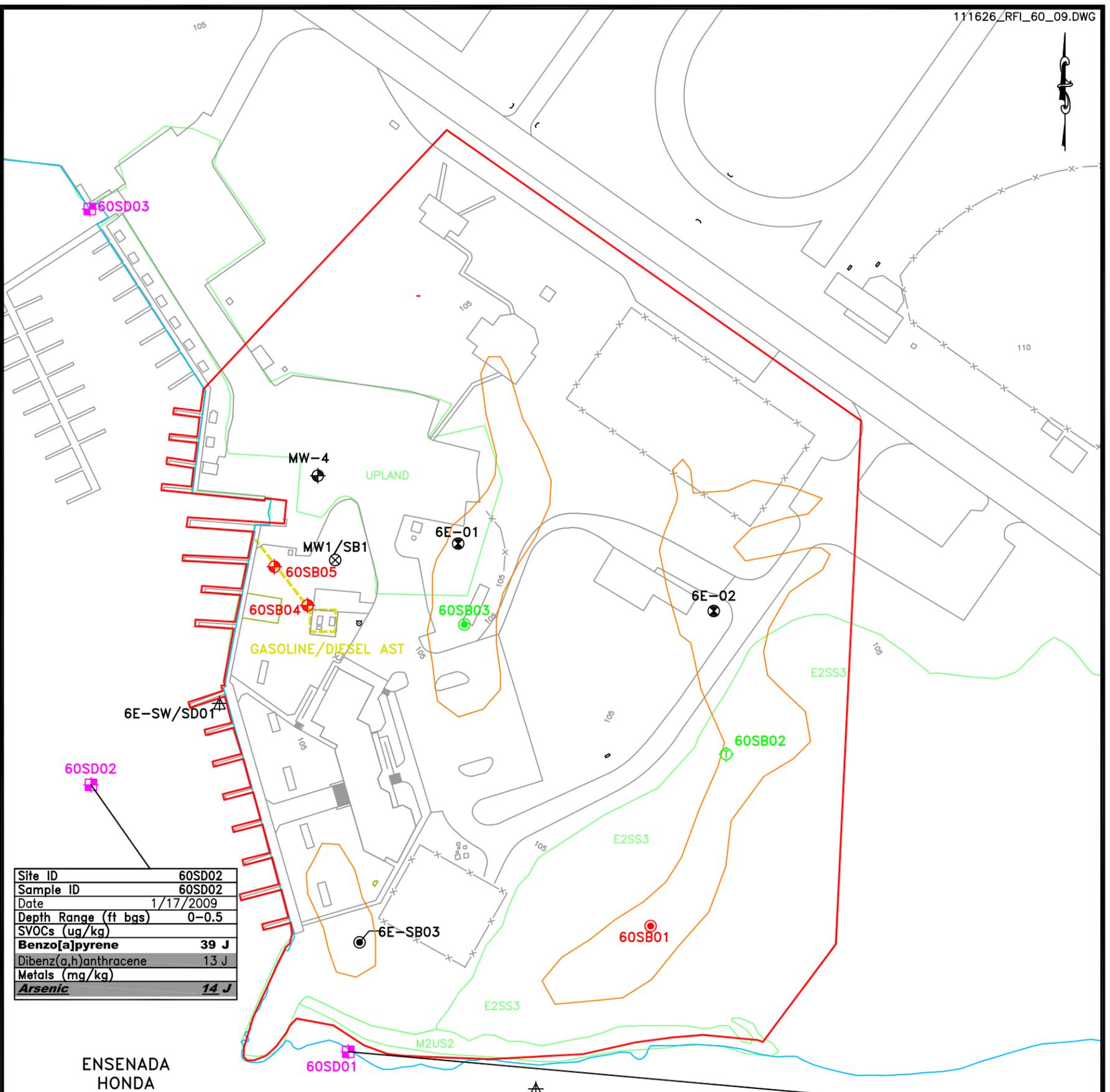
- E2SS3 -ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
- M2US2 -MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

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



<ul style="list-style-type: none"> ○ -1958 POLYGON FEATURE ○ -EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004) △ -EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004) ⊙ -EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004) ⊗ -EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION) ⊕ -EXISTING MONITORING WELL LOCATION ● -SURFACE SOIL SAMPLE LOCATION ⊙ -SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION ⊕ -SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION ⊙ -SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY) ⊕ -SEDIMENT SAMPLE LOCATION ■ -GASOLINE/DIESEL AST - -APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM 	<p>LEGEND</p> <ul style="list-style-type: none"> ○ -SWMU BOUNDARY
--	---

FIGURE 6-3
 SUBSURFACE SOIL (1-3 ft bgs)
 EXCEEDANCES OF ECOLOGICAL AND
 BACKGROUND SCREENING CRITERIA⁽¹⁾
 SWMU 60-FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO



Site ID	60SD02
Sample ID	60SD02
Date	1/17/2009
Depth Range (ft bgs)	0-0.5
SVOCs (ug/kg)	
Benzo[a]pyrene	39 J
Dibenz(a,h)anthracene	13 J
Metals (mg/kg)	
Arsenic	14 J

Site ID	60SD01
Sample ID	60SD01
Date	1/17/2009
Depth Range (ft bgs)	0.0-0.5
SVOCs (ug/kg)	
Acenaphthylene	30
Benzo[a]anthracene	210
Benzo[a]pyrene	450
Benzo[b]fluoranthene	700
Chrysene	470
Dibenz(a,h)anthracene	75
Dimethyl phthalate	14 J
Fluoranthene	370
Pyrene	950
Metals(mg/kg)	
Arsenic	14

Notes/Qualifiers:

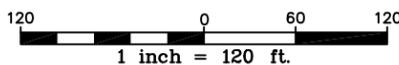
- ft bgs -feet below ground surface
- ug/kg -micrograms per kilogram
- mg/kg -miligrams per kilogram
- J -Estimated value
- Exceeds Ecological Sediment Screening Criteria**
- BOLD** -Exceeds Regional Screening Levels for Residential Soil
- ITALICS** -Exceeds Regional Screening Levels for Industrial Soil
- UNDERLINE** -Exceeds Basewide Background Screening Values
- (1) -Background Not Established For SVOCs

If screening criteria/background values were not available, detected concentrations were retained as COPCs.

COWARDIAN WETLAND CLASSIFICATION

- E2SS3 -ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
- M2US2 -MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

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



-1958 POLYGON FEATURE	-SWMU BOUNDARY
-ESTUARINE WETLAND BOUNDARY	
-EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)	
-EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)	
-EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)	
-EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)	
-EXISTING MONITORING WELL LOCATION	
-SURFACE SOIL SAMPLE LOCATION	
-SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION	
-SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION	
-SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY)	
-SEDIMENT SAMPLE LOCATION	
-GASOLINE/DIESEL AST	
-APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM	

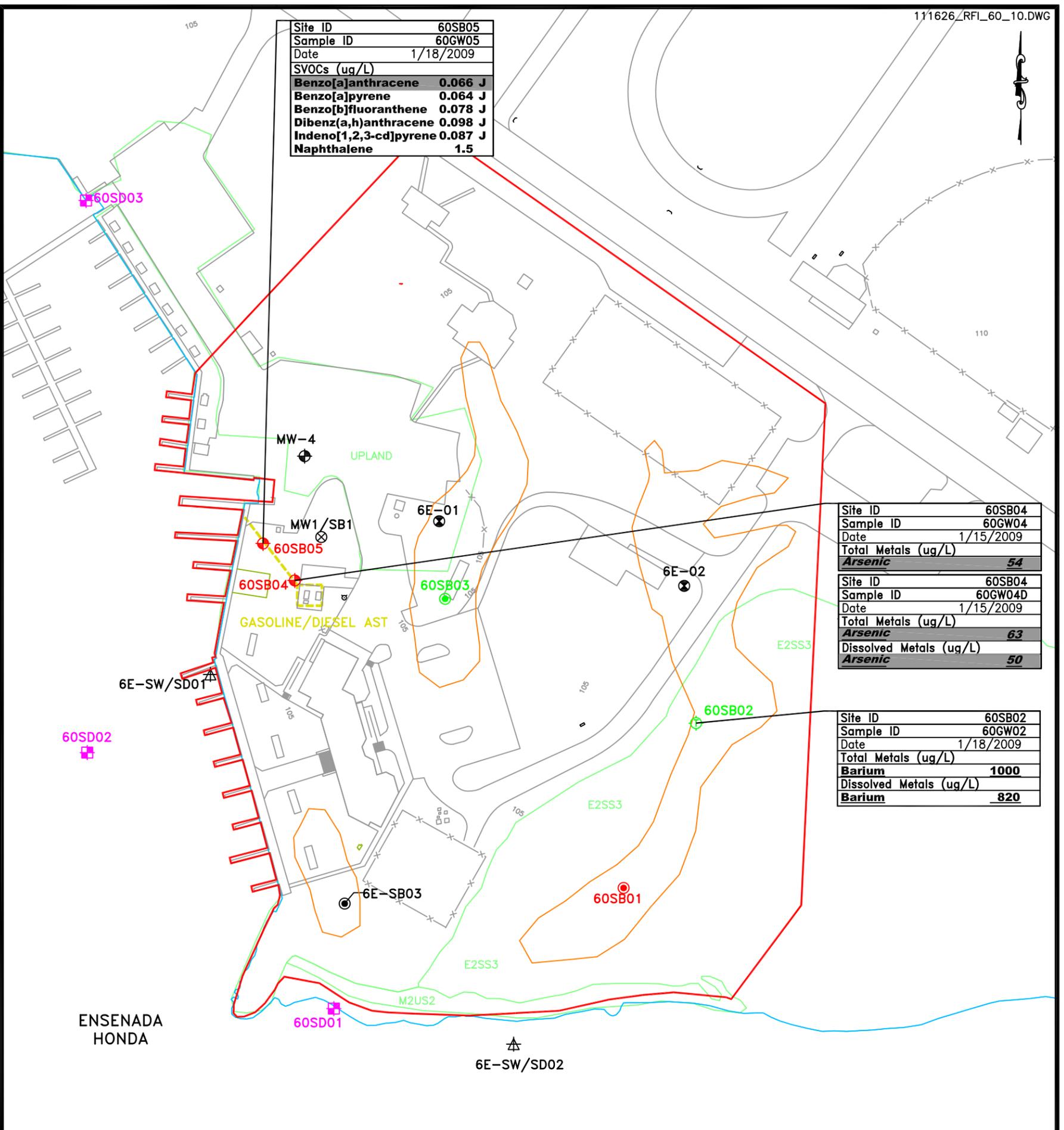
FIGURE 6-4
 SEDIMENT EXCEEDANCES OF
 HUMAN HEALTH, ECOLOGICAL, AND
 BACKGROUND SCREENING CRITERIA⁽¹⁾
 SWMU 60-FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO

Site ID	60SB05
Sample ID	60GW05
Date	1/18/2009
SVOCs (ug/L)	
Benzo[a]anthracene	0.066 J
Benzo[a]pyrene	0.064 J
Benzo[b]fluoranthene	0.078 J
Dibenz(a,h)anthracene	0.098 J
Indeno[1,2,3-cd]pyrene	0.087 J
Naphthalene	1.5

Site ID	60SB04
Sample ID	60GW04
Date	1/15/2009
Total Metals (ug/L)	
Arsenic	54

Site ID	60SB04
Sample ID	60GW04D
Date	1/15/2009
Total Metals (ug/L)	
Arsenic	63
Dissolved Metals (ug/L)	
Arsenic	50

Site ID	60SB02
Sample ID	60GW02
Date	1/18/2009
Total Metals (ug/L)	
Barium	1000
Dissolved Metals (ug/L)	
Barium	820



Notes/Qualifiers:

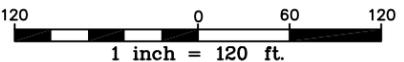
- ug/L -micrograms per kilogram
- J -Estimated value
- █** -Exceeds Ecological Groundwater Screening Criteria
- BOLD** -Exceeds Regional Tap Water Screening Level for Groundwater
- ITALICS* -Exceeds USEPA MCLs
- UNDERLINE -Exceeds Basewide Background Screening Values
- (1) -Background Not Established For SVOCs.

If screening criteria/background values were not available, detected concentrations were retained as COPCs.

COWARDIAN WETLAND CLASSIFICATION

- E2SS3 -ESTUARINE INTERTIDAL SCRUB-SHRUB BROAD LEAVED EVERG.
- M2US2 -MARINE INTERTIDAL UNCONSOLIDATED SHORE SAND

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



	-1958 POLYGON FEATURE		-SWMU BOUNDARY
	-ESTUARINE WETLAND BOUNDARY		-EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (PHASE II ECP 2004)
	-EXISTING SURFACE WATER AND SEDIMENT SAMPLE LOCATION (PHASE II ECP 2004)		-EXISTING SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (PHASE II ECP 2004)
	-EXISTING SOIL AND GROUNDWATER SAMPLE LOCATION (1999 SITE CHARACTERIZATION)		-EXISTING MONITORING WELL LOCATION
	-SURFACE SOIL SAMPLE LOCATION		-SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
	-SURFACE, SUBSURFACE SOIL AND GROUNDWATER SAMPLE LOCATION		-SURFACE SOIL AND GROUNDWATER SAMPLE LOCATION (TEMPORARY)
	-SEDIMENT SAMPLE LOCATION		-GASOLINE/DIESEL AST
	-APPROXIMATE LOCATION OF UNDERGROUND PIPING SYSTEM		

FIGURE 6-5
GROUNDWATER EXCEEDANCES OF HUMAN HEALTH, ECOLOGICAL AND BACKGROUND SCREENING CRITERIA⁽¹⁾
SWMU 60-FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO

APPENDIX A
2009 FIELD ACTIVITIES

SITE PHOTOGRAPHS



Photo 1. Access road southeastern portion of SWMU 60. View looking northeast.



Photo 2. Marina building and parking area in background. View looking west.



Photo 3. Boat dock and marina building in background. View looking east.



Photo 4. Installation of monitoring well 60GW04. AST's, pump station, and Secondary containment area in background. View looking southeast.



Photo 5. Geoprobe® direct push drilling rig at sample location 60SB05.



Photo 6. Debris identified in the vicinity of 60SB01 and 60SB02.

FIELD LOG BOOK NOTES

Environmental Geologist – Joe Burawa

JOE BURAWA

Site Investigations

Sumus 60, 70, 9-A

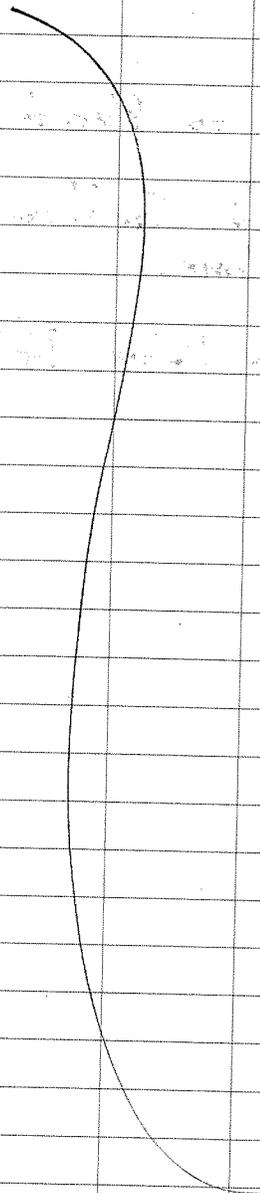
January 2009

[11 to 24]

Michael Baker Jr., Inc.
100 Arside Drive
Moon Township, PA 15108.

④

10/11



1/12/09 ⑤

on-site 7:00am
meet with Millie and Victor look
for Keys, determine command has
them.

Walk 60 and 70, C.I.
get keys @ 9:15am
open equipment and bottles
GPS 60 locations
receive sand for JFA
Mingo and Edwin on-site @
11:15 unload supplies.

Coordinate water delivery from
Fire station for DECON water.
Calibrate PID
Mingo and Edwin get cement and
sand for concrete, stick ups, bollards

Coordinate with Right-Way to use
backfill to clear path for GOSB01
GOSB02

Drill GOSB01 & GOSB02

JHB

⑥ 90511

60SB02-00 1/12-00

Soil sample from 1/12-00
at 1/12-00

0-4' Sandy clay, mod soft
1.5' Rec damp to moist, light brown
0-0.5 10 ppm to gray calcareous
0.5-1.0 16 ppm @ 1.2' Black part
wet, very soft

4-8' low reactivity in part
1.0' Rec black, wet, some sand
52 ppm → light gray shell frag @
MAX 5' mixed with sand and
clay, wet

JHB
8/16

1/12/09 ⑦

Samples collected

60SB02-00 0-1' Bgs 1240

JHB

⑧ 1/12/09

60SB01

0-4' Sandy silt, roots, damp to
moist, very soft
[2.5 ppm
1.8
2.1
3.2] light gray, some shell frags
1.5' Rec saturated @ 1.2' shell
frags and sand, med-grained

4-8' 4.0' saturated sand and shell frags
4.10' Rec
[1.2 ppm
3.1
4.2
2.8] 4.3' becomes dark green, weathered
rock and sand, moist, med hard
more brown and rock frags @
7.0', hard

JHB

1/12/09 ⑨

Soil Samples collected

60SB01 - 00 1600

Finish drilling 4:15 pm

Mingo & Edward go set up decow
area

JHB

10

Pol/sif

particular information

0000 0000 100000

000000 000000 000000

000000 000000 000000

JHB

1/13/09

11

Zam On-site with JFA

Trouble getting on Base, guards want a list of everybody's name and vehicles. No actual vehicle pass.

Talk to Pedro Ruiz about getting a list to the guardhouse.

Calibrate P.I.D

JHB

(12) 1/13/09

605B03

0-4' Sandy loam, med. brown, dry
2.7' Rec some stones, roots

Oppm- 0.5 to 1.1 limestone, gray
hard, (fill) dry

1.1' reddish brown, sandy
clay, damp to dry, soft

4-8' @ 3.0' wet, peat, black
1.2' Rec. woody

Oppm- 4' sandy clay, dark brown
wet, soft, some gravel

↓

JHB

1/13/09 (13)

Soil Samples Collected

605B03-00

8:10

605B03-00D

605B03-00MS

605B03-00MSD

↓

605B03-01

8:40

JHB

14

1/13/09

60SB04

0-4' Med Brown sandy loam to
 3.6' Rec. 0.6' some stones, dry
 Oppm- then dark brown sandy clay
 damp, soft some pebbles
 @ 3.2' dark greenish brown
 4-8' sandy silt, soft some
 4' Rel gravel

1' 0 ppm

2' 0

3' 100

4' 360

@ 6.4 Med to dark grey sand
 with shell frags, damp to
 moist, very soft, odor,
 calcareous

8-12'

3.2' Rec

1 - 50 ppm

2 - 70

3 - 145

JHB

1/13/09

15

Soil Samples Collected

60SB04 - 00 1010

60SB04 - 01 1025

60SB04 - 01 D

60SB04 - 01 MS

60SB04 - 01 MSD

60SB04 - 03 1050

Install Monitoring Well
 Overdrill with 3 1/4" Augers

Total Depth 15.5'

10' 0.010" Slot Screen - 2" DIA

Sand 3.5'

Bentonite 1.5'

Install Flushmont

Well Installed @ 1130

JHB

16
1/13/09

605B05

0-4' Sandy loam to 0.8' med brown
2.7' Rec. some rocks, damp to dry
1'-0 ppm gray rock from 0.8' to 1.1'
2'-0 ppm dry, hard,
2.5'-0 ppm @ 1.1' sandy clay, somewhat
med brown, soft damp to moist

@ 2.6' sand and rocks, greenish
gray, loose, wet

4-8'
1.9' Rec coarse sand and some fine
1' 0 ppm gravel, loose, wet
1.5' 0 ppm becomes clayey @ 5.5'

8-12'
0.8' coarse sand and fine gravel
loose, well sorted, wet

JHB

1/13/09 17

Soil Samples Collected

605B05-00 1415

605B05-01 1425

Overdrill with 3/4" Augers
Install well to 15' Dgs
10' 2"-Dia Screen 0.010" slot
Sand to 3'
2' Bentonite
Install Plushmount
→ Well Installed @ 1515

JHB

18 1/12/09

detailed report on 2

214 00-708200

234 00-708200

234 "H" B ...
epd 21 of the ...

234 "H" B ...
epd 21 of the ...

• ...

...

214 00-708200

JHB

1/13/09 19

→ Because of elevated PID hits @ locations 605B02 a temporary well screen was placed into the boring @ 605B02 and a groundwater sample will be collected.

Well screen installed 1630
5' Screen on 5' of riser pushed to 7'.
2" Screen 0.010" Slot

This is a change in scope.

JHB off-site @ 5pm to attend RAB meeting.

JFA on-site til 630 to install flushmants

JHB

**Note: Pages 20-88 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

11/21/09

(89)

95B49

Hand Auger to 1.6' where
water was observed.

Silty Sand, moist, 0-1.6'
No PID Readings above (<1)
Crab holes present.

Collect Soil Sample from
0-1 feet.

95B49-00

JHB

11/21/09

(90)

Attempt to Find Existing well
MW-1 at SWMU 60.

Found MW-4 with the help from
Navy Personnel.

Used map in Appendix B
to reference MW-4's location
in attempt to locate MW-1.

Unable to locate MW-1 still.
Could not locate MW-1, MW-3
or MW-2.

Existing well MW-1, was not
sampled @ SWMU 60 as presented
in the work plan.

Although a groundwater sample was
collected @ 60SB02, because of
elevated PID measurements. These
PID readings may be natural organic
degradation. A sample was collected
to verify.

JHB

**Note: Pages 91-94 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

(95)

Water levels 1/23/09

70GW01	8.17	TPUC
70GW02	4.54	↓
70GW03	5.18	
70GW04	9.10	

60GW02	5.62	TPUC
60GW04	2.53	↓
60GW05	2.52	

13GW05	20.45	TPUC
9φPW54	21.99	TPUC
9φPW52	21.19	}
9φPW53	13.27	
9φPW44	9.47	
9φPW41	10.90	
9φPW47	11.58	
9φTW39	17.92	
9φTW37	7.96	
9φTW40	7.98	
9φTW48	5.58	
9φTW50	14.70	
9φTW42	17.97	

JAB

1/24/09

(96)

Travel Day

Return to Pittsburgh

JAB

Field Scientist – Michael Cromley

**Note: Pages 1-15 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

① 1/14/09

- 1205 Stopped by JB @ SWMU
70 to see if help was
needed
- 1250 LUNCH
- 1330 Arranged tools & supplies
needed to develop wells
at SWMU 60.
- 1345 Arrived @ SWMU 60
begin setting up for
development at 60SB05
- 1525 ~~Developed~~ Began development
at 60SB05
- 1558 Stopped development @ 60SB05
purged dry. Will try again
tomorrow. Moved on to 60SB04
- 1615 Began development of 60SB05
- 1730 Development of 60SB05
complete
- 1735 Checked DTW of 60SB05
- 1740 Back to Security Bldg. to
recharge batteries and grab more
supplies for tomorrow
- 1805 LEFT BASE

MRL

DTW: 9.37

②

60SB05 WELL DEVELOPMENT

TIME	DTW	TEMP	SPCOND	DO	PH	ORP	TURB
1525			START PURGE				

1558 - After 3 1/2 gallons purged
still very muddy, purged ~~dry~~^{dry}.
Waited 10 minutes until 1608
still dry. Will move onto
60SB04

Check DTW @ 1735
DTW: 8.77

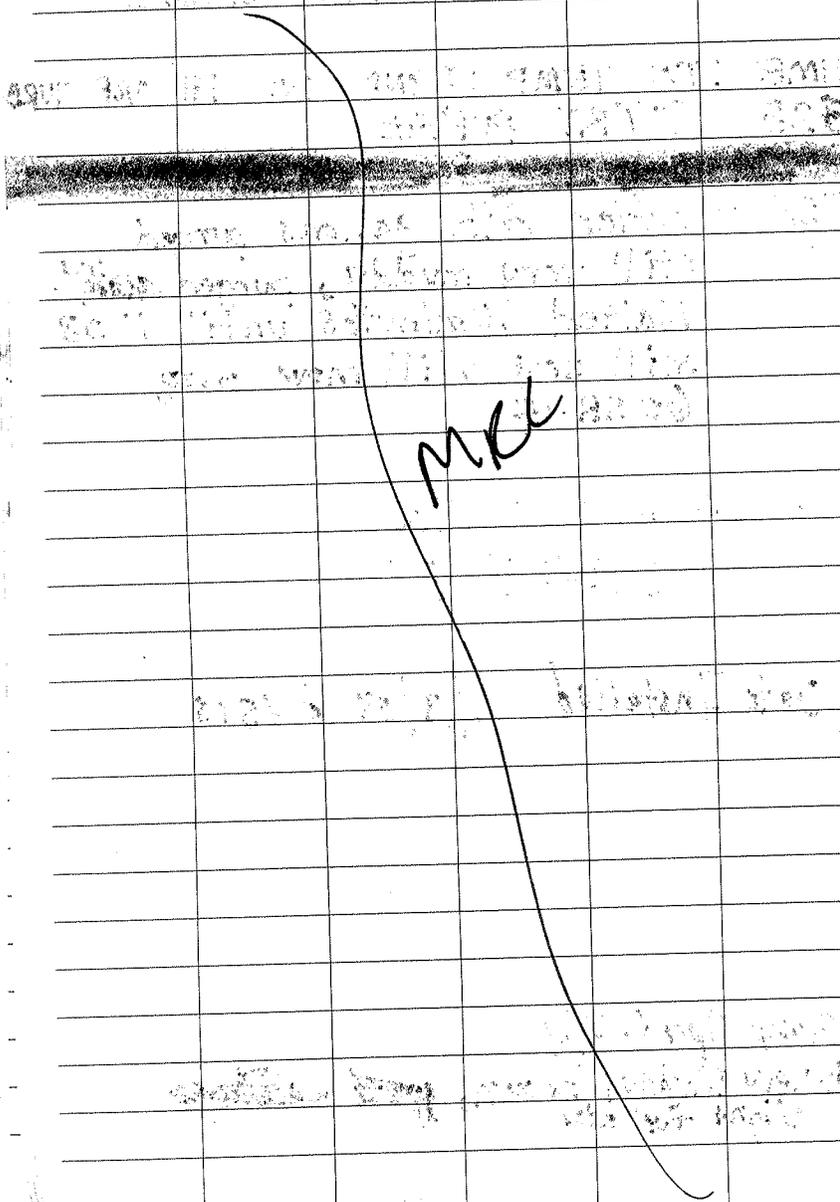
Date Installed 1/13/09 @ 1515

Pump Speed = 3/4
* Very Muddy, brown,
slight fuel odor

MRC

(18)

1/14/09



1/14/09

DTW: 7.79

(19)

60SB04

WELL DEVELOPMENT

TIME	DTW	TEMP	SPLND	DO	pH	ORP	TURB
1615	START PURGE						
	- very strong odor odor/sulfur odor						
	- light brown color						
1628	9.91	29.95	69.61	0.10	6.49	-330.9	144
1633	8.71	29.71	69.57	0.14	6.47	-332.4	24.6
1638	9.65	29.09	69.63	0.02	6.40	-361.3	125
1643	9.42	29.06	69.72	0.02	6.47	-365.1	183
1648	10.05	29.09	69.59	0.03	6.46	-362.4	2.33
1653	10.16	29.15	69.65	0.06	6.47	-362.7	3.99
1658	10.22	29.12	69.71	0.05	6.47	-361.9	5.71
1703	10.19	29.16	69.67	0.07	6.47	-362.4	2.11
1708	10.30	29.25	69.58	0.05	6.46	-361.9	4.79
1713	10.35	29.59	69.71	0.08	6.48	-362.9	3.91
1718	10.32	29.44	69.55	0.07	6.47	-362.4	3.77
1723	10.39	29.35	69.61	0.05	6.48	-362.1	2.45
1728	10.45	29.41	69.69	0.06	6.47	-362.7	3.12
1730	END PURGE						

* Slight odor throughout

* became very clear

* Steady recharge

Pump Speed = 3/4

75 Gallons Pumped

Date Installed

1/13/09 @ 1130

MCL

(20) 1/15/09

- 0645 ARRIVE ON BASE
- 0655 Began collecting bottles and containers to use for sampling SWMU 60.
- 0755 Arrive @ SWMU 60 w/ DH
Begin setting up to develop 60SB05
- 1015 60SB05 is dry will try later in the day. Will help DH with sampling of 60SB04
- 1140 LUNCH
- 1240 Returned to Security Bldg. grabbed more VOA's & Filters
- 1300 Returned to Marina to help DH w/ sampling
- 1330 Back to security Bldg. to drop off samples and tape them
Helped AG w/ condensing coolers and cleaning up room
- 1400 Went w/ DH to examine if any wells from SWMU 70 could be finished and start and development. @ Could not start today Mingo was working on the casing
- ~ me

1/15/09

1 1030
2 1215
3 0400

(21)

- 1530 Went to SWMU 60 to develop a temporary well
Well was not in correct boring hole
- 1600 Left to SWMU 70 to 70SB01 to develop w/ DH
- ~~1725~~
~~1700~~ Finished development of well 70SB01 and went back to Security bldg.
- 1800 LEFT BASE

MRL

(22) 1/15/09

DTW: 4.79

Total Depth: 16.40

60SB05

WELL DEVELOPMENT

TIME	DTW	TEMP	SPCOND	DO	PH	ORP	TURB
0817							

START PURGE

- very muddy

0825 6.81 28.05 43.86 0.14 6.85 -263.9 NR

0830 7.81 27.38 41.55 0.08 6.89 -262.7 NR

0835 9.45 28.13 40.21 0.16 6.84 -281.4 NR

0840 10.37 28.37 41.36 0.10 6.96 -284.4 285

0845 11.34 28.71 42.67 0.11 6.87 -283.7 427

0850 12.71 29.07 41.97 0.09 6.89 -284.8 220

0855 14.17 28.81 41.64 0.11 6.87 -283.4 27

0900 15.89 28.91 42.41 0.07 6.88 -283.7 211

0905 - Dry will give 10 mins to recharge

0915 14.45 - well pumped dry again

0925 14.12 - well pumped dry again

0935 15.09 - well pumped dry again

0955 13.11 - well pump dry again. much clearer

will continue purging at 1000-1005

*1005 14.19 28.45 47.44 0.03 7.05 -344.4 41.7

1010 15.30 28.51 47.86 0.24 6.98 -339.7 700

1015 - Dry will try again later in the day

* Pump speed = 3/4
NR = No Reading

MRC

1/15/09

DTW: 8.04

(23)

70SB01

WELL DEVELOPMENT

TIME	DTW	TEMP	SPCOND	DO	PH	ORP	TURB
1616							

START PURGE

- Grayish brown color

- Sweet pungent smell

1622 9.33

1628 3 Gallons pumped - still grayish brown

- some smell - sulfur?

1640 6 Gallons pumped

1642 10.52 27.64 8.84 0.17 7.05 -369.7 NR

1650 9 Gallons pumped

1652 10.88 27.83 8.599 5.91 7.04 -382.2 341

1657 11.05 27.93 8.587 6.07 6.99 -382.5 244

1702 11.31 27.92 8.601 5.98 6.97 -383.4 223

1707 11.49 27.94 8.551 6.05 6.98 -387.1 188

1712 11.17 27.92 8.497 6.05 6.97 -386.5 149

1717 11.31 27.91 8.512 6.04 6.98 -387.1 104.3

1722 11.42 27.91 8.491 6.05 6.97 -386.7 98

Date Installed

1/14/09 @ 1030

MRC

NR - No Reading

**Note: Pages 24-29 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

(30) 1/17/09

0645 ARRIVE ON BASE
0715 Head to SWMU 70
with DH to sample &
develop 70SB08 & 70SB07
1230 Back to Security Bldg. to
drop off samples and get
more bottles & labels for
SWMU 70, 70SB06
1300 Went to 70SB06 w/ DH
to begin development and
sampling
1400 BACK to Security Bldg. to
get more supplies to finish
SWMU 60. Had to drive out
to SWMU 9 to get key from
AG @ 1430/1620
1400 BACK to Security to get
supplies
1630 Arrive at SWMU 60 60SB05
to measure GW and develop
well
1730 Finished purging will take
readings tomorrow and sample
1755 LEFT BASE

MRL

1/17/09

DTW = 9.51

(31)

60SB05 PURGE & SAMPLE

TIME	DTW	TURB
1645		
1700*	1.5 GALLONS PURGED	
	- CLOUDY	DTW: 10.48 TURB: 924
1715*	3.0 GALLONS PURGED	
	- CLOUDY	DTW: 12.81 TURB: 775
1720*	3.25 GALLONS PURGED	
	- Slightly Clearer	DTW: 15.81 TURB: 395
1725*	3.50 GALLONS PURGED	
	- Slightly Clearer	DTW: 16.01 TURB: 234
1730*	3.75 GALLONS PURGE	
		DTW: 16.11 TURB: 84.2

* FULL SPEED TO REMOVE SOIL & SILT

✓ LESS THAN HALF SPEED

Stopped at 1730 will come in
morning to sample well

MRL

(32)

1/18/09

0645 ARRIVE ON BASE

0700 Go to SWMU 60 to purge

and sample 60SB05

~~080904~~ 60SB05 has been purged and sampled

now moving to 60SB02 to

develop & purge

0910 Setup and begin developing

60SB02 temporary well

1025 Began samples on 60SB02

1145 Finished all but 2 14 Ambers

will return later to finish

1200 Returned to Security Bldg. to

get GW labels for SWMU 9

1210 Arrived at SWMU 9 begin

setting up for well development

at well 9 PWS4

1345 SAMPLED 9PWS4

1405 Went back to Security Bldg.

to get more PVC tubing, DH

came back out to SWMU 9

to setup at 9 PWS2

1420 Setup a 9 PWS2

1425 Begin development

~~1500~~ 1537 Began Purge

1619 Stopped Purge process due
to rising turbidity →

MRC

(33)

will try again in the morning

1515 LEFT BASE

MRC

34 1/18/09

DTW: 9.31

605805

TIME	DTW	TEMP	SPCOND	DO	ORP	PH	TURB
0710							
START PURGE							
0715	9.51	26.74	39.50	0.31	-75.7	6.86	291
0720	9.92	26.91	38.12	0.27	-74.1	6.81	242
0725	10.41	26.12	38.91	0.30	-73.4	6.83	229
0730	11.07	26.45	39.12	0.28	-74.9	6.83	215
0735	11.49	26.64	38.79	0.31	-74.1	6.84	200
0740	11.72	26.72	38.11	0.32	-74.7	6.83	172
0745	11.99	26.61	38.41	0.30	-74.1	6.83	144
0750	12.21	26.12	38.65	0.31	-74.3	6.84	11
0755	12.49	26.31	38.41	0.31	-74.9	6.83	9
0800	12.71	26.45	38.50	0.32	-74.4	6.83	12
0805	13.01	26.41	38.58	0.29	-74.8	6.84	10
0810	13.31	26.52	38.49	0.31	-74.2	6.83	10
0815 BEGIN SAMPLING							

0815 - SAMPLE TIME 605805
 Date Installed 1/13/09 @ 1515
 PUMP SPEED 1/2 speed

MPL

1/18/09

DTW: 6.62

35

605802 TEMP WELL
 DEVELOPMENT PURGE SAMPLE

TIME	DTW	TEMP	SPCOND	DO	PH	ORP	TURB
0840							
BEGIN PURGE							
0915	7.61	26.40	12.33	0.19	7.36	-193.8	139
0920	8.47	27.10	13.12	0.18	7.35	-194.9	160
0925	10.10	26.43	12.92	0.21	7.36	-195.1	142
0930	10.40	- DRY		will allow		5 min recharge	
0935	9.91	26.29	12.17	0.16	7.37	-191.2	111
0940	10.11	26.47	12.67	0.18	7.36	-192.3	91
0945	10.22	26.49	12.43	0.17	7.36	-191.2	87
0950	10.30	26.50	12.57	0.18	7.36	-191.7	96
0955	10.30	26.39	12.55	0.18	7.36	-191.1	52
1000	10.32	26.45	12.51	0.16	7.36	-192.2	57
1005	10.25	26.44	12.61	0.17	7.37	-193.1	18
1010	10.21	26.43	12.65	0.19	7.38	-192.8	14
1015	10.15	26.47	12.61	0.18	7.37	-193.7	12
1020	10.18	26.45	12.67	0.17	7.38	-192.7	11
1025 SAMPLE TIME							

* Very low flow rate and well
 began to go dry ~~concrete~~

Date
 Installed
 1/12/09

MPL

1/2 or less
 pump speed

Field Scientist – Adam Gailey

①
Depart Pgh 1/11/09 for
San Juan Puerto Ric.

Arrive at NAPR 0700.

Site Investigations
SWMU's 60, 70, 9B

January 2009

Prepare for data events -
GPS and Flag pre-determined
Sample Locations.

- SWMU 60
- SWMU 70

Depart NAPR 1815.

APK.

ARRIVE at NAPR 0715.
January 12, 2009 (2)

Collect JAN 09 - ER01
at 1515 with Macro-core liner
Corresponds to Soil Borings at
SWMU 60.

ER 01 -

- VOC
- SVOC w/UPM's
- PEST
- METALS
- GPO
- DRO

Prepare Sample for Fed-ex
Pickup.

Fed Ex arrives @ 1500

DEPART NAPR 1700.

ADG.

January 15, 2009 (3)

ARRIVE at NAPR 0700.

Prepare for Puy's events
at NAPR.

Get Gas and Fueling,
etc and load Vehicle.

Collect Equipment Zinsco
JANER-02 0800 with
VOC Macro-Core Liner
SVOC
PEST
METALS
GPO
DRO
SWMU 60.

Continue to utilize GPS
in order to Navigate to
pre-determined Sample
Locations.

APK

**Note: Pages 4-5 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

⑥ January 14, 2009

Collection of Field Blank
JAN09-FB01 - Laboratory Grade
Deionized water

Time of Collection: 1625 by John
Malinowski jfn

2 1 Liter Ambers: LL SVOC's

2 1 Liter Ambers: PCBs

2 1 Liter Ambers: Pesticides

2 1 Liter Ambers (HCL): DR O

3 40ml Vials (HCL): VOCs

3 40ml Vials (HCL): GRO

1 250ml Poly (HNO₃): Total Metals

Collection of Equipment Rinse Blank
Macro Core Liner

JAN09-ER03 - collected by passing
Laboratory Grade Deionized
water through an un-used
Macro Core Liner

This equipment rinse blank corresponds
to soil collection activities at Summit 60/70

⑦

Time of Collection: 1700 by John
Malinowski jfn

2 1 Liter Ambers: LL SVOCs

2 1 Liter Ambers: PCBs

2 1 Liter Ambers: Pesticides

2 1 Liter Ambers (HCL): DR O

3 40ml Vials (HCL): VOCs

3 40ml Vials (HCL): GRO

1 250 ml Poly (HNO₃): Total Metals

⑧

January 15, 2008

Collection of Equipment Rinseate Blank
Jan09-ER04 - Collected by pumping
laboratory grade water
through tubing used
for ground water collection.

Time of collection: 1635 on January
15, 2008

Collected by: John Malinowski, Jm

- 2 1 liter Ambers - LL SVOCs
- 2 1 liter Ambers - Pesticides
- 2 1 liter Ambers (HCL) - DR0
- 3 40ml Vials (HCL) - VOAs
- 3 40ml Vials (HCL) - GRO
- 1 250ml Poly (HNO₃) - metals

This equipment rinseate blank corresponds
to groundwater collection activities at
SWMU 60.

January 16, 2008

⑨

SWMU 9 Sediment Collection
John Malinowski
Adam Guillet

95092 - 1015 - Red mangroves
and standing H₂O

95081 - 1025 Red mangroves
No standing water - Saturated
sediments.

95084 - 1040 Red mangrove. Silt
Clay. Saturated sediment and
standing water.

95090 - 1050 Red mangrove
Silt clay - saturated sediment
and little standing water.

95096 - 1058 Red mangrove
2 inch layer of silt - below
2" back to silt clay. Standing
water.

**Note: Pages 10-11 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

SwMu's 60 + 70

(12)

Sediment Sampling:

John Malinowski and Adam Gurey

~~70SD03~~

70SD03

70SD03D

70SD03MS

70SD03MSD

70SD03MS/MSD

Collected at

1025. Mostly

sand with

Turtle grass

Present. Water
Depth - 2 ft.

Weather Conditions: Rain

~~Some~~ Sometimes heavy.

70SD02 - 1050. Sand with
Turtle grass present. Water
Depth 2 ft.

60SD02 - 1125. Depth at
Approx. 11 ft. Mostly ~~sand~~
Silty Sand. (Water Depth)

60SD03 - 1205. Depth of water
at approx. 8 ft. Sand with
little Turtle grass. In the
vicinity of boat ramp. Put - id.

SwMu's 60 and 70
Sediment Sampling:

(13)

- Security personnel assisted
by providing access by boat
to pre-determined sample locations.

- All sample locations were
navigated to using GPS.

- Continue to Sample
SwMu 60/70 Sediment

70SD01 - 1400. Sand.
Location adjacent to shore
where Red mangroves are
present.

60SD03 - 1430. Silty Sand
and organic material abundant.
Depositional area. Red
mangrove in water with
white mangrove further inland.

Note: Pages 14-19 of the field log book are not included because they pertain to another SWMU included in the January 2009 multi-site investigation.

(20)

9SD100. Silt 1st inch - Then a
silty clay. Decaying leaf organic
matter. Standing water beginning
to get deeper 2"-3" on
average. Also, decaying red
mangroves becoming abundant
at this location and beyond.
Saturated.

9SD101, 0900. Standing Water.
Approx 3". decaying red mangroves.
Silty clay and organic matter.

9SD103. 0905 Standing Water approx
6". Silt followed by silty clay.

devoid of any vegetation.

9SD103 D Also collected here.

9SD102, 0910. Silty clay. decaying
red mangrove standing water approx.
8".

9SD104. 0915. Silty clay. decaying
red mangroves. standing water
approx. 8".

(21)

Back to security Bldg.
to collect ~~the~~ JAN 09 GLOB
Corresponds to GW sampling
at SWMU 9. 0940

3 Vials - Voc's
3 Vials - GRO
2 1L Ambers - DRO
2 1L Ambers - CLPAM's.

Prep samples for Fed EX
Pick up.

Collect Feed Bank JAN 09 - FBOA
(NAPR Potable Water)

2 1 Liter Ambers: Svol's
2 1 Liter Ambers: PCBs / PEST
2 1 Liter Ambers: DRO
3 40 ml Vials (Hcl): Voc's
3 40 ml Vials (Hcl): GRO
1 250 ml Perf (Hcl): TOTAL Metals

APB

**Note: Pages 22-23 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

(26)

January 23, 2008

Arrive at NARR 0730.

Assemble last shipment of
samples for FedEx.

Organize and pack equipment.

Inventory of remaining
supplies -

Depart NARR

AC2

Field Scientist – Darrin Hupe

Jan. 15, 2009

SLJMU 60

Weather: Partly cloudy, breezy, ~80°F, brief heavy shower in AM.

606W04 (Purge/Develop)

* M. Cramby Developed this well yesterday - 1/14.

TD = 15.94

SWL = 2.55 @ 0826

Start Purge @ 0830

Time	Vol.	Temp.	Cond.	D.O.	pH	ORP	Turb.
0835	0.4	28.48	7.37	0.51	6.55	-306	224

(SWL = 3.97)

0840 - Approx. 1/3 gal. of very murky/Turbid water pulled from well.

0845	1.0	28.42	70.22	0.23	6.52	-349	183
------	-----	-------	-------	------	------	------	-----

(SWL = 4.92)

0850	1.3	28.32	69.72	0.19	6.50	-358	over
------	-----	-------	-------	------	------	------	------

(SWL = 5.18)

0855 - Data rising turbidity, deemed it necessary to develop some more: Keep getting slugs of very fine sandy silt. Purged/Developed 2.4 gals. this round. Ends Turb. = 123.

- Re start Purge/Sample on next ps.

↓
* Purge water milky Tan color, containing very fine grained sand. Mod. sulfur/Fuel odor. No

Sheen observed.

DMH

1/15/2009 SWMU 60

606W04 (Sample)

Time	Vol. ^{gals}	Temp	Cond.	P.O.	pH	ORP	Turb.
0930	-	29.01	59.04	0.08	6.52	-356	over
LSL = 6.62							
0935	0.4	29.14	61.41	0.05	6.50	-368	493
LSL = 6.82							
0940	0.9	29.17	63.71	0.04	6.51	-371	171
LSL = 6.97							
0945	1.2	29.30	64.67	0.03	6.49	-377	87
LSL = 7.09 29.30							
0950	1.5	29.28	65.97	0.03	6.49	-375	43
LSL = 7.15							
0955	2.1	29.28	66.54	0.03	6.47	-378	35
LSL = 7.23							
1000	2.5	29.35	66.95	0.03	6.47	-376	27
LSL = 7.33							
1005	3.0	29.50	66.95	0.03	6.46	-377	20
LSL = 7.44							
1010	3.4	29.40	66.60	0.03	6.48	-376	10
LSL = 7.48							
1015	3.8	29.51	67.60	0.03	6.48	-376	9
LSL = 7.56							
1020	4.3	29.55	67.10	0.03	6.48	-375	8.5
LSL = 7.72							

2 DNH cont. →

1/15/09 SWMU 60

606W04

Note: Seeing that Well 04 was a much better producer compared to Well 05, 04 was used for the QA/QC samples - contrary to the work plan table 3-1.

606W04 - Sampled @ 1030

04D " " 1045

04MS " " 1030

04MSD " " 1030

Note: Dup. MS + MSD labels with 606W05 were used for Well 04 (05 changed to 04).

* Sample water clear w/ ~~light~~ Moderate sulfur / Fuel odor. No Sheen.

* Sample reacted to HCL in vial vials - very hard to fill w/o bubbles.

3 DNH

**Note: Pages 4-11 of the field log book are not included
because they pertain to another SWMU
included in the January 2009 multi-site investigation.**

1/12/09

SWMU70

70GW06 (Sample)

Time	Vol.	Temp.	Cond.	P.O.	pH	ORP	Turb.
1342	-	26.92	29.01	0.39	6.94	60	over
1347	.75	25.77	33.91	0.21	6.83	-110.7	over
1352	1.00	25.82	32.96	0.21	6.84	-130.9	over
1357	1.50	25.68	32.84	0.23	6.84	-136.1	over
1402	1.75	25.78	32.78	0.20	6.84	-138.4	372
1407	2.00	25.86	33.10	0.14	6.79	-139.9	174
1412	2.50	25.74	32.40	0.25	6.88	-141.7	165
1417	2.75	25.69	33.18	0.31	6.82	-171.4	165
1422	- Had to retrieve & switch battery ^{for pump}						
1427		25.71	33.50	0.20	6.82	-188	470
1432	3.2	25.73	29.29	0.22	6.92	-184	700
L SWL = 3.28							
1437	3.5	25.63	33.72	0.20	6.82	-188	206
1442	3.8	25.62	34.76	0.18	6.79	-198	80
1447	4.3	25.61	35.16	0.17	6.80	-205	33
C SWL = 3.28							
1452	4.7	25.59	35.47	0.16	6.79	-208	30
1457	5.2	25.57	35.48	0.16	6.78	-210	30

1500 - Sample Taken.

- Sample clear w/ very light yellow tinge,
or very slight organic odor.

- Pump Speed @ 2/3.

- Ending Turb. = 28

was a little hard filling
JVA's do to fizziness
of water.

12
DNH

1/17/09

SWMU60

60GW02 (Develop) * Temporary Well Installed

SWL = 5.65 TD = 10.41 1/12.

1645 - Start

1650 - Pumped ^{DRY} 0.8 gals. before going
Dry, very turbid, dark gray color. No odor.

- Pump Speed @ Full.

- Recharge Rate of 1A. in 9 min.

- Will attempt to purge & for sample
tomorrow.

* M. Cramely Sampled this well on 1/18.

1/18/09

SWMU9

- Processed Sediment Sample Terrachlers
- Helped M. Cramely sample wells

13
DNH

SOIL BORING LOGS AND WELL CONSTRUCTION RECORDS

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Naval Activity Puerto Rico - SWMU 60SO NO.: 111626BORING NO.: 60SB01COORDINATES: EAST: 936618.87NORTH: 801983.76

ELEVATION: SURFACE: _____

Rig: Geoprobe 66DT					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
MC Sampler	Casing	Augers	Core Barrel					
Size (ID)	2"	--	--	--	1/12/09	0.0 - 8.0	82° Cloudy	1.2
Length	4'	--	--	--				
Type	Acetate	--	--	--				
Hammer Wt.	--	--	--	--				
Fall	--	--	--	--				

Remarks:

<u>SAMPLE TYPE</u>						<u>DEFINITIONS</u>		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Direct Push P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm)	Visual Description	Elevation (Ft. MSL)	
1	D-1	1.5 38%		60SB01-00 (0-1')	2.5	Sandy Silt, light gray, damp to moist, soft	1.2'	
2					1.8	Sand, gray, shell fragments, saturated medium-grained sand		
3					2.1			
4					3.2		4.3'	
5	D-2	4.0 100%			1.2	Weathered Rock and Sand, dark green, moderately hard, moist		
6					3.1			
7					4.2	becomes brown and harder at 7.0'		
8					2.8			
9						End of Boring at 8'		
10								

DRILLING CO.: JFA Geological & Environmental ScientistsBAKER REP.: Joe BurawaDRILLER: Domingo Gonzalez - RodriguezBORING NO.: 60SB01 SHEET 1 OF 1

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Naval Activity Puerto Rico - SWMU 60

PROJ. NO.: 111626

BORING NO.: 60SB02

COORDINATES: EAST: 936698.49

NORTH: 802165.16

ELEVATION: SURFACE: _____

TOP OF PVC CASING: 105.19

Rig: Geoprobe 66DT					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
MC Sampler	Casing	Augers	Core Barrel					
Size (ID)	2"	--	3 1/4"	--	1/12/2009	0.0 - 8.0	82° Cloudy	1.2
Length	4'	--	5'	--				
Type	Acetate	--	HSA	--				
Hammer Wt. Fall	--	--	--	--				

Remarks: Temporary Well Location

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Direct Push P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
						Schedule 40 PVC Riser	2"	+3	2.0
						Schedule 40 PVC Screen	2"	2.0	7.0
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm)	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	D-1	1.5 38%		60SB02-00 (0-1')	10 16	Sandy Clay, light brown to gray, calcareous, damp to moist			
2						Peat, black, very soft, wet			
3						-poor recovery			
4						4.0			
5	D-2	1.0 25%			52	Sand and Clay, some peat, very soft, light gray clay, wet			
6						Bottom of Screen at 7'			
7									
8						8.0			
9						End of Boring at 8'			
10									

DRILLING CO.: JFA Geological & Environmental Scientists

BAKER REP.: Joe Burawa

DRILLER: Domingo Gonzalez - Rodriguez

BORING NO.: 60SB02

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Naval Activity Puerto Rico - SWMU 60SO NO.: 111626BORING NO.: 60SB03COORDINATES: EAST: 936698.18NORTH: 802165.08ELEVATION: SURFACE: 102.40

Rig: Geoprobe 66DT					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)		
MC Sampler	Casing	Augers	Core Barrel							
Size (ID)	2"	--	--	--	1/13/09	0.0 - 8.0	85° Cloudy	3.0		
Length	4'	--	--	--						
Type	Acetate	--	--	--						
Hammer Wt.	--	--	--	--						
Fall	--	--	--	--						
Remarks:										
<u>SAMPLE TYPE</u> S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Direct Push P = Piston N = No Sample					<u>DEFINITIONS</u> SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million					
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm)	Visual Description	Elevation (Ft. MSL)			
1	D-1	2.7 68%		60SB03-00	<1	Sandy Loam, medium brown, dry, stones	0.5'			
				60SB03-00D		Limestone, gray, hard, fill, dry	1.1'			
2				60SB03-00MS		Sandy Clay, reddish brown, damp to dry,				
				60SB03-00MSD		soft				
3				(0-1)			3.0'			
4	4.0			60SB03-01		Peat, black, woody, wet	4.0'			
				(1-3)						
5	D-2	1.2 30%			<1	Sandy Clay, dark brown, soft,				
						some gravel, wet				
6										
7										
8	8.0									
9						End of Boring at 8'				
10										

DRILLING CO.: JFA Geological & Environmental ScientistsBAKER REP.: Joe BurawaDRILLER: Domingo Gonzalez - RodriguezBORING NO.: 60SB03 SHEET 1 OF 1

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Naval Activity Puerto Rico - SWMU 60

PROJ. NO.: 111626

BORING NO.: 60SB04

COORDINATES: EAST: 936257.70

NORTH: 802322.21

ELEVATION: SURFACE: 102.65

TOP OF PVC CASING: 102.38

Rig: Geoprobe 66DT					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
MC Sampler	Casing	Augers	Core Barrel					
Size (ID)	2"	--	3 1/4"	--	6/2/2008	0.0 - 15.5	85° Cloudy	3.0
Length	4'	--	5'	--				
Type	Acetate	--	HSA	--				
Hammer Wt. Fall	--	--	--	--				

Remarks:

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Direct Push P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
						Schedule 40 PVC Riser	2"	0	5.5
						Schedule 40 PVC Screen	2"	5.5	15.5
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)	
1	D-1	3.6 90%		60SB04-00 (0-1')	<1	Sandy Loam, med. brown, stones, dry		101.15	
2				60SB04-01	<1	Sandy Clay, dark brown, soft, some pebbles, damp			
3				60SB04-01D 60SB04-01MS 60SB04-01MSD (1-3')	<1	Sandy Silt, dark greenish brown, soft, some gravel, damp to moist			
4	4.0						2" PVC Riser	99.15	
5	D-2	4.0 100%		60SB04-03 (5-7')	<1			97.15	
6					<1				
7					100	Sand, medium/dark gray, soft, soft, calcareous, hydrocarbon odor, damp to moist			
8	8.0				360		2" PVC Screen		
9	D-3	3.2 80%			50				
10					70				

DRILLING CO.: JFA Geological & Environmental Scientists

BAKER REP.: Joe Burawa

DRILLER: Domingo Gonzalez - Rodriguez

BORING NO.: 60SB04

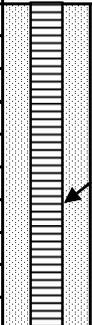
SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Naval Activity Puerto Rico - SWMU 60

SO NO.: 111626

BORING NO.: 60SB04

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Direct Push P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11						<i>Continued from Sheet 1</i>		87.15
12	D-3	3.2 80%			145			
13								
14	A	NA						
15								
15.5						Bottom of Well at 15.5'		
16								
17						Regular Compensated		
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Naval Activity Puerto Rico - SWMU 60

PROJ. NO.: 111626

BORING NO.: 60SB05

COORDINATES: EAST: 936222.83

NORTH: 802362.89

ELEVATION: SURFACE: 102.62

TOP OF PVC CASING: 102.29

Rig: Geoprobe 66DT					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
MC Sampler	Casing	Augers	Core Barrel					
Size (ID)	2"	--	3 1/4"	--	1/13/2009	0.0 - 15.0	85° Sunny	2.6
Length	4'	--	5'	--				
Type	Acetate	--	HSA	--				
Hammer Wt. Fall	--	--	--	--				

Remarks:

SAMPLE TYPE					WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Direct Push P = Piston N = No Sample					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
					Schedule 40 PVC Riser	2"	0	5.0
					Schedule 40 PVC Screen	2"	5.0	15.0
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	D-1	2.7 68%		60SB05-00 (0-1')	<1	Sandy Loam, medium brown, damp		101.62
						Rock, gray, hard		
2						Sandy Clay, medium brown, some silt, soft, damp to moist		
3								
4	4.0			60SB05-01 (1-3')	<1	Sand and Gravel, greenish gray, loose, wet	2" PVC Riser	99.62
5	D-2	1.9 48%			<1	Sand, coarse-grained, some fine grained sand, grayish brown, loose, wet		97.62
6						becomes clayey at 5.5'		
7								
8	8.0				<1	some fine gravel, well sorted at 8'	2" PVC Screen	
9	D-3	0.8 20%			<1			
10								

DRILLING CO.: JFA Geological & Environmental Scientists

BAKER REP.: Joe Burawa

DRILLER: Domingo Gonzalez - Rodriguez

BORING NO.: 60SB05

SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Naval Activity Puerto Rico - SWMU 60

SO NO.: 111626

BORING NO.: 60SB05

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Direct Push P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11						<i>Continued from Sheet 1</i>		87.62
12	D-3	0.8 20%						
13						Bottom of Well at 15'		87.62
14	A	NA						
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

CHAIN-OF-CUSTODY FORMS

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

Fed Ex Airbill NO:
8480 2694 7422

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.testamericainc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

60-001

THE LEADER IN ENVIRONMENTAL TESTING

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE <i>NAPR Investigations</i>	PROJECT NO. <i>111626</i>	PROJECT LOCATION (STATE) <i>PR</i>	MATRIX TYPE		REQUIRED ANALYSIS							PAGE <i>1</i>	OF <i>2</i>						
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT ...)	<i>APP IX Vac's</i>	<i>APP IX SUOC's</i>	<i>APP IX Metals</i>	<i>APP IX Metals Dis Solvent</i>	<i>TPH GRO</i>	<i>TPH PRO</i>	<i>APP IX Pest</i>	<i>APP IX PCB</i>	STANDARD REPORT DELIVERY <input type="radio"/>			
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE <i>412.337.7465</i>	CLIENT FAX						<i>APP IX Vac's</i>	<i>APP IX SUOC's</i>	<i>APP IX Metals</i>	<i>APP IX Metals Dis Solvent</i>	<i>TPH GRO</i>	<i>TPH PRO</i>	<i>APP IX Pest</i>	<i>APP IX PCB</i>	DATE DUE <i>28 DAY TAT</i>	EXPEDITED REPORT DELIVERY (SURCHARGE) <input type="radio"/>	DATE DUE _____	NUMBER OF COOLERS SUBMITTED PER SHIPMENT:
CLIENT NAME <i>Michael Baker JR, INC.</i>	CLIENT E-MAIL <i>mkimes@mbakercorp.com</i>							PRESERVATIVE											
CLIENT ADDRESS <i>100 Airside Drive, Moon Twp, PA 15108</i>	COMPANY CONTRACTING THIS WORK (if applicable)																		

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT ...)	NUMBER OF CONTAINERS SUBMITTED							REMARKS	
DATE	TIME															
<i>1/12/09</i>	<i>1600</i>	<i>60 SB01 -00</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>							
<i>1/12/09</i>	<i>1240</i>	<i>60 SB 02 -00</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>							
<i>1/13/09</i>	<i>0810</i>	<i>60 SB 03 -00</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>							
	<i>0810</i>	<i>60 SB 03 -00 D</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>							
	<i>0810</i>	<i>60 SB 03 -00 MS</i>	<i>G</i>	<i>X</i>			<i>3</i>									
	<i>0810</i>	<i>60 SB 03 -00 MSD</i>	<i>G</i>	<i>X</i>			<i>3</i>									
	<i>1010</i>	<i>60 SB 04 -00</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>		<i>3</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
	<i>1025</i>	<i>60 SB 04 -01</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>		<i>3</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
	<i>1025</i>	<i>60 SB 04 -01 P</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>		<i>3</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
	<i>1025</i>	<i>60 SB 04 -01 MS</i>	<i>G</i>	<i>X</i>			<i>3</i>				<i>3</i>					
	<i>1025</i>	<i>60 SB 04 -01 MSD</i>	<i>G</i>	<i>X</i>			<i>3</i>				<i>3</i>					
<i>1/13/09</i>	<i>1050</i>	<i>60 SB 04 -03</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>		<i>3</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/13/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/13/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/12/09</i>	TIME <i>0700</i>	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>KL</i>	DATE <i>1/14/09</i>	TIME <i>0854</i>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>680-43887</i>	LABORATORY REMARKS <i>2.8 / 1.6 / 1.6 / 2.2 / 2.2</i>
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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica *FED EX Airbill No.:*
8480 2694 7422

TestAmerica Savannah
 5102 LaRoche Avenue
 Savannah, GA 31404

Website: www.testamericainc.com
 Phone: (912) 354-7858
 Fax: (912) 352-0165

60-001

LEADER IN ENVIRONMENTAL TESTING

Alternate Laboratory Name/Location

Phone:
 Fax:

PROJECT REFERENCE MPR INVESTIGATION	PROJECT NO. 111626	PROJECT LOCATION (STATE) PR	MATRIX TYPE	REQUIRED ANALYSIS							PAGE 2	OF 2	
LAB (LAB) PROJECT MANAGER Kathy E. Smith	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	<input type="checkbox"/>	STANDARD REPORT DELIVERY								
CLIENT (SITE) PM Mark Kimes	CLIENT PHONE 412-337-7465	CLIENT FAX		<input type="checkbox"/>	<input type="checkbox"/>	DATE DUE 28 JAN 11							
CLIENT NAME Michael Baker Jr., Inc.	CLIENT E-MAIL mkimes@mbakercorp.com			<input type="checkbox"/>	<input type="checkbox"/>	EXPEDITED REPORT DELIVERY (SURCHARGE)							
CLIENT ADDRESS 100 Airside Drive, Moon Township, PA 15108	COMPANY CONTRACTING THIS WORK (if applicable) Michael Baker Jr., Inc.			<input type="checkbox"/>	<input type="checkbox"/>	DATE DUE _____							
				PRESERVATIVE							NUMBER OF COOLERS SUBMITTED PER SHIPMENT:		

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED							REMARKS
DATE	TIME														
<i>1/12/09</i>	<i>1515</i>	<i>JAN 09 - ERO1</i>						<i>3</i>	<i>2</i>	<i>1</i>		<i>3</i>	<i>2</i>	<i>2</i>	
<i>1/13/09</i>	<i>0800</i>	<i>JAN 09 - ERO2</i>						<i>3</i>	<i>2</i>	<i>1</i>		<i>3</i>	<i>2</i>	<i>2</i>	
<i>1/13/09</i>	<i>0840</i>	<i>60 SB 03-01</i>						<i>3</i>	<i>1</i>	<i>1</i>				<i>✓</i>	
<i>1/13/09</i>	<i>0810</i>	<i>60 SB 03-00 MS/MSD</i>							<i>1</i>	<i>1</i>				<i>✓</i>	
<i>1/13/09</i>	<i>1025</i>	<i>60 SB 04-01 MS/MSD</i>							<i>1</i>	<i>1</i>				<i>✓</i>	
		<i>Jan 09 - TB01</i>						<i>X</i>				<i>X</i>			<i>KS 1/19/09 - TB added per mbaker</i>

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/13/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/13/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/12/09</i>	TIME <i>0700</i>	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>KL</i>	DATE <i>1/14/09</i>	TIME <i>0857</i>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>68-43887</i>	LABORATORY REMARKS
--	------------------------	---------------------	---	------------------	-------------------------------------	--------------------

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

FED-EX Airbill No.:
8480 2694 7580

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.testamericainc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

60-003

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE <i>NAPR Investigations</i>	PROJECT NO. <i>11162E</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS										PAGE <i>1</i>	OF <i>1</i>
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER <i>412.337.7465</i>	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	APP. IX. VOC	APP. IX. SVOC	APP. IX. METALS	APP. TPA DRO	TPH GRC	APP. IX. PEST	APP. IX. PCB	TOC	LLPAH	APP. IX. METALS <i>Dissolved</i>	STANDARD REPORT DELIVERY	DATE DUE <i>28 DAY DAT</i>
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE	CLIENT FAX		PRESERVATIVE										EXPEDITED REPORT DELIVERY (SURCHARGE)	DATE DUE
CLIENT NAME <i>Michael Baker Jr., Inc.</i>	CLIENT E-MAIL <i>mkimes@mbakercorp.com</i>													NUMBER OF COOLERS SUBMITTED PER SHIPMENT:	
CLIENT ADDRESS <i>100 Riverside Drive, Moon TWP, PA, 15108</i>	COMPANY CONTRACTING THIS WORK (if applicable)													REMARKS	

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED										REMARKS
DATE	TIME																	
<i>1/15/09</i>	<i>1030</i>	<i>60 GW 04</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>2</i>					
	<i>1045</i>	<i>60 GW 04 D</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>2</i>					
	<i>1045</i>	<i>60 GW 04 MS</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>2</i>					
<i>1/15/09</i>	<i>1045</i>	<i>60 GW 04 MSD</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>2</i>					

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/16/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/16/09</i>	TIME <i>0700</i>	RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY								
RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>01/17/09</i>	TIME <i>10⁰⁰</i>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>44002</i> <i>6804399/OK 1/17</i>	LABORATORY REMARKS <i>0.1/0.4/1.1/1.6/2.0/0.1</i>	TEMI	

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

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60-004

Alternate Laboratory Name/Location

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PROJECT REFERENCE <i>NAPR Investigations</i>		PROJECT NO. <i>111626</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS								PAGE <i>1</i>	OF <i>1</i>
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>		P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	APP. IX VOC	APP. IX SUOC	APP. IX LEAD'S	TPH DRO	TPH GRO	APP. IX METALS	APP. IX METALS(D)	APP. IX PEST	APP. IX PCB	STANDARD REPORT DELIVERY
CLIENT (SITE) PM <i>Mark Kimes</i>		CLIENT PHONE <i>412.337.7465</i>	CLIENT FAX											DATE DUE <i>28 DAY TAT</i>
CLIENT NAME <i>Michael Baker Jr. Inc.</i>		CLIENT E-MAIL <i>m.kimes@mbakercorp.com</i>												EXPEDITED REPORT DELIVERY (SURCHARGE)
CLIENT ADDRESS <i>100 Airside Dr., Moon Twp. PA., 15108</i>		COMPANY CONTRACTING THIS WORK (if applicable)												DATE DUE
PRESERVATIVE														NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED								REMARKS
DATE	TIME							1	2	3	4	5	6	7	8	
<i>1/18/09</i>	<i>0815</i>	<i>60GW05</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>2</i>	<i>2</i>	<i>3</i>	<i>1</i>	<i>1</i>	<i>2</i>	<i>Temps: 1.4/1.1/1.6/1.0 0.1/1.6/1.1/1.0 0.4/0.1/1.0/1.0 1.4/1.1/1.6/1.0 0.2/3.0/1.0</i>		
<i>1/18/09</i>	<i>1025</i>	<i>60GW02</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>2</i>	<i>2</i>	<i>3</i>	<i>1</i>	<i>1</i>	<i>2</i>			
<i>1/17/09</i>		<i>JAN 09 TBO6</i>	<i>G</i>	<i>X</i>			<i>2</i>			<i>2</i>						
		<i>60SD01</i>	<i>G</i>	<i>X</i>				<i>1</i>			<i>1</i>		<i>X</i>			
		<i>60SD02</i>	<i>G</i>	<i>X</i>				<i>1</i>			<i>1</i>		<i>X</i>			
		<i>60SD03</i>	<i>G</i>	<i>X</i>				<i>1</i>			<i>1</i>		<i>X</i>			
		<i>60SD03D</i>	<i>G</i>	<i>X</i>				<i>1</i>					<i>X</i>			

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
<i>[Signature]</i>	<i>1/19/09</i>	<i>1500</i>	<i>[Signature]</i>	<i>1/19/09</i>	<i>1500</i>	<i>[Signature]</i>		
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
<i>[Signature]</i>	<i>1/12/09</i>	<i>0700</i>	<i>[Signature]</i>			<i>[Signature]</i>		

LABORATORY USE ONLY								
RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS		
<i>[Signature]</i>	<i>012009</i>	<i>0857</i>			<i>68044016</i>			

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PROJECT REFERENCE <i>MAPR Investigations</i>		PROJECT NO. <i>111625</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS							PAGE	OF
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>		P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	APP. EX VOC	APP. EX SVOC	APP. EX METALS	TPH GRO	TPH DRO	APP. PEST	APP. PCB	STANDARD REPORT DELIVERY <input checked="" type="radio"/>	
CLIENT (SITE) PM <i>Mark Kimes</i>		CLIENT PHONE <i>412-337-7465</i>	CLIENT FAX									DATE DUE <i>28 DAY TAT</i>	
CLIENT NAME <i>Michael Baker Jr., Inc.</i>		CLIENT E-MAIL <i>MKimes@mbakercorp.com</i>										EXPEDITED REPORT DELIVERY (SURCHARGE) <input type="radio"/>	
CLIENT ADDRESS <i>100 Airside Drive Moon Twp, PA. 15108</i>		COMPANY CONTRACTING THIS WORK (if applicable)										DATE DUE _____	
					PRESERVATIVE							NUMBER OF COOLERS SUBMITTED PER SHIPMENT:	

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED							REMARKS
DATE	TIME							1	2	3	4	5	6	7	
<i>1/14/09</i>	<i>0915</i>	<i>70 SB 01 - 00</i>	<i>G</i>	<i>+</i>			<i>X</i>	<i>1</i>	<i>1</i>	<i>X</i>	<i>✓</i>	<i>✓</i>	<i>✓</i>	<i>VOC + GRO added to all samples per M. Baker KS 1/19/09</i>	
<i>1/14/09</i>	<i>0940</i>	<i>70 SB 01 - 01</i>	<i>G</i>	<i>+</i>			<i>X</i>	<i>1</i>	<i>1</i>	<i>X</i>	<i>✓</i>	<i>✓</i>	<i>✓</i>		
<i>1/14/09</i>	<i>1115</i>	<i>70 SB 02 - 00</i>	<i>G</i>	<i>+</i>			<i>X</i>	<i>1</i>	<i>1</i>	<i>X</i>	<i>✓</i>	<i>✓</i>	<i>✓</i>		
<i>1/14/09</i>	<i>1130</i>	<i>70 SB 02 - 01</i>	<i>G</i>	<i>+</i>			<i>X</i>	<i>1</i>	<i>1</i>	<i>X</i>	<i>✓</i>	<i>✓</i>	<i>✓</i>		
		<i>Jan 09 - TB02</i>					<i>X</i>			<i>X</i>				<i>TB added to ccc per MBaker. KS 1/19/09</i>	

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/14/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/14/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/12/09</i>	TIME <i>0700</i>	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY								
RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>011509</i>	TIME	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>68043925</i>	LABORATORY REMARKS <i>temp 1.8/2.8</i>		

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

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PROJECT REFERENCE <i>NAPR Investigations</i>	PROJECT NO. <i>111626</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS						PAGE <i>1</i>	OF <i>2</i>	
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	APP IX VOC	APP IX SUBC	APP IX METALS	TPH DRO	TPH G-RO	APP IX. PEST	APP IX. PCB	STANDARD REPORT DELIVERY <input checked="" type="checkbox"/>	
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE <i>412.337.7465</i>	CLIENT FAX		PREPRESERVATIVE								DATE DUE <i>28 DAY TAT</i>
CLIENT NAME <i>Michael Baker Tr, Inc</i>	CLIENT E-MAIL <i>M.Kimes@mbakercorp.com</i>											EXPEDITED REPORT DELIVERY (SURCHARGE) <input type="checkbox"/>
CLIENT ADDRESS <i>100 Airside Dr. Moon Twp, PA. 15708</i>	COMPANY CONTRACTING THIS WORK (if applicable)											DATE DUE _____

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED						REMARKS
DATE	TIME													
<i>1/14/09</i>	<i>1420</i>	<i>70 SB 03 - 00</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>		
<i>1/14/09</i>	<i>1445</i>	<i>70 SB 03 - 01</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>		
<i>1/15/09</i>	<i>0845</i>	<i>70 SB 04 - 00</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>		
	<i>0845</i>	<i>70 SB 04 - 00 D</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>		
	<i>0845</i>	<i>70 SB 04 - 00 MS</i>	<i>G</i>	<i>X</i>			<i>3</i>				<i>3</i>			
	<i>0845</i>	<i>70 SB 04 - 00 MS/MSD</i>	<i>G</i>	<i>X</i>				<i>1</i>	<i>1</i>	<i>✓</i>		<i>✓</i>		
	<i>0915</i>	<i>70 SB 04 - 01</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>		
	<i>0915</i>	<i>70 SB 04 - 01 D</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>		
	<i>0915</i>	<i>70 SB 04 - 01 MS</i>	<i>G</i>	<i>X</i>			<i>3</i>				<i>3</i>			
	<i>0915</i>	<i>70 SB 04 - 01 MSD</i>	<i>G</i>	<i>X</i>			<i>3</i>				<i>3</i>			
<i>1/15/09</i>	<i>0915</i>	<i>70 SB 04 - 01 MS/MSD</i>	<i>G</i>	<i>X</i>				<i>1</i>	<i>1</i>	<i>✓</i>		<i>✓</i>		
<i>1/14/09</i>		<i>JAN 09 - TB 03</i>	<i>G</i>	<i>X</i>			<i>3</i>				<i>3</i>		<i>Trip Blank</i>	

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/15/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/15/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/12/09</i>	TIME <i>0700</i>	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>01/16/09</i>	TIME <i>0857</i>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>68043961</i>	LABORATORY REMARKS <i>temp 1.2/2.0/0.6/0.2</i>
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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

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PROJECT REFERENCE <i>NAPR Investigations</i>	PROJECT NO. <i>11626</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS								PAGE <i>2</i>	OF <i>2</i>
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	APP IX DOC	APP IX SUOC	APP IX METALS	TPH DRO	TPH GRO	APP IX PEST	APP IX PCB	STANDARD REPORT DELIVERY DATE DUE <i>28 JAN 2009</i>		
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE <i>412-337-7465</i>	CLIENT FAX		TPH DRO	TPH GRO	APP IX PEST	APP IX PCB	EXPEDITED REPORT DELIVERY (SURCHARGE) DATE DUE _____					
CLIENT NAME <i>Michael Baker Jr. Inc</i>	CLIENT E-MAIL <i>Mkimes@mbakercorp.com</i>			PRESERVATIVE								NUMBER OF COOLERS SUBMITTED PER SHIPMENT:	
CLIENT ADDRESS <i>100 Airside Drive Moon TWP, PA. 15108</i>	COMPANY CONTRACTING THIS WORK (if applicable)											REMARKS	

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED								REMARKS
DATE	TIME							1	2	3	4	5	6	7	8	
<i>1/14/09</i>	<i>1700</i>	<i>JAN 09 - FRO3</i>	<i>G X</i>					<i>3</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>2</i>	<i>2</i>	<i>Rinstate</i>	
<i>1/14/09</i>	<i>1625</i>	<i>JAN 09 - FB01</i>	<i>G X</i>					<i>3</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>2</i>	<i>2</i>	<i>Field Blank</i>	
<i>1/15/09</i>	<i>0845</i>	<i>70SB04 - 00 MSD</i>	<i>G X</i>					<i>3</i>				<i>3</i>				

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/15/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/15/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/12/09</i>	TIME <i>0700</i>	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY								
RECEIVED FOR LABORATORY BY (SIGNATURE) <i>[Signature]</i>	DATE <i>01/16/09</i>	TIME <i>0857</i>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>08043961</i>	LABORATORY REMARKS <i>Temp 1.2/2.0/0.6/0.2</i>		

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

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70-003

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PROJECT REFERENCE <i>NAPR Investigations</i>	PROJECT NO. <i>11628</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS								PAGE <i>1</i>	OF <i>1</i>	
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	<i>APP. IX. VOC</i>	<i>APP. IX. SUOC</i>	<i>APP. IX. METALS</i>	<i>TPH DRO</i>	<i>TPH GRO</i>	<i>APP. IX. PEST</i>	<i>APP. IX. PCB</i>	<i>TOC</i>	<i>LL PAH</i>	STANDARD REPORT DELIVERY <input checked="" type="radio"/>	
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE <i>412.337.7465</i>	CLIENT FAX		<i>PRESERVATIVE</i>										DATE DUE <i>08 PM TAT</i>
CLIENT NAME <i>Michael Baker Jr., Inc</i>	CLIENT E-MAIL <i>mkimes@mbakercorp.com</i>													EXPEDITED REPORT DELIVERY (SURCHARGE) <input type="radio"/>
CLIENT ADDRESS <i>100 Airside Drive Moon Twp, PA. 15108</i>	COMPANY CONTRACTING THIS WORK (if applicable)													DATE DUE _____

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED								REMARKS
DATE	TIME							3	1	1	✓	3	✓	✓	✓	
<i>1/15/09</i>	<i>1520</i>	<i>70 SD 06</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>	<i>include Toc</i>		
<i>1/15/09</i>	<i>1300</i>	<i>70 SD 07</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>	<i>include Toc</i>		
<i>1/15/09</i>	<i>1230</i>	<i>70 SD 08</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>1</i>	<i>1</i>	<i>✓</i>	<i>3</i>	<i>✓</i>	<i>include Toc</i>		
<i>1/15/09</i>	<i>1135</i>	<i>JAN09 - ER04</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>2</i>			
<i>1/15/09</i>		<i>JAN09 - TB04</i>	<i>G</i>	<i>X</i>				<i>2</i>			<i>2</i>	<i>2</i>				

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/16/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/16/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/17/09</i>	TIME <i>1500</i>	RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY								
RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>01/20/09</i>	TIME <i>10^{am}</i>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>68043991</i>	LABORATORY REMARKS <i>0.1/0.4/1.1/1.6/2.0/0.1</i>		

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

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9-003

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE <i>NAPR Investigations</i>	PROJECT NO. <i>111626</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS										PAGE <i>2</i> OF <i>4</i>		
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	PRESERVATIVE	TOC	METALS	METALS (CO)	PEST	PCB	TPH	DRO	GRO	WPATH	SUC	UOC	STANDARD REPORT DELIVERY
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE <i>412.337.7465</i>	CLIENT FAX														DATE DUE <i>AS DATA</i>
CLIENT NAME <i>Baker</i>	CLIENT E-MAIL <i>mkimes@mbakercorp.com</i>															EXPEDITED REPORT DELIVERY (SURCHARGE)
CLIENT ADDRESS <i>100 Airside Drive, Moon Twp, PA. 15108</i>	COMPANY CONTRACTING THIS WORK (if applicable)															DATE DUE
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:																

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED										REMARKS
DATE	TIME							1	2	3	4	5	6	7	8	9	10	
<i>1/19/09</i>	<i>0910</i>	<i>9SB41-05</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>								
<i>1/18/09</i>	<i>1040</i>	<i>9SB43-00</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/18/09</i>	<i>1010</i>	<i>9SB45-00</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/18/09</i>	<i>0930</i>	<i>9SB46-00</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/18/09</i>	<i>0930</i>	<i>9SB46-00D</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/19/09</i>	<i>1435</i>	<i>9SB47-00</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
	<i>1445</i>	<i>9SB47-03</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>								
	<i>1455</i>	<i>9SB47-04</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>								
	<i>1210</i>	<i>9SB53-00</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
	<i>1225</i>	<i>9SB53-04</i>	<i>G</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>								
<i>1/19/09</i>	<i>1235</i>	<i>9SB53-05</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>								
<i>1/18/09</i>		<i>JAN 09 TBO 7</i>	<i>G</i>	<i>X</i>			<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>								

RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/20/09</i>	TIME <i>1500</i>	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>1/12/09</i>	TIME <i>0700</i>	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY								
RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>[Signature]</i>	DATE <i>012109</i>	TIME <i>0957</i>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO. <i>68044044</i>	LABORATORY REMARKS		

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

FED Ex Airbill No.:
8480 2694 7466

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.testamericainc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

9-004

THE LEADER IN ENVIRONMENTAL TESTING

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE NAPR	PROJECT NO. 11162E	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS										PAGE 3	OF 4
TAL (LAB) PROJECT MANAGER Kathy E. Smith	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	PRESERVATIVE	MR. DOC	MR. SUOC	MR. UPAH	TPH DRO	TPH GRO	MR. METALS	NETHS (D)	MR. PEST	MR. PCB	STANDARD REPORT DELIVERY	
CLIENT (SITE) PM MARK Kimes	CLIENT PHONE 412.337.7465	CLIENT FAX												DATE DUE 28 DAY TAT	
CLIENT NAME BAKER	CLIENT E-MAIL mkimes@mbakercorp.com													EXPEDITED REPORT DELIVERY (SURCHARGE)	
CLIENT ADDRESS 100 Arside Drive, Moon Twp. PA. 15108														DATE DUE _____	
COMPANY CONTRACTING THIS WORK (if applicable)													NUMBER OF COOLERS SUBMITTED PER SHIPMENT:		

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED										REMARKS
DATE	TIME							1	2	3	4	5	6	7	8	9	10	
1/20/09	1210	9SB51-01	G	X			3		1	X	3							
		9TW40 9GW40	X				3		2	2	3							
		9PW41 9GW41	X				3		2	2	3							
		9PW41D 9GW41D	X				3		2	2	3							
1/20/09		9PW42 9GW42	X				3		2	2	3							
1/20/09		JAN 09 FB02	X				3	2	2	2	3	1	X	2				
1/20/09		JAN 09 TB09	X				3		2	2	3							
1/20/09		JAN 09 ERO8	X				3	2	2	2	3							per Baker, run
1/21/09		9SD 70	X				3		1	X	3	1						82706 AP9
		9SD 71	X				3		1	X	3	1						KS 1/22/09
		9SD 72	X				3		1	X	3	1						
1/21/09		9SD 75	G	X			3		1	X	3	1						

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
				1/21/09	1500			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
	1/21/09	0900						

LABORATORY USE ONLY							
RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS	
	012210	0857	YES <input type="radio"/> NO <input type="radio"/>		6804077		

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

FED Ex Airbill No.:
8617 8652 6973

TestAmerica Savannah
5102 LaRoche Avenue
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9-005

Alternate Laboratory Name/Location

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Fax:

THE LEADER IN ENVIRONMENTAL TESTING

PROJECT REFERENCE <i>NARR Investigations</i>	PROJECT NO. <i>11625</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS								PAGE 1	OF 1	
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	DOC	SUC	PAH	DRO	GRO	METALS	METALS	TEMP Volatiles	Benzene	RCI	STANDARD REPORT DELIVERY
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE <i>412.337.7465</i>	CLIENT FAX		REX	REX	REX	TPH	GRO	METALS	TEMP METALS	TEMP Volatiles	Benzene	RCI	DATE DUE <i>28 DAY TAT</i>
CLIENT NAME <i>BAKER</i>	CLIENT E-MAIL <i>mkimes@mbakercorp.com</i>													EXPEDITED REPORT DELIVERY (SURCHARGE)
CLIENT ADDRESS <i>100 Airside Drive, Moon Twp, PA. 15108</i>														DATE DUE
COMPANY CONTRACTING THIS WORK (if applicable)				PRESERVATIVE										NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED											REMARKS
DATE	TIME																		
<i>1/21/09</i>	<i>1030</i>	<i>JAN 09 ER 09</i>	<i>G X</i>					<i>3</i>	<i>2</i>	<i>2</i>	<i>3</i>	<i>1</i>						<i>Equipment RIMSATE Bucket Auger</i>	
<i>1/21/09</i>		<i>JAN 09 TB 10</i>	<i>G X</i>					<i>2</i>			<i>2</i>								
<i>1/21/09</i>	<i>1400</i>	<i>9SB49-00</i>	<i>G X</i>					<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/21/09</i>	<i>1210</i>	<i>9GW47</i>	<i>G X</i>					<i>3</i>	<i>2</i>	<i>2</i>	<i>3</i>								
<i>1/21/09</i>	<i>1405</i>	<i>9GW53</i>	<i>G X</i>					<i>3</i>	<i>2</i>	<i>2</i>	<i>3</i>								
<i>1/21/09</i>	<i>1455</i>	<i>9GW39</i>	<i>G X</i>					<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>								
<i>1/22/09</i>	<i>0930</i>	<i>JAN 09 - IDW 01</i>	<i>G X</i>										<i>1</i>	<i>1</i>				<i>Soil</i>	
<i>1/22/09</i>	<i>1000</i>	<i>JAN 09 - IDW 02</i>	<i>G X</i>										<i>1</i>					<i>Water</i>	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
			<i>[Signature]</i>	<i>1/22/09</i>	<i>1500</i>			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
<i>[Signature]</i>	<i>1/22/09</i>	<i>0700</i>						

LABORATORY USE ONLY								
RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS		
<i>[Signature]</i>	<i>012409</i>	<i>1020</i>			<i>68044155</i>	<i>1.4/0.8/1.6 TEMP</i>		

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

Fed Ex Airbill No. 8480 2694 7455

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Savannah
5102 LaRoche Avenue
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CAB-002

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE <i>NTR Investigations</i>	PROJECT NO. <i>111625</i>	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS										PAGE <i>1</i>	OF <i>2</i>
TAL (LAB) PROJECT MANAGER <i>Kathy E. Smith</i>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	APEX VOC	APEX SUOC	APEX PAH	TPH DRO	TPH GRO	METALS	METALS (D)	PEST	PCB	TOC	STANDARD REPORT DELIVERY	
CLIENT (SITE) PM <i>Mark Kimes</i>	CLIENT PHONE <i>412-337-7465</i>	CLIENT FAX												DATE DUE <i>28 DAY TA</i>	
CLIENT NAME <i>Baker</i>	CLIENT E-MAIL <i>MKimes@mbakercorp.com</i>													EXPEDITED REPORT DELIVERY (SURCHARGE)	
CLIENT ADDRESS <i>100 Arside Drive, Moon Twp, PA. 15108</i>														DATE DUE _____	
COMPANY CONTRACTING THIS WORK (if applicable)			PRESERVATIVE										NUMBER OF COOLERS SUBMITTED PER SHIPMENT:		

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED										REMARKS	
DATE	TIME							1	2	3	4	5	6	7	8	9	10		
<i>1/19/09</i>	<i>1415</i>	<i>CAB SED 01</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/18/09</i>	<i>1600</i>	<i>CAB SED 02</i>	<i>G</i>					<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/18/09</i>	<i>1600</i>	<i>CAB SED 02 D</i>	<i>G</i>					<i>3</i>	<i>1</i>	<i>X</i>	<i>3</i>	<i>1</i>							
<i>1/18/09</i>	<i>1600</i>	<i>CAB SED 02 MS</i>	<i>G</i>					<i>3</i>			<i>3</i>								
<i>1/18/09</i>	<i>1600</i>	<i>CAB SED 02 MSD</i>	<i>G</i>					<i>3</i>			<i>3</i>								
<i>1/18/09</i>	<i>1600</i>	<i>CAB SED 02 MS/MSD</i>	<i>G</i>						<i>1</i>	<i>X</i>		<i>1</i>							
<i>1/19/09</i>	<i>0930</i>	<i>CAB CCO1</i>	<i>G</i>					<i>1</i>	<i>1</i>			<i>X</i>							
<i>1/19/09</i>	<i>1230</i>	<i>CAB CCO2</i>	<i>G</i>					<i>1</i>	<i>1</i>			<i>X</i>							
<i>1/19/09</i>	<i>1230</i>	<i>CAB CCO2</i>	<i>G</i>																
<i>1/19/09</i>	<i>1230</i>	<i>CAB CCO2 D</i>	<i>G</i>					<i>1</i>	<i>1</i>			<i>X</i>							
<i>1/19/09</i>	<i>1230</i>	<i>CAB CCO2 MS/MSD</i>	<i>G</i>	<i>X</i>				<i>1</i>	<i>1</i>			<i>X</i>							
<i>1/17/09</i>	<i>0900</i>	<i>JAN 09 ER 06</i>	<i>G</i>	<i>X</i>				<i>3</i>	<i>2</i>	<i>2</i>	<i>3</i>	<i>1</i>	<i>2</i>	<i>X</i>					<i>Equip. Rinsate Spoon</i>

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
			<i>[Signature]</i>	<i>1/20/09</i>	<i>1500</i>			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
<i>[Signature]</i>	<i>1/12/09</i>	<i>0700</i>						

LABORATORY USE ONLY							
RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS	
<i>[Signature]</i>	<i>012109</i>	<i>0957</i>	YES <input type="radio"/> NO <input type="radio"/>		<i>62044044</i>	<i>Emps: 1.6/0.1/0.1/0.2/0.1/0.6/0.1/1.0/0.1</i>	

680-44056

IDW ANALYTICAL RESULTS

APPENDIX A

SUMMARY OF ANALYTICAL RESULTS - IDW SOIL SWMU 60 - FORMER LANDFILL AT THE MARINA PHASE I RFI REPORT NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID JAN09-IDW01
Sampling Date 1/22/2009

TCLP VOCs (mg/L)

Benzene	0.0064 U
2-Butanone (MEK)	0.017 J
Carbon tetrachloride	0.0054 U
Chlorobenzene	0.0068 U
Chloroform	0.0058 U
1,2-Dichloroethane	0.0062 U
1,1-Dichloroethene	0.0072 U
Tetrachloroethene	0.0056 U
Trichloroethene	0.008 U
Vinyl chloride	0.004 U

TCLP Metals (mg/L)

Arsenic	0.059 U
Barium	0.25 J
Cadmium	0.0053 U
Chromium	0.013 U
Lead	0.052 JB
Selenium	0.036 U
Silver	0.0053 J
Mercury	0.008 U

General Chemistry

Ignitability - mm/sec	NB
Cyanide, Total - mg/Kg	0.31 U
Sulfide - mg/Kg	32 U
pH - SU	7.8

Notes:

- U: Undetected at the Limit of Detection.
- J: Estimated: The analyte was positively identified; the quantitation is an estimation
- B: Blank contamination: The analyte was detected above one-half the reporting limit in an associated blank.
- NB: No burn

APPENDIX A

SUMMARY OF ANALYTICAL RESULTS - IDW WATER SWMU 60 - FORMER LANDFILL AT THE MARINA PHASE I RFI REPORT NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID JAN09-IDW02
Sampling Date 1/22/2009

Metals (ug/L)

Antimony	2.1 JB
Arsenic	6.6
Barium	1200
Beryllium	1.2
Cadmium	0.96
Chromium	120
Cobalt	210 B
Copper	310
Lead	16
Nickel	150
Selenium	0.6 U
Silver	0.09 U
Thallium	0.55 U
Tin	1.4 J
Vanadium	160
Zinc	820
Mercury	0.08 U

General Chemistry

Flashpoint - Degrees F	>140
Cyanide, Total - mg/L	0.0057 J
Sulfide - mg/L	1 U
pH - SU	9.9 H

Notes:

- U: Undetected at the Limit of Detection.
- H: Sample was prepped or analyzed beyond the specified holding time
- J: Estimated: The analyte was positively identified; the quantitation is an estimation
- B: Blank contamination: The analyte was detected above one-half the reporting limit in an associated blank.

APPENDIX B
SUMMARY OF ANALYTICAL RESULTS FROM 1999 SITE
CHARACTERIZATION

TABLE B-1

Summary of TEG Laboratory Soil Analytical Results
 Marina, Roosevelt Roads, U.S. Naval Station, Ceiba, Puerto Rico

Soil Boring	Date Sampled	TEG Laboratory		
		EPA Method 8015M (GRO) TPH (mg/kg)	EPA Method 8015M (DRO) TPH (mg/kg)	EPA Method 8020 Total BTEX (mg/kg)
Marina-SB-1 (4-6')	5/5/99	<10	<25	<0.30
Marina-SB-2 (2-4')	5/5/99	<10	<25	<0.30
Marina-SB-3 (2-4')	5/6/99	3,200	<25	426.2
Marina-SB-4 (0-2')	5/6/99	600	<25	66.5
Marina-SB-5 (0-2')	5/6/99	3,100	<25	464.6
Marina-SB-6 (0-2')	5/6/99	610	<25	58.96
Marina-SB-7 (2-4')	5/6/99	<10	<25	1.97
Marina-SB-8 (0-2')	5/6/99	<10	<25	<0.30
Marina-SB-9 (0-2')	5/6/99	<10	<25	<0.30
Marina-SB-10	NC	NC	NC	NC
Marina-SB-11 (2-4')	5/7/99	<10	<25	<0.30
Marina-SB-12 (0-2')	5/10/99	<10	<25	<0.30
PREQB UST Target Levels		100	100	NS
Notes:	PREQB =	Puerto Rico Environmental Quality Board		
	TPH =	Total Petroleum Hydrocarbons		
	Total BTEX =	Sum of Benzene, Toluene, Ethylbenzene, and Xylene Concentrations		
	mg/kg =	Milligrams per Kilogram		
	NS =	No Standards in Puerto Rico		
	UST =	Underground Storage Tanks		
	NC =	Not Collected		
	EPA =	Environmental Protection Agency		
	8015M (GRO) =	EPA Method 8015M Gasoline Range Organics		
	8015M (DRO) =	EPA Method 8015M Diesel Range Organics		
	NA =	Not analyzed		

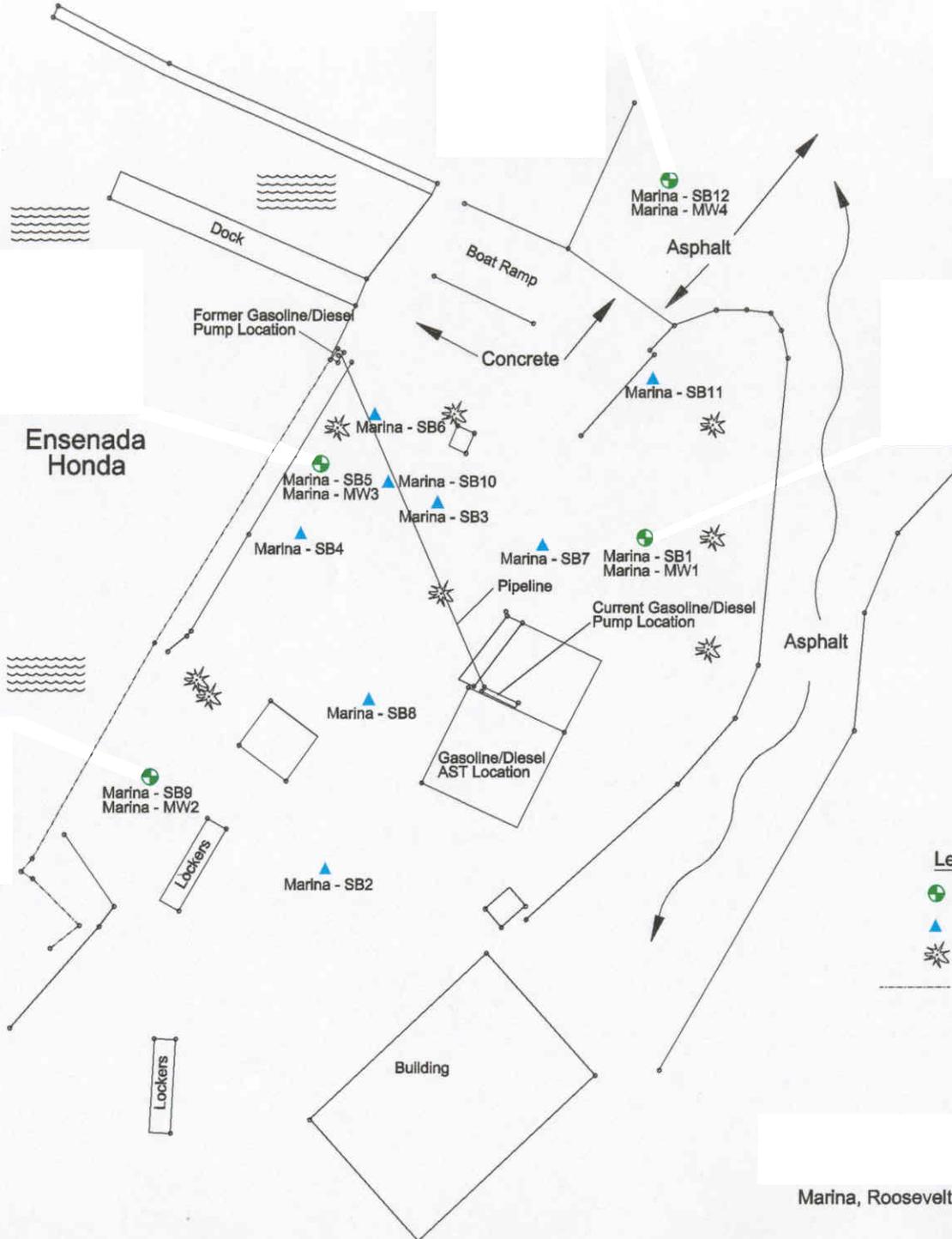
TABLE B-2
 Summary of Groundwater Analytical Results
 Marina, Roosevelt Roads, U.S. Naval Station, Ceiba, Puerto Rico

Parameters	PREBQ Target Levels	U.S. EPA MCL	Marina- MW-1	Marina- MW-2	Marina- MW-3	Marina- MW-4
Date Sampled			7/13/99	7/13/99	7/13/99	7/13/99
Benzene (µg/L)	5.0	1.0	<5	<5	190	<5
Toluene (µg/L)	1,000	1,000	<5	<5	160	<5
Ethylbenzene (µg/L)	700	700	<5	<5	180	<5
Total Xylenes (µg/L)	10,000	10,000	<15	<15	270	<15
Total BTEX (µg/L)	50,000	NS	<30	<30	800	<30
TPH (GRO) (µg/L)	50,000	NS	<10,000	<10,000	12,000	<10,000
TPH (DRO) (µg/L)	50,000	NS	<25,000	<25,000	<25,000	<25,000
PNA (µg/L)	NS	NS	*	**	***	****
Lead (µg/L) Unfiltered	15	15	1400	460	250	1400
Lead (µg/L) Filtered (45 micron filter)	15	15	830	490	270	1300

Notes:

- µg/L = Micrograms per Liter
- PREQB = Puerto Rico Environmental Quality Board
- Total BTEX = Sum of Benzene, Toluene, Ethylbenzene, and Xylenes
- TPH (GRO) = EPA Method 8015M Gasoline Range Organics
- TPH (DRO) = EPA Method 8015M Diesel Range Organics
- PAH = Polynuclear Aromatic Hydrocarbon (excluding total naphthalene's)
- NS = No Standard
- NA = Not Collected or Analyzed
- MCL = Maximum Contaminant Level
- BDL = Below Detection Levels
- * = Detected Benzo(b)Fluoranthene/Benzo(k)Fluoranthene, Benzo (a) Pyrene, and Dibenzo(ah)Anthracene-Indeno (1, 2, 3-cd) Pyrene at concentrations of 0.07, 0.57, and 0.15 mg/L respectively
- ** = Detected Benzo(b)Fluoranthene/Benzo(k)Fluoranthene, and Dibenzo(ah)Anthracene-Indeno (1, 2, 3-cd) Pyrene at concentrations of 0.05 and 0.19 mg/L respectively
- *** = Detected Naphthalene, Benzo(b)Fluoranthene/Benzo(k)Fluoranthene, and Dibenzo(ah)Anthracene-Indeno (1, 2, 3-cd) Pyrene at concentrations of 0.04, 0.32, and 0.09 mg/L respectively
- **** = Detected Dibenzo(ah)Anthracene-Indeno (1, 2, 3-cd) Pyrene at concentrations of 0.09 mg/L
- US EPA = United States Environmental Protection Agency

- General Notes:
- 1) The horizontal control are referred to an arbitrary system.
 - 2) The vertical control are referred to a mean sea level system (by USGS Datum).
 - 3) All distances and elevations are in feet.
 - 4) The survey was performed between September and October of 1998.



NTS

Legend

- Monitor Well/Soil Boring
- Soil Boring
- Palms
- Sea Wall

Marina, Roosevelt Roads Naval Station, Puerto Rico

CH2MHILL

APPENDIX C
SUMMARY OF ANALYTICAL RESULTS FROM PHASE II ECP

TABLE C-1

**SUMMARY OF ORGANIC DETECTIONS IN SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID	EPA Region III	EPA Region III	6E-03	6E-03	Number Exceeding	Range Exceeding	Number Exceeding	Range Exceeding	Location of
Sample ID	Industrial	Residential	6E-SS03	6E-SS03D	EPA Region III	EPA Region III	EPA Region III	EPA Region III	Maximum
Sample Date	RBCs	RBCs	05/07/04	05/07/04	Industrial	Industrial	Residential	Residential	Detection
Sample Depth (ft bgs)	(ug/kg)	(ug/kg)	0.00 - 0.50	0.00 - 0.50	RBCs	RBCs	RBCs	RBCs	
Volatile Organic Compounds (ug/kg)									
Chlorobenzene	2,000,000	160,000	4.5 U	2.5 J	0/2		0/2		6E-SS03D
Tetrachloroethene	5,300	1,200	4.5 U	2.2 J	0/2		0/2		6E-SS03D
Semivolatile Organic Compounds (ug/kg)									
Benzo(g,h,i)perylene	NE	NE	58 J	370 U	NE		NE		6E-SS03
Fluoranthene	4,100,000	310,000	57 J	42 J	0/2		0/2		6E-SS03
Indeno(1,2,3-cd)pyrene	3,900	870	58 J	370 U	0/2		0/2		6E-SS03
Pyrene	3,100,000	230,000	48 J	43 J	0/2		0/2		6E-SS03
Pesticides/PCBs (ug/kg)									
4,4'-DDE	8,400	1,900	2.8 J	3 J	0/2		0/2		6E-SS03D
4,4'-DDT	8,400	1,900	3.6 U	0.76 JP	0/2		0/2		6E-SS03D
OP-Pesticides (ug/kg)									
Not Detected									
Chlorinated Herbicides (ug/kg)									
Not Detected									

Notes:

J - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.

U - The compound was analyzed for, but was not detected at or above the MDL/PQL.

P - The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two GC columns or HPLC detectors.

NE - Not Established.

ft bgs - feet below ground surface.

ug/kg - micrograms per kilogram.

TABLE C-2

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID	EPA Region III Industrial RBCs (mg/kg)	EPA Region III Residential RBCs (mg/kg)	<u>2x Average</u> <u>Detected</u> <u>Background</u> (mg/kg)	6E-03 6E-SS03 05/07/04 0.00 - 0.50	6E-03 6E-SS03D 05/07/04 0.00 - 0.50	Number Exceeding EPA Region III Industrial RBCs	Range Exceeding EPA Region III Industrial RBCs	Number Exceeding EPA Region III Residential RBCs	Range Exceeding EPA Region III Residential RBCs	<u>Number</u> <u>Exceeding</u> <u>2x Average</u> <u>Detected</u> <u>Background</u>	<u>Range</u> <u>Exceeding</u> <u>2x Average</u> <u>Detected</u> <u>Background</u>	Location of Maximum Detection
Appendix IX Inorganics (mg/kg)												
Arsenic	1.9	0.43	2.4	2.1	2.1	2/2	2.1 - 2.1	2/2	2.1 - 2.1	0/2		63-SS03, 6E-SS03D
Barium	7,200	550	181	110	89	0/2		0/2		0/2		6E-SS03
Beryllium	200	16	0.45	0.22 B	0.22 B	0/2		0/2		0/2		63-SS03, 6E-SS03D
Cadmium	100	7.8	0.27	0.085 B	0.076 B	0/2		0/2		0/2		6E-SS03
Chromium	310	23	59.3	18	21	0/2		0/2		0/2		6E-SS03D
Cobalt	2,000	160	44.0	18 E	15 E	0/2		0/2		0/2		6E-SS03
Copper	4,100	310	234	91	98	0/2		0/2		0/2		6E-SS03D
Lead	400 ⁽¹⁾	400 ⁽¹⁾	125	15	16	0/2		0/2		0/2		6E-SS03D
Mercury	31 ⁽²⁾	2.3 ⁽²⁾	0.11	0.02	0.017 B	0/2		0/2		0/2		6E-SS03
Nickel	2,000	160	16.6	8.8	8.7	0/2		0/2		0/2		6E-SS03
Tin	61,000	4,700	2.43	2 B	<u>2.9</u> B	0/2		0/2		1/2	2.9B	6E-SS03D
Vanadium	100	7.8	355	120	120	0/2		2/2	120 - 120	0/2		63-SS03, 6E-SS03D
Zinc	31,000	2,300	125	60	63	0/2		0/2		0/2		6E-SS03D

- Notes:**
- B - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.
 - E - The reported value is an estimated because of the presence of matrix interference.
 - ⁽¹⁾ - 1996 Soil Screening Guidance.
 - ⁽²⁾ - Value based on the RBC for Mercuric Chloride.
 - NE - Not Established.
 - ft bgs - feet below ground surface.
 - mg/kg - milligrams per kilogram.

TABLE C-3

**SUMMARY OF ORGANIC DETECTIONS IN SUBSURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID	EPA Region III	EPA Region III	6E-01	6E-02	6E-03	Number Exceeding EPA	Range Exceeding EPA	Number Exceeding EPA	Range Exceeding EPA	Location of Maximum Detection
Sample ID	Industrial	Residential	6E-SB01-02	6E-SB02-01	6E-SB03-01	Region III	Region III	Region III	Region III	
Sample Date	RBCs	RBCs	05/07/04	05/07/04	05/07/04	Industrial	Industrial	Residential	Residential	
Sample Depth (ft bgs)	(ug/kg)	(ug/kg)	3.00 - 5.00	1.00 - 3.00	1.00 - 3.00	RBCs	RBCs	RBCs	RBCs	
Volatile Organic Compounds (ug/kg)										
Carbon disulfide	10,000,000	780,000	3.5 J	5.8 U	5.4 U	0/3		0/3		6E-SB01-02
Toluene	20,000,000	1,600,000	5.7 U	5.8 U	6.3	0/3		0/3		6E-SB03-01
Xylene	20,000,000	1,600,000	11 U	12 U	4.8 J	0/3		0/3		6E-SB03-01
Semivolatile Organic Compounds (ug/kg)										
Benzo(g,h,i)perylene	NE	NE	390 U	400 U	35 J	NE		NE		6E-SB03-01
Fluoranthene	4,100,000	310,000	390 U	400 U	77 J	0/3		0/3		6E-SB03-01
Pyrene	3,100,000	230,000	42 J	400 U	58 J	0/3		0/3		6E-SB03-01
Pesticides/PCBs (ug/kg)										
4,4'-DDD	12,000	2,700	30	1.5 J	41	0/3		0/3		6E-SB03-01
4,4'-DDE	8,400	1,900	46	14	60	0/3		0/3		6E-SB03-01
4,4'-DDT	8,400	1,900	210 D	0.98 J	1.2 JP	0/3		0/3		6E-SB01-02
OP-Pesticides (ug/kg)										
Not Detected										
Chlorinated Herbicides (ug/kg)										
Not Detected										

Notes:

J - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.

U - The compound was analyzed for, but was not detected at or above the MDL/PQL.

P - The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two GC columns or HPLC detectors.

D - The reported result is from a secondary dilution.

NE - Not Established.

ft bgs - feet below ground surface.

ug/kg - micrograms per kilogram.

TABLE C-4

**SUMMARY OF INORGANIC DETECTIONS IN SUBSURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID Sample ID Sample Date Sample Depth (ft bgs)	EPA Region III Industrial RBCs (mg/kg)	EPA Region III Residential RBCs (mg/kg)	<u>2x Average</u> <u>Detected</u> <u>Background</u> (mg/kg)	6E-01 6E-SB01-02 05/07/04 3.00 - 5.00	6E-02 6E-SB02-01 05/07/04 1.00 - 3.00	6E-03 6E-SB03-01 05/07/04 1.00 - 3.00	Number Exceeding EPA Region III Industrial RBCs	Range Exceeding EPA Region III Industrial RBCs	Number Exceeding EPA Region III Residential RBCs	Range Exceeding EPA Region III Residential RBCs	<u>Number</u> <u>Exceeding</u> <u>2x Average</u> <u>Detected</u> <u>Background</u>	<u>Range</u> <u>Exceeding</u> <u>2x Average</u> <u>Detected</u> <u>Background</u>	Location of Maximum Detection
Appendix IX Inorganics (mg/kg)													
Antimony	41,000	3,100	2.8	2.3 U	1.4 B	2.3 U	0/3		0/3		0/3		6E-SB02-01
Arsenic	1.9	0.43	2.05	1.6	3.3	2.9	2/3	2.9 - 3.3	3/3	1.6 - 3.3	2/3	2.9 - 3.3	6E-SB02-01
Barium	7,200	550	222	76	62	49	0/3		0/3		0/3		6E-SB01-02
Beryllium	200	16	0.74	0.17 B	0.11 B	0.16 B	0/3		0/3		0/3		6E-SB01-02
Cadmium	100	7.8	0.74	0.28 B	0.31 B	0.22 B	0/3		0/3		0/3		6E-SB02-01
Chromium	310	23	133	12	14	16	0/3		0/3		0/3		6E-SB03-01
Cobalt	2,000	160	30.0	11 E	6.4 E	9.4 E	0/3		0/3		0/3		6E-SB01-02
Copper	4,100	310	193	84	82	65	0/3		0/3		0/3		6E-SB01-02
Lead	400 ⁽¹⁾	400 ⁽¹⁾	8.68	<u>20</u>	<u>63</u>	<u>16</u>	0/3		0/3		3/3	16 - 63	6E-SB02-01
Mercury	31 ⁽²⁾	2.3 ⁽²⁾	0.093	0.057 S	0.03	0.025	0/3		0/3		0/3		6E-SB01-02
Nickel	2,000	160	31.9	6.2	4.9	8.3	0/3		0/3		0/3		6E-SB03-01
Sulfide	NE	NE	32.58	30 B	30 B	31 U	NE		NE		0/3		6E-SB01-02, 6E-SB02-01
Tin	61,000	4,700	2.96	<u>3.6</u> B	<u>4</u> B	2.6 B	0/3		0/3		2/3	3.6B - 4B	6E-SB02-01
Vanadium	100	7.8	462	94	47	68	0/3		3/3	47 - 94	0/3		6E-SB01-02
Zinc	31,000	2,300	88.6	<u>100</u>	<u>94</u>	56	0/3		0/3		2/3	94 - 100	6E-SB01-02

Notes:

B - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.

E - The reported value is an estimated because of the presence of matrix interference.

U - The compound was analyzed for, but was not detected at or above the MDL/PQL.

S - The result was determined by Method of Standard Addition.

⁽¹⁾ - 1996 Soil Screening Guidance.

⁽²⁾ - Value based on the RBC for Mercuric Chloride.

NE - Not Established.

ft bgs - feet below ground surface.

mg/kg - milligrams per kilogram.

TABLE C-5

**SUMMARY OF ORGANIC DETECTIONS IN GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID Sample ID Sample Date	Federal MCLs (ug/L)	EPA Region III Tap Water RBCs (ug/L)	PR Water Quality Standards (ug/L)	6E-01 6E-GW01 05/09/04	6E-02 6E-GW02 05/09/04	Number Exceeding Federal MCLs	Range Exceeding Federal MCLs	Number Exceeding EPA Region III Tap Water RBCs	Range Exceeding EPA Region III Tap Water RBCs	Number Exceeding PR Water Quality Standards	Range Exceeding PR Water Quality Standards	Location Maximum Detection
Volatile Organic Compounds (ug/L)												
Acetone	NE	550	NE	7.8 J	25 U	NE		0/2		NE		6E-GW01
2-Butanone	NE	700	NE	1.8 J	10 U	NE		0/2		NE		6E-GW01
Carbon disulfide	NE	100	NE	0.77 J	1 U	NE		0/2		NE		6E-GW01
Toluene	1,000	75	1,000	0.93 J	0.93 J	0/2		0/2		0/2		6E-GW01, 6E-GW02
Semivolatile Organic Compounds (ug/L)												
Cresol, m & p	NE	NE	NE	5 J	10 U	NE		NE		NE		6E-GW01
Pesticides/PCBs (ug/L)												
Not Detected												
OP-Pesticides (ug/L)												
Not Detected												
Chlorinated Herbicides (ug/L)												
Not Detected												

Notes:
 J - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.
 U - The compound was analyzed for, but was not detected at or above the MDL/PQL.
 ug/L - micrograms per liter.
 NE - Not Established.

TABLE C-6

**SUMMARY OF (DISSOLVED) INORGANIC DETECTIONS IN GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID Sample ID Sample Date	Federal MCLs (mg/L)	EPA Region III Tap Water RBCs (mg/L)	PR Water Quality Standards (mg/L)	6E-01 6E-GW01 05/09/04	6E-02 6E-GW02 05/09/04	Number Exceeding Federal MCLs	Range Exceeding Federal MCLs	Number Exceeding EPA Region III Tap Water RBCs	Range Exceeding EPA Region III Tap Water RBCs	Number Exceeding PR Water Quality Standards	Range Exceeding PR Water Quality Standards	Location Maximum Detection
Appendix IX Inorganics (mg/L)												
Barium	2	0.26	NE	0.18	0.33	0/2		1/2	0.33	NE		6E-GW02
Chromium	0.1	0.011	NE	0.0016 B	0.01 U	0/2		0/2		NE		6E-GW01
Cobalt	NE	0.073	NE	0.01 U	0.0084 B	NE		0/2		NE		6E-GW02
Copper	1.3 ⁽¹⁾	0.15	1.3	0.1 U	0.0075 B	0/2		0/2		0/2		6E-GW02
Mercury	0.002	0.0011 ⁽²⁾	0.002	0.00054 B	0.002 U	0/2		0/2		0/2		6E-GW01
Nickel	NE	0.073	NE	0.04 U	0.0049 B	NE		0/2		NE		6E-GW02
Vanadium	NE	0.0037	NE	0.015 B	0.0024 B	NE		1/2	0.015B	NE		6E-GW01

Notes:

B - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.

U - The compound was analyzed for, but was not detected at or above the MDL/PQL.

⁽¹⁾ - EPA action level.

⁽²⁾ - Value based on the Tap Water RBC for Mercuric Chloride.

NE - Not Established.

mg/L - milligrams per liter.

TABLE C-7

**SUMMARY OF ORGANIC DETECTIONS IN SEDIMENT
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID	Marine Sediment Screening Values (ug/kg)	6E-SW/SD01	6E-SW/SD02	Number Exceeding Marine Sediment Screening Values	Range Exceeding Marine Sediment Screening Values	Location of Maximum Detection
Sample ID		6E-SD01	6E-SD02			
Sample Date		05/14/04	05/14/04			
Sample Depth (ft bgs)		0.00 - 0.50	0.00 - 0.50			
Volatile Organic Compounds (ug/kg)						
Not Detected						
Semivolatile Organic Compounds (ug/kg)						
Benzo(a)anthracene	74.8	190 J	770 U	1/2	190J	6E-SD01
Benzo(a)pyrene	88.8	240 J	770 U	1/2	240J	6E-SD01
Benzo(b)fluoranthene	1,800	240 J	770 U	0/2		6E-SD01
Benzo(g,h,i)perylene	670	130 J	770 U	0/2		6E-SD01
Benzo(k)fluoranthene	1,800	250 J	770 U	0/2		6E-SD01
bis(2-Ethylhexyl)phthalate	182	370 J	770 U	1/2	370J	6E-SD01
Chrysene	108	230 J	770 U	1/2	230J	6E-SD01
Fluoranthene	113	270 J	770 U	1/2	270J	6E-SD01
Indeno(1,2,3-cd)pyrene	600	130 J	770 U	0/2		6E-SD01
Phenanthrene	86.7	72 J	770 U	0/2		6E-SD01
Pyrene	153	300 J	770 U	1/2	300J	6E-SD01
Pesticides/PCBs (ug/kg)						
4,4'-DDE	2.07	12	7.7 U	1/2	12	6E-SD01
OP-Pesticides (ug/kg)						
Not Detected						
Chlorinated Herbicides (ug/kg)						
Not Detected						

Notes:

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

TABLE C-8

**SUMMARY OF INORGANIC DETECTIONS IN SEDIMENT
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID	Marine Sediment Screening Values (mg/kg)	6E-SW/SD01	6E-SW/SD02	Number Exceeding Marine Sediment Screening Values	Range Exceeding Marine Sediment Screening Values	Location of Maximum Detection
Sample ID		6E-SD01	6E-SD02			
Sample Date		05/14/04	05/14/04			
Sample Depth (ft bgs)		0.00 - 0.50	0.00 - 0.50			
Appendix IX Inorganics (mg/kg)						
Arsenic	7.24	7.8	2.1 U	1/2	7.8	6E-SD01
Barium	48.0	18	9.4	0/2		6E-SD01
Beryllium	NA	0.14 B	0.83 U	NA		6E-SD01
Chromium	52.3	25	9.9	0/2		6E-SD01
Cobalt	10.0	4.6	2 B	0/2		6E-SD01
Copper	18.7	98	13	1/2	98	6E-SD01
Lead	30.2	20	5.8	0/2		6E-SD01
Mercury	0.13	0.15 S	0.043 U	1/2	0.15S	6E-SD01
Nickel	15.9	7.7	2.7 B	0/2		6E-SD01
Sulfide	NA	87	340	NA		6E-SD02
Tin	3.40	5.7 B	4.4 B	2/2	4.4B - 5.7B	6E-SD01
Vanadium	57.0	42	19	0/2		6E-SD01
Zinc	124	70	16	0/2		6E-SD01

Notes:

B - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.

S - The result was determined by Method of Standard Addition.

U - The compound was analyzed for, but was not detected at or above the MDL/PQL.

NA - Not Available.

ft bgs - feet below ground surface.

mg/kg - milligrams per kilogram.

TABLE C-9

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE WATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE II ECP REPORT
NAVAL ACTIVITY PUERTO RICO**

Site ID	PR Water Quality Standards (mg/L)	Surface Water Screening Values (mg/L)	6E-SW/SD01 6E-SW01 05/14/04	6E-SW/SD01 6E-SW01D 05/14/04	6E-SW/SD02 6E-SW02 05/14/04	6E-SW/SD02 6E-SW02D 05/14/04	Number Exceeding PR Water Quality Standards	Range Exceeding PR Water Quality Standards	Number Exceeding Surface Water Screening Values	Range Exceeding Surface Water Screening Values	Location Maximum Detection
Appendix IX (Total) Inorganics (mg/L)											
Barium	NE	50	0.007 B	0.0069 B	0.0069 B	0.0072 B	NE		0/4		6E-SW02D
Vanadium	NE	0.120 ⁽¹⁾	0.05 U	0.0043 B	0.05 U	0.05 U	NE		0/4		6E-SW01D

Notes:

B - The reported result is an estimated concentration that is less than the PQL, but greater than or equal to the MDL.

U - The compound was analyzed for, but was not detected at or above the MDL/PQL.

⁽¹⁾ - This chemical lacks a marine/estuarine surface water screening value. The value shown is a freshwater screening value.

NE - Not Established.

mg/L - milligrams per liter.

APPENDIX D
LABORATORY ANALYTICAL RESULTS

SURFACE SOIL

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0

Volatile Organic Compounds (ug/kg)

1,1,1,2-Tetrachloroethane	0.97 U	0.67 U	1.1 U	0.69 U	0.63 U	0.7 U
1,1,1-Trichloroethane	0.88 U	0.61 U	0.99 U	0.63 U	0.57 U	0.63 U
1,1,2,2-Tetrachloroethane	2.1 U	1.5 U	2.4 U	1.5 U	1.4 U	1.5 U
1,1,2-Trichloroethane	1.8 U	1.3 U	2 U	1.3 U	1.2 U	1.3 U
1,1-Dichloroethane	0.76 U	0.52 U	0.85 U	0.54 U	0.49 U	0.55 U
1,1-Dichloroethene	0.82 U	0.57 U	0.92 U	0.58 U	0.53 U	0.59 U
1,2,3-Trichloropropane	2.1 U	1.5 U	2.4 U	1.5 U	1.4 U	1.5 U
1,2-Dibromo-3-Chloropropane	4.2 U	2.9 U	4.8 U	3 U	2.7 U	3.1 U
1,2-Dichloroethane	1.5 U	1 U	1.7 U	1.1 U	0.98 U	1.1 U
1,2-Dichloropropane	1.7 U	1.2 U	1.9 U	1.2 U	1.1 U	1.2 U
2-Butanone (MEK)	4.1 U	2.8 U	4.6 U	2.9 U	2.6 U	4.4 U
2-Chloro-1,3-butadiene	0.87 U	0.6 U	0.97 U	0.61 U	0.56 U	0.62 U
2-Hexanone	3.2 U	2.2 U	3.6 U	2.3 U	2.1 U	2.3 U
3-Chloro-1-propene	2.3 U	1.6 U	2.6 U	1.6 U	1.5 U	1.6 U
4-Methyl-2-pentanone (MIBK)	4.4 U	3 U	5 U	3.1 U	2.8 U	3.2 U
Acetone	6.7 U	4.6 U	16 U	9.3 U	4.3 U	15 U
Acetonitrile	68 U	47 U	77 U	49 U	44 U	49 U
Acrolein	29 UJ	20 UJ	32 UJ	20 UJ	19 UJ	21 UJ
Acrylonitrile	35 UJ	24 UJ	39 UJ	25 UJ	23 UJ	25 UJ
Benzene	1.2 U	0.83 U	1.3 U	0.85 U	0.77 U	0.86 U
Bromoform	1.7 U	1.2 U	1.9 U	1.2 U	1.1 U	1.2 U
Bromomethane	2.4 U	1.7 U	2.7 U	1.7 U	1.6 U	1.7 U
Carbon disulfide	1.8 U	1.3 U	2 U	1.3 U	1.2 U	1.3 U
Carbon tetrachloride	1.5 U	1 U	1.7 U	1.1 U	0.98 U	1.1 U
Chlorobenzene	1.1 U	0.77 U	1.2 U	0.79 U	0.72 U	0.8 U
Chlorodibromomethane	0.76 U	0.52 U	0.85 U	0.54 U	0.49 U	0.55 U
Chloroethane	1.8 U	1.3 U	2 U	1.3 U	1.2 U	1.3 U
Chloroform	0.76 U	0.52 U	0.85 U	0.54 U	0.49 U	0.55 U
Chloromethane	1.1 U	0.74 U	1.2 U	0.77 U	0.7 U	0.78 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0

Volatile Organic Compounds (ug/kg)

cis-1,3-Dichloropropene	1.3 U	0.91 U	1.5 U	0.94 U	0.85 U	0.95 U
Dibromomethane	1.8 U	1.3 U	2 U	1.3 U	1.2 U	1.3 U
Dichlorobromomethane	1.3 U	0.87 U	1.4 U	0.9 U	0.81 U	0.91 U
Dichlorodifluoromethane	1.4 U	0.93 U	1.5 U	0.96 U	0.87 U	0.97 U
Ethyl methacrylate	3.3 U	2.3 U	3.8 U	2.4 U	2.2 U	2.4 U
Ethylbenzene	1.1 U	0.79 U	1.3 U	0.81 U	0.73 U	0.82 U
Ethylene Dibromide	2.3 U	1.6 U	2.6 U	1.6 U	1.5 U	1.6 U
Iodomethane	1.5 U	1 U	1.7 U	1.1 U	0.98 U	1.1 U
Isobutyl alcohol	100 U	72 U	120 U	74 U	68 U	75 U
Methacrylonitrile	36 U	25 U	41 U	26 U	24 U	26 U
Methyl methacrylate	5.6 U	3.9 U	6.3 U	4 U	3.6 U	4 U
Methylene Chloride	1.5 U	1 U	1.7 U	1.1 U	0.98 U	1.1 U
Pentachloroethane	3.3 U	2.3 U	3.8 U	2.4 U	2.2 U	2.4 U
Propionitrile	32 U	22 U	36 U	23 U	21 U	23 U
Styrene	1 U	0.69 U	1.1 U	0.71 U	0.65 U	0.72 U
Tetrachloroethene	1.1 U	0.77 U	1.2 U	0.79 U	0.72 U	0.8 U
Toluene	1.2 U	0.83 U	1.3 U	0.85 U	0.77 U	0.86 U
trans-1,2-Dichloroethene	1.5 U	1 U	1.7 U	1 U	0.95 U	1.1 U
trans-1,3-Dichloropropene	1.3 U	0.91 U	1.5 U	0.94 U	0.85 U	0.95 U
trans-1,4-Dichloro-2-butene	4.7 U	3.3 U	5.3 U	3.3 U	3 U	3.4 U
Trichloroethene	1.5 U	1 U	1.7 U	1.1 U	0.98 U	1.1 U
Trichlorofluoromethane	2.3 U	1.6 U	2.6 U	1.6 U	1.5 U	1.6 U
Vinyl acetate	2.3 U	1.6 U	2.6 UJ	1.6 UJ	1.5 U	1.6 U
Vinyl chloride	0.88 U	0.61 U	0.99 U	0.63 U	0.57 U	0.63 U
Xylenes, Total	3.5 U	2.4 U	3.9 U	2.5 U	2.3 U	2.5 U

Semivolatile Organic Compounds (ug/kg)

1,2,4,5-Tetrachlorobenzene	11 U	8.5 U	7.3 U	6.9 U	7.5 U	8.4 U
1,2,4-Trichlorobenzene	13 U	9.9 U	8.6 U	8.1 U	8.8 U	9.8 U
1,2-Dichlorobenzene	12 U	9.4 U	8.1 U	7.7 U	8.3 U	9.3 U

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Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Semivolatile Organic Compounds (ug/kg)						
1,3,5-Trinitrobenzene	29 UJ	23 UJ	20 U	19 UJ	20 UJ	23 U
1,3-Dichlorobenzene	10 U	8 U	7 U	6.6 U	7.2 U	8 U
1,3-Dinitrobenzene	6.7 U	5.2 U	4.5 U	4.3 U	4.7 U	5.2 U
1,4-Dichlorobenzene	11 U	8.3 U	7.2 U	6.8 U	7.4 U	8.2 U
1,4-Dioxane	14 U	11 U	9.3 U	8.8 U	9.5 U	11 U
1,4-Naphthoquinone	6.7 U	5.2 U	4.5 U	4.3 U	4.7 U	5.2 U
1-Naphthylamine	26 U	20 U	17 UJ	16 U	18 U	20 U
2,2'-oxybis[1-chloropropane]	11 U	8.5 U	7.3 U	6.9 U	7.5 U	8.4 U
2,3,4,6-Tetrachlorophenol	7.2 U	5.6 U	4.9 U	4.6 U	5 U	5.6 U
2,4,5-Trichlorophenol	12 U	9.1 U	7.9 UJ	7.5 U	8.1 U	9 U
2,4,6-Trichlorophenol	14 U	11 U	9.2 U	8.7 U	9.4 U	10 U
2,4-Dichlorophenol	14 U	11 U	9.4 U	8.9 U	9.7 U	11 U
2,4-Dimethylphenol	29 U	23 U	20 UJ	19 UJ	20 U	23 U
2,4-Dinitrophenol	140 UJ	110 UJ	96 U	91 UJ	99 UJ	110 U
2,4-Dinitrotoluene	10 U	7.9 U	6.8 UJ	6.5 U	7 U	7.8 U
2,6-Dichlorophenol	11 U	8.6 U	7.4 U	7 U	7.6 U	8.5 U
2,6-Dinitrotoluene	11 U	8.3 U	7.2 U	6.8 U	7.4 U	8.2 U
2-Acetylaminofluorene	8.8 U	6.8 U	5.9 U	5.6 U	6.1 U	6.8 U
2-Chloronaphthalene	11 U	8.3 U	7.2 U	6.8 U	7.4 U	8.2 U
2-Chlorophenol	11 U	8.9 U	7.7 U	7.2 U	7.9 U	8.8 U
2-Methylnaphthalene	2.9 U	2.3 U	2 U	1.9 U	2 U	150
2-Methylphenol	14 U	11 U	9.4 UJ	8.9 UJ	9.7 U	11 U
2-Naphthylamine	34 UJ	27 UJ	23 UJ	22 UJ	24 UJ	27 UJ
2-Nitroaniline	11 U	8.7 U	7.5 UJ	7.1 U	7.8 U	8.6 U
2-Nitrophenol	13 U	9.8 U	8.5 U	8 U	8.7 U	9.7 U
2-Picoline	21 U	16 U	14 U	13 U	14 U	16 U
2-Toluidine	16 U	12 U	11 U	10 U	11 U	12 U
3 & 4 Methylphenol	13 U	9.8 U	8.5 UJ	8 UJ	8.7 U	9.7 U
3,3'-Dichlorobenzidine	16 U	12 U	11 UJ	10 UJ	11 U	12 U

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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0

Semivolatile Organic Compounds (ug/kg)

3,3'-Dimethylbenzidine	310 UJ	240 U	210 UJ	200 UJ	210 UJ	240 UJ
3-Methylcholanthrene	10 U	8.2 U	7.1 U	6.7 U	7.3 U	8.1 U
3-Nitroaniline	7.7 U	6 U	5.2 UJ	4.9 U	5.4 U	6 U
4,6-Dinitro-2-methylphenol	10 UJ	7.8 UJ	6.7 UJ	6.4 UJ	6.9 UJ	7.7 U
4-Aminobiphenyl	22 U	17 U	15 U	14 U	16 U	17 U
4-Bromophenyl phenyl ether	12 U	9.5 U	8.2 U	7.8 U	8.5 U	9.4 U
4-Chloro-3-methylphenol	13 U	10 U	8.7 U	8.2 U	8.9 U	10 U
4-Chloroaniline	10 U	8 U	7 UJ	6.6 UJ	7.2 U	8 U
4-Chlorophenyl phenyl ether	11 U	8.3 U	7.2 U	6.8 U	7.4 U	8.2 U
4-Nitroaniline	13 U	10 U	8.9 U	8.4 U	9.2 U	10 U
4-Nitrophenol	57 U	44 U	38 U	36 U	39 U	44 U
4-Nitroquinoline-1-oxide	19 R	15 R	13 R	12 R	13 R	15 R
7,12-Dimethylbenz(a)anthracene	16 U	12 U	11 U	10 U	11 U	12 U
Acenaphthene	2.9 U	2.3 U	2 U	1.9 U	2 U	2.3 U
Acenaphthylene	2.9 U	2.3 U	2 U	1.9 U	4.4 J	2.3 U
Acetophenone	15 U	12 U	10 U	9.4 U	10 U	11 U
alpha,alpha-Dimethyl phenethylamine	100 U	79 U	68 U	65 U	70 U	78 U
Aniline	11 U	8.5 U	7.3 UJ	6.9 UJ	7.5 U	8.4 U
Anthracene	2.9 U	2.3 U	2 U	1.9 U	7.9 J	2.3 U
Aramite, Total	19 U	15 U	13 U	12 U	13 U	15 U
Benzo[a]anthracene	2.9 U	17	16 J	10 J	95	4 J
Benzo[a]pyrene	3 J	30	18 J	17 J	160	7.6 J
Benzo[b]fluoranthene	5.1 J	52	42 J	35 J	460	2.3 UJ
Benzo[g,h,i]perylene	2.9 UJ	17 J	23 J	17 J	100 J	10
Benzo[k]fluoranthene	2.9 U	2.3 U	2 U	1.9 U	2 U	2.3 U
Benzyl alcohol	14 U	11 U	9.3 U	8.8 U	9.5 U	11 U
Bis(2-chloroethoxy)methane	12 U	9.1 U	7.9 U	7.5 U	8.1 U	9 U
Bis(2-chloroethyl)ether	9.8 U	7.6 U	6.6 U	6.3 U	6.8 U	7.6 U
Bis(2-ethylhexyl) phthalate	18 U	17 U	15 UJ	27 U	25 U	21 U

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Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0

Semivolatile Organic Compounds (ug/kg)

Butyl benzyl phthalate	12 U	9.7 U	8.3 U	7.9 U	8.6 U	9.6 U
Chrysene	2.9 U	16	18 J	11 J	230	4.6 J
Diallate	17 U	13 U	11 U	11 U	11 U	13 U
Dibenz(a,h)anthracene	0.98 UJ	0.76 UJ	4.9 J	0.63 UJ	34 J	0.76 U
Dibenzofuran	7.2 U	5.6 U	4.9 U	4.6 U	5 U	5.6 U
Diethyl phthalate	19 U	15 U	13 U	12 U	13 U	15 U
Dimethyl phthalate	11 U	8.6 U	7.4 U	7 U	12 J	8.5 U
Di-n-butyl phthalate	43 U	34 U	29 UJ	27 U	30 U	33 U
Di-n-octyl phthalate	5.7 U	4.4 U	3.8 U	3.6 U	3.9 U	4.4 U
Dinoseb	29 U	23 U	20 U	19 U	20 U	23 U
Ethyl methanesulfonate	19 U	15 U	13 U	12 U	13 U	15 U
Fluoranthene	1.2 J	7.9 J	21 J	7.5 J	84	3.1 J
Fluorene	2.9 U	2.3 U	2 U	1.9 U	2 U	2.3 U
Hexachlorobenzene	12 U	9.1 U	7.9 U	7.5 U	8.1 U	9 U
Hexachlorobutadiene	16 U	12 U	11 UJ	10 UJ	11 U	12 U
Hexachlorocyclopentadiene	24 UJ	19 UJ	16 UJ	15 UJ	17 UJ	19 UJ
Hexachloroethane	13 U	9.9 U	8.6 U	8.1 U	8.8 U	9.8 U
Hexachlorophene	1400 UJ	1100 UJ	960 U	910 UJ	990 UJ	1100 UJ
Hexachloropropene	12 U	9.7 U	8.3 U	7.9 U	8.6 U	9.6 U
Indeno[1,2,3-cd]pyrene	5.7 UJ	13 J	12 J	8.8 J	97 J	4.4 U
Isophorone	11 U	8.3 U	7.2 U	6.8 U	7.4 U	8.2 U
Isosafrole	12 U	9.5 U	8.2 U	7.8 U	8.5 U	9.4 U
Methapyrilene	16 U	12 U	11 UJ	10 U	11 U	12 U
Methyl methanesulfonate	16 U	12 U	11 U	10 U	11 U	12 U
Naphthalene	2.9 U	2.3 U	2.1 J	1.9 U	2 U	7.1 J
Nitrobenzene	12 U	9.3 U	8 U	7.6 U	8.2 U	9.2 U
N-Nitro-o-toluidine	10 U	8 U	7 U	6.6 U	7.2 U	8 U
N-Nitrosodiethylamine	21 U	16 U	14 U	13 U	14 U	16 U
N-Nitrosodimethylamine	17 U	13 U	11 U	11 U	12 U	13 U

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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Semivolatile Organic Compounds (ug/kg)						
N-Nitrosodi-n-butylamine	16 U	12 U	11 U	10 U	11 U	12 U
N-Nitrosodi-n-propylamine	11 U	8.7 U	7.5 U	7.1 U	7.8 U	8.6 U
N-Nitrosodiphenylamine	12 U	9.5 U	8.2 U	7.8 U	8.5 U	9.4 U
N-Nitrosomethylethylamine	9.8 U	7.6 U	6.6 U	6.3 U	6.8 U	7.6 U
N-Nitrosomorpholine	11 U	8.9 U	7.7 U	7.2 U	7.9 U	8.8 U
N-Nitrosopiperidine	15 U	11 U	9.9 U	9.3 U	10 U	11 U
N-Nitrosopyrrolidine	15 U	12 U	10 U	9.8 U	11 U	12 U
p-Dimethylamino azobenzene	12 U	9.5 U	8.2 U	7.8 U	8.5 U	9.4 U
Pentachlorobenzene	11 U	8.3 U	7.2 U	6.8 U	7.4 U	8.2 U
Pentachloronitrobenzene	10 U	7.9 U	6.8 U	6.5 U	7 U	7.8 U
Pentachlorophenol	14 U	11 U	9.6 UJ	9.1 UJ	9.9 U	11 U
Phenacetin	8.1 U	6.3 U	5.4 U	5.2 U	5.6 U	6.2 U
Phenanthrene	2.9 U	2.3 U	9 J	2.8 J	2.5 J	2.8 J
Phenol	8.3 U	6.4 U	5.6 U	5.3 U	5.7 U	6.4 U
p-Phenylene diamine	280 UJ	210 UJ	190 UJ	180 UJ	190 UJ	210 UJ
Pronamide	15 U	12 U	10 U	9.9 U	11 U	12 U
Pyrene	2.9 U	16	27 J	17 J	180	5.5 J
Pyridine	19 U	15 U	13 U	12 U	13 U	15 U
Safrole, Total	14 U	11 U	9.6 U	9.1 U	9.9 U	11 U
Pesticides (ug/kg)						
4,4'-DDD	0.62 U	0.48 U	17 U	16 U	17 U	19 U
4,4'-DDE	0.55 U	7.5 U	67 J	20 J	15 U	17 U
4,4'-DDT	0.9 U	0.69 U	24 U	23 U	25 U	28 U
Aldrin	0.19 U	0.15 U	5.1 U	4.8 U	5.2 U	5.9 U
alpha-BHC	0.14 U	0.11 U	3.8 U	3.6 U	3.9 U	4.4 U
beta-BHC	0.38 U	0.29 U	10 U	9.7 U	10 U	12 U
Chlordane (technical)	2.4 U	1.9 U	65 U	62 U	67 U	75 U
Chlorobenzilate	8.1 UJ	6.2 UJ	220 U	210 U	220 U	250 U
delta-BHC	0.21 U	0.16 U	5.5 U	5.3 U	5.7 U	6.4 U

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Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0

Pesticides (ug/kg)

Dieldrin	0.53 U	0.41 U	14 U	14 U	15 U	17 U
Endosulfan I	0.48 U	0.37 U	13 U	12 U	13 U	15 U
Endosulfan II	1.2 U	0.9 U	31 U	30 U	32 U	36 U
Endosulfan sulfate	0.47 U	0.36 U	12 U	12 U	13 U	14 U
Endrin	0.59 U	0.45 U	16 U	15 U	16 U	18 U
Endrin aldehyde	1.1 U	0.85 U	30 U	28 U	30 U	34 U
gamma-BHC (Lindane)	0.17 U	0.13 U	4.6 U	4.4 U	4.8 U	5.3 U
Heptachlor	0.4 U	0.31 U	11 U	10 U	11 U	12 U
Heptachlor epoxide	0.17 U	0.13 U	4.6 U	4.4 U	4.8 U	5.3 U
Isodrin	0.38 U	0.29 U	10 U	9.7 U	10 U	12 U
Kepone	2.4 UJ	1.9 UJ	65 U	62 U	67 U	75 U
Methoxychlor	1.4 U	1.1 U	37 U	35 U	38 U	43 U
Toxaphene	72 U	56 U	1900 U	1800 U	2000 U	2200 U

Metals (mg/kg)

Antimony	0.77	0.96 U	22 J	11 J	0.42 U	0.69
Arsenic	3.9	5	6.1 J	2.6 J	1.7	3.3
Barium	27 J	35 J	250 J	140 J	220 J	76 J
Beryllium	0.084 U	0.11 U	0.24	0.18	0.25	0.26
Cadmium	0.16 J	0.18 UJ	4.2 R	0.59 R	0.15 J	0.18
Chromium	21	19	51 J	33 J	26	24 J
Cobalt	9.5 J	6 J	25 J	20 J	26 J	16 J
Copper	33 J	24 J	470 J	230 J	110 J	73 J
Lead	5 J	7.3 J	520 R	86 R	8.1 J	9.3 J
Mercury	0.05 J	0.035 J	0.18 J	0.082 J	0.071 J	0.052
Nickel	9.9	7	26	15 J	15 J	9.9 J
Selenium	0.24 J	0.71 U	0.54 J	0.34 J	0.29 J	0.55 J
Silver	0.16 U	0.12 U	0.61	0.21 U	0.082 U	0.05 U
Thallium	0.18 U	0.71 U	0.13 U	0.13 U	0.13 U	0.16 U
Tin	6 U	24 U	61 J	19 J	4.2 U	5.2 U

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Site ID	60SB01	60SB02	60SB03	60SB03	60SB04	60SB05
Sample ID	60SB01-00	60SB02-00	60SB03-00	60SB03-00D	60SB04-00	60SB05-00
Date	1/12/2009	1/12/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Metals (mg/kg)						
Vanadium	43	45	160	130	170	140 J
Zinc	43 J	23 U	910 J	260 J	58 J	61 J
TPH DRO and GRO (mg/kg)						
Diesel Range Organics	NA	NA	NA	NA	19	44
Gasoline Range Organics	NA	NA	NA	NA	0.058 UJ	0.08 J

SUBSURFACE SOIL

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0

Volatile Organic Compounds (ug/kg)

1,1,1,2-Tetrachloroethane	0.75 U	0.64 U	0.72 U	0.65 U
1,1,1-Trichloroethane	0.68 U	0.58 U	0.65 U	0.59 U
1,1,2,2-Tetrachloroethane	1.6 U	1.4 U	1.6 U	1.4 U
1,1,2-Trichloroethane	1.4 U	1.2 U	1.3 U	1.2 U
1,1-Dichloroethane	0.59 U	0.5 U	0.56 U	0.51 U
1,1-Dichloroethene	0.63 U	0.54 U	0.61 U	0.55 U
1,2,3-Trichloropropane	1.6 U	1.4 U	1.6 U	1.4 U
1,2-Dibromo-3-Chloropropane	3.3 U	2.8 U	3.1 U	2.8 U
1,2-Dichloroethane	1.2 U	1 U	1.1 U	1 U
1,2-Dichloropropane	1.3 U	1.1 U	1.2 U	1.1 U
2-Butanone (MEK)	3.2 U	4 U	3.3 U	2.7 U
2-Chloro-1,3-butadiene	0.67 U	0.57 U	0.64 U	0.58 U
2-Hexanone	2.5 U	2.1 U	2.4 U	2.1 U
3-Chloro-1-propene	1.8 U	1.5 U	1.7 U	1.5 U
4-Methyl-2-pentanone (MIBK)	3.4 U	2.9 U	3.3 U	2.9 U
Acetone	7.2 U	15 U	16 U	27 U
Acetonitrile	53 U	45 U	50 U	46 U
Acrolein	22 UJ	19 UJ	21 UJ	19 UJ
Acrylonitrile	27 UJ	23 UJ	26 UJ	23 UJ
Benzene	0.93 U	0.79 U	0.89 U	0.8 U
Bromoform	1.3 U	1.1 U	1.2 U	1.1 U
Bromomethane	1.9 U	1.6 U	1.8 U	1.6 U
Carbon disulfide	1.4 U	1.2 U	1.3 U	2 J
Carbon tetrachloride	1.2 U	1 U	1.1 U	1 U
Chlorobenzene	0.86 U	0.73 U	0.82 U	0.74 U
Chlorodibromomethane	0.59 U	0.5 U	0.56 U	0.51 U
Chloroethane	1.4 U	1.2 U	1.3 U	1.2 U
Chloroform	0.59 U	0.5 U	0.56 U	0.51 U
Chloromethane	0.83 U	0.71 U	0.8 U	0.72 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
 SWMU 60 - FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0

Volatile Organic Compounds (ug/kg)

cis-1,3-Dichloropropene	1 U	0.87 U	0.98 U	0.88 U
Dibromomethane	1.4 U	1.2 U	1.3 U	1.2 U
Dichlorobromomethane	0.97 U	0.83 U	0.93 U	0.84 U
Dichlorodifluoromethane	1 U	0.89 U	1 U	0.9 U
Ethyl methacrylate	2.6 U	2.2 U	2.5 U	2.2 U
Ethylbenzene	0.88 U	0.75 U	0.84 U	46
Ethylene Dibromide	1.8 U	1.5 U	1.7 U	1.5 U
Iodomethane	1.2 U	1 U	1.1 U	1 U
Isobutyl alcohol	81 U	69 U	77 U	70 U
Methacrylonitrile	28 U	24 U	27 U	24 U
Methyl methacrylate	4.3 U	3.7 U	4.1 U	3.7 U
Methylene Chloride	1.2 U	1 U	1.4 J	3.3 J
Pentachloroethane	2.6 U	2.2 U	2.5 U	2.2 U
Propionitrile	25 U	21 U	24 U	21 U
Styrene	0.77 U	0.66 U	0.74 U	0.67 U
Tetrachloroethene	0.86 U	0.73 U	0.82 U	0.74 U
Toluene	0.93 U	0.79 U	0.89 U	0.8 U
trans-1,2-Dichloroethene	1.1 U	0.97 U	1.1 U	0.98 U
trans-1,3-Dichloropropene	1 U	0.87 U	0.98 U	0.88 U
trans-1,4-Dichloro-2-butene	3.6 U	3.1 U	3.5 U	3.1 U
Trichloroethene	1.2 U	1 U	1.1 U	1 U
Trichlorofluoromethane	1.8 U	1.5 U	1.7 U	1.5 U
Vinyl acetate	1.8 U	1.5 U	1.7 U	1.5 U
Vinyl chloride	0.68 U	0.58 U	0.65 U	0.59 U
Xylenes, Total	2.7 U	2.3 U	2.6 U	34

Semivolatile Organic Compounds (ug/kg)

1,2,4,5-Tetrachlorobenzene	7.4 U	77 U	7.9 U	7.5 U
1,2,4-Trichlorobenzene	8.7 U	90 U	9.3 U	8.8 U
1,2-Dichlorobenzene	8.2 U	86 U	8.8 U	8.4 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
 SWMU 60 - FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0

Semivolatile Organic Compounds (ug/kg)

1,3,5-Trinitrobenzene	20 UJ	210 UJ	21 UJ	20 U
1,3-Dichlorobenzene	7 U	73 U	7.5 U	7.2 U
1,3-Dinitrobenzene	4.6 U	48 U	4.9 U	4.7 U
1,4-Dichlorobenzene	7.3 U	76 U	7.8 U	7.4 U
1,4-Dioxane	9.4 U	98 U	10 U	9.6 U
1,4-Naphthoquinone	4.6 U	48 U	4.9 U	4.7 U
1-Naphthylamine	18 U	180 U	19 U	18 U
2,2'-oxybis[1-chloropropane]	7.4 U	77 U	7.9 U	7.5 U
2,3,4,6-Tetrachlorophenol	4.9 U	51 U	5.3 U	5 U
2,4,5-Trichlorophenol	8 U	83 U	8.5 U	8.1 U
2,4,6-Trichlorophenol	9.3 U	97 U	9.9 U	9.4 U
2,4-Dichlorophenol	9.5 U	99 U	10 U	9.7 U
2,4-Dimethylphenol	20 U	210 UJ	21 UJ	20 U
2,4-Dinitrophenol	97 UJ	1000 UJ	100 UJ	99 U
2,4-Dinitrotoluene	6.9 U	72 UJ	7.4 UJ	7 U
2,6-Dichlorophenol	7.5 U	78 U	8 U	7.6 U
2,6-Dinitrotoluene	7.3 U	76 U	7.8 U	7.4 U
2-Acetylaminofluorene	6 U	62 U	6.4 U	6.1 U
2-Chloronaphthalene	7.3 U	76 U	7.8 U	7.4 U
2-Chlorophenol	7.7 U	81 U	8.3 U	7.9 U
2-Methylnaphthalene	2.6 J	21 U	2.1 U	38
2-Methylphenol	9.5 U	99 U	10 U	9.7 U
2-Naphthylamine	23 UJ	240 UJ	25 UJ	24 UJ
2-Nitroaniline	7.6 U	79 U	8.1 U	7.8 U
2-Nitrophenol	8.6 U	89 U	9.1 U	8.7 U
2-Picoline	14 U	150 U	15 U	14 U
2-Toluidine	11 U	110 U	12 U	11 U
3 & 4 Methylphenol	8.6 U	89 U	9.1 U	8.7 U
3,3'-Dichlorobenzidine	11 U	110 U	12 U	11 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0

Semivolatile Organic Compounds (ug/kg)

3,3'-Dimethylbenzidine	210 U	2200 UJ	230 U	210 UJ
3-Methylcholanthrene	7.1 U	75 U	7.6 U	7.3 U
3-Nitroaniline	5.3 U	55 U	5.6 U	5.4 U
4,6-Dinitro-2-methylphenol	6.8 UJ	71 UJ	7.3 UJ	6.9 U
4-Aminobiphenyl	15 U	160 U	16 U	16 U
4-Bromophenyl phenyl ether	8.3 U	87 U	8.9 U	8.5 U
4-Chloro-3-methylphenol	8.8 U	92 U	9.4 U	9 U
4-Chloroaniline	7 U	73 U	7.5 U	7.2 U
4-Chlorophenyl phenyl ether	7.3 U	76 U	7.8 U	7.4 U
4-Nitroaniline	9 U	94 U	9.6 U	9.2 U
4-Nitrophenol	39 U	400 U	41 U	39 U
4-Nitroquinoline-1-oxide	13 R	130 R	14 R	13 R
7,12-Dimethylbenz(a)anthracene	11 U	110 U	12 U	11 U
Acenaphthene	2 U	21 U	2.1 U	2 U
Acenaphthylene	4.3 J	21 U	2.1 U	2 U
Acetophenone	10 U	110 U	11 U	10 U
alpha,alpha-Dimethyl phenethylamine	69 U	720 U	74 U	70 U
Aniline	7.4 U	77 U	7.9 U	7.5 U
Anthracene	5.5 J	21 U	2.6 J	2 U
Aramite, Total	13 U	130 U	14 U	13 U
Benzo[a]anthracene	57	21 UJ	42 J	2 U
Benzo[a]pyrene	100	21 UJ	55 J	2 U
Benzo[b]fluoranthene	180	21 UJ	83 J	2 UJ
Benzo[g,h,i]perylene	110 J	21 UJ	39 J	2 U
Benzo[k]fluoranthene	2 U	21 U	2.1 U	2 U
Benzyl alcohol	9.4 U	98 U	10 U	9.6 U
Bis(2-chloroethoxy)methane	8 U	83 U	8.5 U	8.1 U
Bis(2-chloroethyl)ether	6.7 U	70 U	7.1 U	6.8 U
Bis(2-ethylhexyl) phthalate	9.9 U	51 U	13 U	15 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0

Semivolatile Organic Compounds (ug/kg)

Butyl benzyl phthalate	8.4 U	88 U	9 U	8.6 U
Chrysene	56	21 UJ	35 J	2 U
Diallate	11 U	120 U	12 U	11 U
Dibenz(a,h)anthracene	29 J	7 UJ	0.71 UJ	0.68 U
Dibenzofuran	4.9 U	51 U	5.3 U	5 U
Diethyl phthalate	13 U	130 U	14 U	13 U
Dimethyl phthalate	7.5 U	78 U	8 U	7.6 U
Di-n-butyl phthalate	29 U	310 U	31 U	30 U
Di-n-octyl phthalate	3.9 U	40 U	4.1 U	3.9 U
Dinoseb	20 U	210 U	21 U	20 U
Ethyl methanesulfonate	13 U	130 U	14 U	13 U
Fluoranthene	48	4.6 UJ	22 J	1.3 J
Fluorene	2 U	21 U	2.1 U	2 U
Hexachlorobenzene	8 U	83 U	8.5 U	8.1 U
Hexachlorobutadiene	11 U	110 U	11 U	11 U
Hexachlorocyclopentadiene	16 UJ	170 UJ	18 UJ	17 UJ
Hexachloroethane	8.7 U	90 U	9.3 U	8.8 U
Hexachlorophene	970 UJ	10000 UJ	1000 UJ	990 UJ
Hexachloropropene	8.4 U	88 U	9 U	8.6 U
Indeno[1,2,3-cd]pyrene	63 J	40 UJ	18 J	3.9 U
Isophorone	7.3 U	76 U	7.8 U	7.4 U
Isosafrole	8.3 U	87 U	8.9 U	8.5 U
Methapyrilene	11 U	110 U	12 U	11 U
Methyl methanesulfonate	11 U	110 U	12 U	11 U
Naphthalene	2 J	21 U	2.1 U	5.9 J
Nitrobenzene	8.1 U	84 U	8.6 U	8.2 U
N-Nitro-o-toluidine	7 U	73 U	7.5 U	7.2 U
N-Nitrosodiethylamine	14 U	150 U	15 U	14 U
N-Nitrosodimethylamine	11 U	120 U	12 U	12 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB03	60SB04	60SB04	60SB05
	Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
	Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009
	Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0
Semivolatile Organic Compounds (ug/kg)					
N-Nitrosodi-n-butylamine		11 U	110 U	11 U	11 U
N-Nitrosodi-n-propylamine		7.6 U	79 U	8.1 U	7.8 U
N-Nitrosodiphenylamine		8.3 U	87 U	8.9 U	8.5 U
N-Nitrosomethylethylamine		6.7 U	70 U	7.1 U	6.8 U
N-Nitrosomorpholine		7.7 U	81 U	8.3 U	7.9 U
N-Nitrosopiperidine		10 U	100 U	11 U	10 U
N-Nitrosopyrrolidine		10 U	110 U	11 U	11 U
p-Dimethylamino azobenzene		8.3 U	87 U	8.9 U	8.5 U
Pentachlorobenzene		7.3 U	76 U	7.8 U	7.4 U
Pentachloronitrobenzene		6.9 U	72 U	7.4 U	7 U
Pentachlorophenol		9.7 U	100 UJ	10 UJ	9.9 U
Phenacetin		5.5 U	57 U	5.9 U	5.6 U
Phenanthrene		21	21 U	11 J	3.8 J
Phenol		5.6 U	59 U	6 U	5.7 U
p-Phenylene diamine		190 UJ	2000 UJ	200 UJ	190 UJ
Pronamide		11 U	110 U	11 U	11 U
Pyrene		93	21 UJ	55 J	3.6 J
Pyridine		13 U	130 U	14 U	13 U
Safrole, Total		9.7 U	100 U	10 U	9.9 U
Pesticides (ug/kg)					
4,4'-DDD		38 J	40 J	18 U	3.4 J
4,4'-DDE		380	21 J	16 U	14
4,4'-DDT		24 U	25 U	26 U	0.62 U
Aldrin		5.2 U	5.3 U	5.5 U	0.13 U
alpha-BHC		3.9 U	4 U	4.2 U	0.099 U
beta-BHC		10 U	11 U	11 U	0.26 U
Chlordane (technical)		66 U	68 U	70 U	1.7 U
Chlorobenzilate		220 U	230 U	240 U	5.6 U
delta-BHC		5.6 U	5.8 U	6 U	0.14 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-3.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB03	60SB04	60SB04	60SB05
	Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB05-01
	Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009
	Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0
Pesticides (ug/kg)					
Dieldrin		15 U	15 U	16 U	0.37 U
Endosulfan I		13 U	14 U	14 U	0.33 U
Endosulfan II		32 U	33 U	34 U	0.81 U
Endosulfan sulfate		13 U	13 U	14 U	0.32 U
Endrin		16 U	17 U	17 U	0.41 U
Endrin aldehyde		30 U	31 U	32 U	0.76 U
gamma-BHC (Lindane)		4.7 U	4.9 U	5 U	0.12 U
Heptachlor		11 U	11 U	12 U	0.27 U
Heptachlor epoxide		4.7 U	4.9 U	5 U	0.12 U
Isodrin		10 U	11 U	11 U	0.26 U
Kepone		66 U	68 U	70 U	1.7 UJ
Methoxychlor		37 U	39 U	40 U	0.95 U
Toxaphene		2000 U	2000 U	2100 U	50 U
Metals (mg/kg)					
Antimony		120	0.39 U	0.42 U	0.97 U
Arsenic		33	2.5	3	3.5
Barium		550 J	41 J	43 J	110 J
Beryllium		0.14 U	0.12	0.23	0.24 U
Cadmium		6.5 J	0.14 J	0.096 UJ	0.22 U
Chromium		180	45	38	20 J
Cobalt		22 J	15 J	26 J	13 J
Copper		3400 J	42 J	49 J	81 J
Lead		1600 J	4.2 J	7.4 J	11 J
Mercury		0.38 J	0.046 J	0.023 J	0.045
Nickel		90	14 J	14 J	11 J
Selenium		0.67 U	0.46 J	0.71	0.63 U
Silver		2.7	0.063 U	0.066 U	0.084 U
Thallium		0.67 U	0.13 U	0.14 U	0.63 U
Tin		390	4.4 U	4.7 U	21 U
Metals (mg/kg)					
Vanadium		87	200	190	96 J
Zinc		2600 J	29 R	46 J	83 J
TPH DRO and GRO (mg/kg)					
Diesel Range Organics		NE	290	440	110
Gasoline Range Organics		NE	0.11 J	0.23 J	2600

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
 SWMU 60 - FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0

Volatile Organic Compounds (ug/kg)

1,1,1,2-Tetrachloroethane	0.75 U	0.64 U	0.72 U	0.91 U	0.65 U
1,1,1-Trichloroethane	0.68 U	0.58 U	0.65 U	0.82 U	0.59 U
1,1,2,2-Tetrachloroethane	1.6 U	1.4 U	1.6 U	2 U	1.4 U
1,1,2-Trichloroethane	1.4 U	1.2 U	1.3 U	1.7 U	1.2 U
1,1-Dichloroethane	0.59 U	0.5 U	0.56 U	0.71 U	0.51 U
1,1-Dichloroethene	0.63 U	0.54 U	0.61 U	0.77 U	0.55 U
1,2,3-Trichloropropane	1.6 U	1.4 U	1.6 U	2 U	1.4 U
1,2-Dibromo-3-Chloropropane	3.3 U	2.8 U	3.1 U	4 U	2.8 U
1,2-Dichloroethane	1.2 U	1 U	1.1 U	1.4 U	1 U
1,2-Dichloropropane	1.3 U	1.1 U	1.2 U	1.6 U	1.1 U
2-Butanone (MEK)	3.2 U	4 U	3.3 U	4.3 U	2.7 U
2-Chloro-1,3-butadiene	0.67 U	0.57 U	0.64 U	0.81 U	0.58 U
2-Hexanone	2.5 U	2.1 U	2.4 U	3 U	2.1 U
3-Chloro-1-propene	1.8 U	1.5 U	1.7 U	2.1 U	1.5 U
4-Methyl-2-pentanone (MIBK)	3.4 U	2.9 U	3.3 U	4.1 U	2.9 U
Acetone	7.2 U	15 U	16 U	22 U	27 U
Acetonitrile	53 U	45 U	50 U	64 U	46 U
Acrolein	22 UJ	19 UJ	21 UJ	27 UJ	19 UJ
Acrylonitrile	27 UJ	23 UJ	26 UJ	33 UJ	23 UJ
Benzene	0.93 U	0.79 U	0.89 U	1.1 U	0.8 U
Bromoform	1.3 U	1.1 U	1.2 U	1.6 U	1.1 U
Bromomethane	1.9 U	1.6 U	1.8 U	2.3 U	1.6 U
Carbon disulfide	1.4 U	1.2 U	1.3 U	7.6	2 J
Carbon tetrachloride	1.2 U	1 U	1.1 U	1.4 U	1 U
Chlorobenzene	0.86 U	0.73 U	0.82 U	1 U	0.74 U
Chlorodibromomethane	0.59 U	0.5 U	0.56 U	0.71 U	0.51 U
Chloroethane	1.4 U	1.2 U	1.3 U	1.7 U	1.2 U
Chloroform	0.59 U	0.5 U	0.56 U	0.71 U	0.51 U
Chloromethane	0.83 U	0.71 U	0.8 U	1 U	0.72 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0

Volatile Organic Compounds (ug/kg)

cis-1,3-Dichloropropene	1 U	0.87 U	0.98 U	1.2 U	0.88 U
Dibromomethane	1.4 U	1.2 U	1.3 U	1.7 U	1.2 U
Dichlorobromomethane	0.97 U	0.83 U	0.93 U	1.2 U	0.84 U
Dichlorodifluoromethane	1 U	0.89 U	1 U	1.3 U	0.9 U
Ethyl methacrylate	2.6 U	2.2 U	2.5 U	3.1 U	2.2 U
Ethylbenzene	0.88 U	0.75 U	0.84 U	1.5 J	46
Ethylene Dibromide	1.8 U	1.5 U	1.7 U	2.1 U	1.5 U
Iodomethane	1.2 U	1 U	1.1 U	1.4 U	1 U
Isobutyl alcohol	81 U	69 U	77 U	98 U	70 U
Methacrylonitrile	28 U	24 U	27 U	34 U	24 U
Methyl methacrylate	4.3 U	3.7 U	4.1 U	5.3 U	3.7 U
Methylene Chloride	1.2 U	1 U	1.4 J	1.4 U	3.3 J
Pentachloroethane	2.6 U	2.2 U	2.5 U	3.1 U	2.2 U
Propionitrile	25 U	21 U	24 U	30 U	21 U
Styrene	0.77 U	0.66 U	0.74 U	0.94 U	0.67 U
Tetrachloroethene	0.86 U	0.73 U	0.82 U	1 U	0.74 U
Toluene	0.93 U	0.79 U	0.89 U	1.1 U	0.8 U
trans-1,2-Dichloroethene	1.1 U	0.97 U	1.1 U	1.4 U	0.98 U
trans-1,3-Dichloropropene	1 U	0.87 U	0.98 U	1.2 U	0.88 U
trans-1,4-Dichloro-2-butene	3.6 U	3.1 U	3.5 U	4.4 U	3.1 U
Trichloroethene	1.2 U	1 U	1.1 U	1.4 U	1 U
Trichlorofluoromethane	1.8 U	1.5 U	1.7 U	2.1 U	1.5 U
Vinyl acetate	1.8 U	1.5 U	1.7 U	2.1 U	1.5 U
Vinyl chloride	0.68 U	0.58 U	0.65 U	0.82 U	0.59 U
Xylenes, Total	2.7 U	2.3 U	2.6 U	3.3 U	34

Semivolatile Organic Compounds (ug/kg)

1,2,4,5-Tetrachlorobenzene	7.4 U	77 U	7.9 U	100 U	7.5 U
1,2,4-Trichlorobenzene	8.7 U	90 U	9.3 U	120 U	8.8 U
1,2-Dichlorobenzene	8.2 U	86 U	8.8 U	110 U	8.4 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
 SWMU 60 - FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0

Semivolatile Organic Compounds (ug/kg)

1,3,5-Trinitrobenzene	20 UJ	210 UJ	21 UJ	280 UJ	20 U
1,3-Dichlorobenzene	7 U	73 U	7.5 U	99 U	7.2 U
1,3-Dinitrobenzene	4.6 U	48 U	4.9 U	64 U	4.7 U
1,4-Dichlorobenzene	7.3 U	76 U	7.8 U	100 U	7.4 U
1,4-Dioxane	9.4 U	98 U	10 U	130 U	9.6 U
1,4-Naphthoquinone	4.6 U	48 U	4.9 U	64 U	4.7 U
1-Naphthylamine	18 U	180 U	19 U	250 U	18 U
2,2'-oxybis[1-chloropropane]	7.4 U	77 U	7.9 U	100 U	7.5 U
2,3,4,6-Tetrachlorophenol	4.9 U	51 U	5.3 U	69 U	5 U
2,4,5-Trichlorophenol	8 U	83 U	8.5 U	110 U	8.1 U
2,4,6-Trichlorophenol	9.3 U	97 U	9.9 U	130 U	9.4 U
2,4-Dichlorophenol	9.5 U	99 U	10 U	130 U	9.7 U
2,4-Dimethylphenol	20 U	210 UJ	21 UJ	280 U	20 U
2,4-Dinitrophenol	97 UJ	1000 UJ	100 UJ	1400 UJ	99 U
2,4-Dinitrotoluene	6.9 U	72 UJ	7.4 UJ	97 U	7 U
2,6-Dichlorophenol	7.5 U	78 U	8 U	110 U	7.6 U
2,6-Dinitrotoluene	7.3 U	76 U	7.8 U	100 U	7.4 U
2-Acetylaminofluorene	6 U	62 U	6.4 U	84 U	6.1 U
2-Chloronaphthalene	7.3 U	76 U	7.8 U	100 U	7.4 U
2-Chlorophenol	7.7 U	81 U	8.3 U	110 U	7.9 U
2-Methylnaphthalene	2.6 J	21 U	2.1 U	28 U	38
2-Methylphenol	9.5 U	99 U	10 U	130 U	9.7 U
2-Naphthylamine	23 UJ	240 UJ	25 UJ	330 UJ	24 UJ
2-Nitroaniline	7.6 U	79 U	8.1 U	110 U	7.8 U
2-Nitrophenol	8.6 U	89 U	9.1 U	120 U	8.7 U
2-Picoline	14 U	150 U	15 U	200 U	14 U
2-Toluidine	11 U	110 U	12 U	150 U	11 U
3 & 4 Methylphenol	8.6 U	89 U	9.1 U	120 U	8.7 U
3,3'-Dichlorobenzidine	11 U	110 U	12 U	150 U	11 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0

Semivolatile Organic Compounds (ug/kg)

3,3'-Dimethylbenzidine	210 U	2200 UJ	230 U	3000 UJ	210 UJ
3-Methylcholanthrene	7.1 U	75 U	7.6 U	100 U	7.3 U
3-Nitroaniline	5.3 U	55 U	5.6 U	74 U	5.4 U
4,6-Dinitro-2-methylphenol	6.8 UJ	71 UJ	7.3 UJ	95 UJ	6.9 U
4-Aminobiphenyl	15 U	160 U	16 U	210 U	16 U
4-Bromophenyl phenyl ether	8.3 U	87 U	8.9 U	120 U	8.5 U
4-Chloro-3-methylphenol	8.8 U	92 U	9.4 U	120 U	9 U
4-Chloroaniline	7 U	73 U	7.5 U	99 U	7.2 U
4-Chlorophenyl phenyl ether	7.3 U	76 U	7.8 U	100 U	7.4 U
4-Nitroaniline	9 U	94 U	9.6 U	130 U	9.2 U
4-Nitrophenol	39 U	400 U	41 U	540 U	39 U
4-Nitroquinoline-1-oxide	13 R	130 R	14 R	180 R	13 R
7,12-Dimethylbenz(a)anthracene	11 U	110 U	12 U	150 U	11 U
Acenaphthene	2 U	21 U	2.1 U	28 U	2 U
Acenaphthylene	4.3 J	21 U	2.1 U	28 U	2 U
Acetophenone	10 U	110 U	11 U	140 U	10 U
alpha,alpha-Dimethyl phenethylamine	69 U	720 U	74 U	970 U	70 U
Aniline	7.4 U	77 U	7.9 U	100 U	7.5 U
Anthracene	5.5 J	21 U	2.6 J	28 U	2 U
Aramite, Total	13 U	130 U	14 U	180 U	13 U
Benzo[a]anthracene	57	21 UJ	42 J	28 U	2 U
Benzo[a]pyrene	100	21 UJ	55 J	28 U	2 U
Benzo[b]fluoranthene	180	21 UJ	83 J	28 U	2 UJ
Benzo[g,h,i]perylene	110 J	21 UJ	39 J	28 UJ	2 U
Benzo[k]fluoranthene	2 U	21 U	2.1 U	28 U	2 U
Benzyl alcohol	9.4 U	98 U	10 U	130 U	9.6 U
Bis(2-chloroethoxy)methane	8 U	83 U	8.5 U	110 U	8.1 U
Bis(2-chloroethyl)ether	6.7 U	70 U	7.1 U	94 U	6.8 U
Bis(2-ethylhexyl) phthalate	9.9 U	51 U	13 U	69 U	15 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0

Semivolatile Organic Compounds (ug/kg)

Butyl benzyl phthalate	8.4 U	88 U	9 U	120 U	8.6 U
Chrysene	56	21 UJ	35 J	28 U	2 U
Diallate	11 U	120 U	12 U	160 U	11 U
Dibenz(a,h)anthracene	29 J	7 UJ	0.71 UJ	9.4 UJ	0.68 U
Dibenzofuran	4.9 U	51 U	5.3 U	69 U	5 U
Diethyl phthalate	13 U	130 U	14 U	180 U	13 U
Dimethyl phthalate	7.5 U	78 U	8 U	110 U	7.6 U
Di-n-butyl phthalate	29 U	310 U	31 U	410 U	30 U
Di-n-octyl phthalate	3.9 U	40 U	4.1 U	54 U	3.9 U
Dinoseb	20 U	210 U	21 U	280 U	20 U
Ethyl methanesulfonate	13 U	130 U	14 U	180 U	13 U
Fluoranthene	48	4.6 UJ	22 J	6.2 U	1.3 J
Fluorene	2 U	21 U	2.1 U	28 U	2 U
Hexachlorobenzene	8 U	83 U	8.5 U	110 U	8.1 U
Hexachlorobutadiene	11 U	110 U	11 U	150 U	11 U
Hexachlorocyclopentadiene	16 UJ	170 UJ	18 UJ	230 UJ	17 UJ
Hexachloroethane	8.7 U	90 U	9.3 U	120 U	8.8 U
Hexachlorophene	970 UJ	10000 UJ	1000 UJ	14000 UJ	990 UJ
Hexachloropropene	8.4 U	88 U	9 U	120 U	8.6 U
Indeno[1,2,3-cd]pyrene	63 J	40 UJ	18 J	54 UJ	3.9 U
Isophorone	7.3 U	76 U	7.8 U	100 U	7.4 U
Isosafrole	8.3 U	87 U	8.9 U	120 U	8.5 U
Methapyrilene	11 U	110 U	12 U	150 U	11 U
Methyl methanesulfonate	11 U	110 U	12 U	150 U	11 U
Naphthalene	2 J	21 U	2.1 U	28 U	5.9 J
Nitrobenzene	8.1 U	84 U	8.6 U	110 U	8.2 U
N-Nitro-o-toluidine	7 U	73 U	7.5 U	99 U	7.2 U
N-Nitrosodiethylamine	14 U	150 U	15 U	200 U	14 U
N-Nitrosodimethylamine	11 U	120 U	12 U	160 U	12 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0

Semivolatile Organic Compounds (ug/kg)

N-Nitrosodi-n-butylamine	11 U	110 U	11 U	150 U	11 U
N-Nitrosodi-n-propylamine	7.6 U	79 U	8.1 U	110 U	7.8 U
N-Nitrosodiphenylamine	8.3 U	87 U	8.9 U	120 U	8.5 U
N-Nitrosomethylethylamine	6.7 U	70 U	7.1 U	94 U	6.8 U
N-Nitrosomorpholine	7.7 U	81 U	8.3 U	110 U	7.9 U
N-Nitrosopiperidine	10 U	100 U	11 U	140 U	10 U
N-Nitrosopyrrolidine	10 U	110 U	11 U	150 U	11 U
p-Dimethylamino azobenzene	8.3 U	87 U	8.9 U	120 U	8.5 U
Pentachlorobenzene	7.3 U	76 U	7.8 U	100 U	7.4 U
Pentachloronitrobenzene	6.9 U	72 U	7.4 U	97 U	7 U
Pentachlorophenol	9.7 U	100 UJ	10 UJ	140 U	9.9 U
Phenacetin	5.5 U	57 U	5.9 U	77 U	5.6 U
Phenanthrene	21	21 U	11 J	28 U	3.8 J
Phenol	5.6 U	59 U	6 U	79 U	5.7 U
p-Phenylene diamine	190 UJ	2000 UJ	200 UJ	2600 UJ	190 UJ
Pronamide	11 U	110 U	11 U	150 U	11 U
Pyrene	93	21 UJ	55 J	28 U	3.6 J
Pyridine	13 U	130 U	14 U	180 U	13 U
Safrole, Total	9.7 U	100 U	10 U	140 U	9.9 U

Pesticides (ug/kg)

4,4'-DDD	38 J	40 J	18 U	23 U	3.4 J
4,4'-DDE	380	21 J	16 U	62 J	14
4,4'-DDT	24 U	25 U	26 U	34 U	0.62 U
Aldrin	5.2 U	5.3 U	5.5 U	7.1 U	0.13 U
alpha-BHC	3.9 U	4 U	4.2 U	5.4 U	0.099 U
beta-BHC	10 U	11 U	11 U	14 U	0.26 U
Chlordane (technical)	66 U	68 U	70 U	91 U	1.7 U
Chlorobenzilate	220 U	230 U	240 U	300 U	5.6 U
delta-BHC	5.6 U	5.8 U	6 U	7.8 U	0.14 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
	Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
	Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
	Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0
Pesticides (ug/kg)						
Dieldrin		15 U	15 U	16 U	20 U	0.37 U
Endosulfan I		13 U	14 U	14 U	18 U	0.33 U
Endosulfan II		32 U	33 U	34 U	44 U	0.81 U
Endosulfan sulfate		13 U	13 U	14 U	17 U	0.32 U
Endrin		16 U	17 U	17 U	22 U	0.41 U
Endrin aldehyde		30 U	31 U	32 U	41 U	0.76 U
gamma-BHC (Lindane)		4.7 U	4.9 U	5 U	6.5 U	0.12 U
Heptachlor		11 U	11 U	12 U	15 U	0.27 U
Heptachlor epoxide		4.7 U	4.9 U	5 U	6.5 U	0.12 U
Isodrin		10 U	11 U	11 U	14 U	0.26 U
Kepone		66 U	68 U	70 U	91 U	1.7 UJ
Methoxychlor		37 U	39 U	40 U	52 U	0.95 U
Toxaphene		2000 U	2000 U	2100 U	2700 U	50 U
Metals (mg/kg)						
Antimony		120	0.39 U	0.42 U	2.8	0.97 U
Arsenic		33	2.5	3	4.3	3.5
Barium		550 J	41 J	43 J	45 J	110 J
Beryllium		0.14 U	0.12	0.23	0.12 U	0.24 U
Cadmium		6.5 J	0.14 J	0.096 UJ	0.61 J	0.22 U
Chromium		180	45	38	20	20 J
Cobalt		22 J	15 J	26 J	9 J	13 J
Copper		3400 J	42 J	49 J	44 J	81 J
Lead		1600 J	4.2 J	7.4 J	26 J	11 J
Mercury		0.38 J	0.046 J	0.023 J	0.052 J	0.045
Nickel		90	14 J	14 J	8 J	11 J
Selenium		0.67 U	0.46 J	0.71	0.75 J	0.63 U
Silver		2.7	0.063 U	0.066 U	0.094 U	0.084 U
Thallium		0.67 U	0.13 U	0.14 U	0.2 U	0.63 U
Tin		390	4.4 U	4.7 U	6.8 J	21 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL (1.0-7.0 ft bgs)
 SWMU 60 - FORMER LANDFILL AT THE MARINA
 PHASE I RFI REPORT
 NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB03	60SB04	60SB04	60SB04	60SB05
	Sample ID	60SB03-01	60SB04-01	60SB04-01D	60SB04-03	60SB05-01
	Date	1/13/2009	1/13/2009	1/13/2009	1/13/2009	1/13/2009
	Depth Range (ft bgs)	1.0-3.0	1.0-3.0	1.0-3.0	5.0-7.0	1.0-3.0
Metals (mg/kg)						
	Vanadium	87	200	190	99	96 J
	Zinc	2600 J	29 R	46 J	49 J	83 J
TPH DRO and GRO (mg/kg)						
	Diesel Range Organics	NA	290	440	840	110
	Gasoline Range Organics	NA	0.11 J	0.23 J	0.11 U	2600

OPEN WATER SEDIMENT

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
SWMU 60 - LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SD01	60SD02	60SD03	60SD03
Sample ID	60SD01	60SD02	60SD03	60SD03D
Date	1/17/2009	1/17/2009	1/17/2009	1/17/2009
Depth Range	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5

Semivolatile Organic Compounds (ug/kg)

1,2,4,5-Tetrachlorobenzene	10 U	16 UJ	13 UJ	12 U
1,2,4-Trichlorobenzene	12 U	18 UJ	16 UJ	14 U
1,2-Dichlorobenzene	12 U	17 UJ	15 UJ	13 U
1,3,5-Trinitrobenzene	28 UJ	42 UJ	36 UJ	31 UJ
1,3-Dichlorobenzene	9.9 U	15 UJ	13 UJ	11 U
1,3-Dinitrobenzene	6.4 U	9.7 UJ	8.3 UJ	7.2 U
1,4-Dichlorobenzene	10 U	15 UJ	13 UJ	11 U
1,4-Dioxane	13 U	20 UJ	17 UJ	15 U
1,4-Naphthoquinone	6.4 U	9.7 UJ	8.3 UJ	7.2 U
1-Naphthylamine	25 U	37 UJ	32 UJ	28 U
2,2'-oxybis[1-chloropropane]	10 U	16 UJ	13 UJ	12 U
2,3,4,6-Tetrachlorophenol	6.9 U	10 UJ	8.9 UJ	7.7 U
2,4,5-Trichlorophenol	11 U	17 UJ	14 UJ	12 U
2,4,6-Trichlorophenol	13 U	20 UJ	17 UJ	14 U
2,4-Dichlorophenol	13 U	20 UJ	17 UJ	15 U
2,4-Dimethylphenol	28 U	42 UJ	36 UJ	31 U
2,4-Dinitrophenol	140 U	210 UJ	180 UJ	150 U
2,4-Dinitrotoluene	9.7 U	15 UJ	13 UJ	11 U
2,6-Dichlorophenol	11 U	16 UJ	14 UJ	12 U
2,6-Dinitrotoluene	10 U	15 UJ	13 UJ	11 U
2-Acetylaminofluorene	8.4 U	13 UJ	11 UJ	9.4 U
2-Chloronaphthalene	10 U	15 UJ	13 UJ	11 U
2-Chlorophenol	11 U	16 UJ	14 UJ	12 U
2-Methylnaphthalene	2.8 U	4.2 UJ	3.6 UJ	3.1 U
2-Methylphenol	13 U	20 UJ	17 UJ	15 U
2-Naphthylamine	33 U	50 UJ	43 UJ	37 U
2-Nitroaniline	11 U	16 UJ	14 UJ	12 U
2-Nitrophenol	12 U	18 UJ	16 UJ	13 U
2-Picoline	20 U	30 UJ	26 UJ	22 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
SWMU 60 - LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SD01	60SD02	60SD03	60SD03
Sample ID	60SD01	60SD02	60SD03	60SD03D
Date	1/17/2009	1/17/2009	1/17/2009	1/17/2009
Depth Range	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5

Semivolatile Organic Compounds (ug/kg)

2-Toluidine	15 U	23 UJ	20 UJ	17 U
3 & 4 Methylphenol	12 U	18 UJ	16 UJ	13 U
3,3'-Dichlorobenzidine	15 UJ	23 UJ	20 UJ	17 UJ
3,3'-Dimethylbenzidine	300 UJ	450 UJ	380 UJ	330 UJ
3-Methylcholanthrene	10 U	15 UJ	13 UJ	11 U
3-Nitroaniline	7.4 U	11 UJ	9.6 UJ	8.3 U
4,6-Dinitro-2-methylphenol	9.6 R	14 R	12 R	11 R
4-Aminobiphenyl	21 U	32 UJ	28 UJ	24 U
4-Bromophenyl phenyl ether	12 U	18 UJ	15 UJ	13 U
4-Chloro-3-methylphenol	12 U	19 UJ	16 UJ	14 U
4-Chloroaniline	9.9 U	15 UJ	13 UJ	11 U
4-Chlorophenyl phenyl ether	10 U	15 UJ	13 UJ	11 U
4-Nitroaniline	13 U	19 UJ	16 UJ	14 U
4-Nitrophenol	54 U	82 UJ	70 UJ	61 U
4-Nitroquinoline-1-oxide	18 U	27 UJ	23 UJ	20 U
7,12-Dimethylbenz(a)anthracene	15 U	23 UJ	20 UJ	17 U
Acenaphthene	5.4 J	4.2 UJ	3.6 UJ	3.1 U
Acenaphthylene	30	4.2 UJ	3.6 UJ	3.1 U
Acetophenone	14 U	21 UJ	18 UJ	16 U
alpha,alpha-Dimethyl phenethylamine	97 U	150 UJ	130 UJ	110 U
Aniline	10 U	16 UJ	13 UJ	12 U
Anthracene	42	4.2 UJ	3.6 UJ	3.1 U
Aramite, Total	18 U	27 UJ	23 UJ	20 U
Benzo[a]anthracene	210	25 J	5.2 J	5.4 J
Benzo[a]pyrene	450	39 J	9.4 J	11 J
Benzo[b]fluoranthene	700	55 J	9.2 J	15
Benzo[g,h,i]perylene	120	21 J	3.6 UJ	3.1 U
Benzo[k]fluoranthene	630	52 J	12 J	10 J
Benzyl alcohol	13 U	20 UJ	17 UJ	15 U

APPENDIX D

**SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
SWMU 60 - LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SD01	60SD02	60SD03	60SD03
Sample ID	60SD01	60SD02	60SD03	60SD03D
Date	1/17/2009	1/17/2009	1/17/2009	1/17/2009
Depth Range	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5

Semivolatile Organic Compounds (ug/kg)

Bis(2-chloroethoxy)methane	11 U	17 UJ	14 UJ	12 U
Bis(2-chloroethyl)ether	9.4 U	14 UJ	12 UJ	10 U
Bis(2-ethylhexyl) phthalate	120	49 UJ	25 UJ	19 U
Butyl benzyl phthalate	12 U	18 UJ	15 UJ	13 U
Chrysene	470	34 J	9.5 J	9.5 J
Diallate	16 U	24 UJ	20 UJ	18 U
Dibenz(a,h)anthracene	75	13 J	1.2 UJ	1 U
Dibenzofuran	6.9 U	10 UJ	8.9 UJ	7.7 U
Diethyl phthalate	18 U	27 UJ	23 UJ	20 U
Dimethyl phthalate	14 J	16 UJ	14 UJ	12 U
Di-n-butyl phthalate	41 U	62 UJ	53 UJ	46 U
Di-n-octyl phthalate	7.5 J	8.2 UJ	7 UJ	6.1 U
Dinoseb	28 U	42 UJ	36 UJ	31 U
Ethyl methanesulfonate	18 U	27 UJ	23 UJ	20 U
Fluoranthene	370	41 J	0.81 UJ	0.7 U
Fluorene	5.4 J	4.2 UJ	3.6 UJ	3.1 U
Hexachlorobenzene	11 U	17 UJ	14 UJ	12 U
Hexachlorobutadiene	15 U	23 UJ	19 UJ	17 U
Hexachlorocyclopentadiene	23 U	35 UJ	30 UJ	26 U
Hexachloroethane	12 U	18 UJ	16 UJ	14 U
Hexachlorophene	1400 UJ	2100 UJ	1800 UJ	1500 UJ
Hexachloropropene	12 UJ	18 UJ	15 UJ	13 UJ
Indeno[1,2,3-cd]pyrene	130	16 J	7 UJ	6.1 U
Isophorone	10 U	15 UJ	13 UJ	11 U
Isosafrole	12 U	18 UJ	15 UJ	13 U
Methapyrilene	15 U	23 UJ	20 UJ	17 U
Methyl methanesulfonate	15 U	23 UJ	20 UJ	17 U
Naphthalene	2.8 U	4.2 UJ	3.6 UJ	3.1 U
Nitrobenzene	11 U	17 UJ	15 UJ	13 U

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**SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
SWMU 60 - LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SD01	60SD02	60SD03	60SD03
Sample ID	60SD01	60SD02	60SD03	60SD03D
Date	1/17/2009	1/17/2009	1/17/2009	1/17/2009
Depth Range	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5

Semivolatile Organic Compounds (ug/kg)

N-Nitro-o-toluidine	9.9 U	15 UJ	13 UJ	11 U
N-Nitrosodiethylamine	20 U	30 UJ	26 UJ	22 U
N-Nitrosodimethylamine	16 U	24 UJ	21 UJ	18 U
N-Nitrosodi-n-butylamine	15 U	23 UJ	19 UJ	17 U
N-Nitrosodi-n-propylamine	11 U	16 UJ	14 UJ	12 U
N-Nitrosodiphenylamine	12 U	18 UJ	15 UJ	13 U
N-Nitrosomethylethylamine	9.4 U	14 UJ	12 UJ	10 U
N-Nitrosomorpholine	11 U	16 UJ	14 UJ	12 U
N-Nitrosopiperidine	14 U	21 UJ	18 UJ	16 U
N-Nitrosopyrrolidine	15 U	22 UJ	19 UJ	16 U
p-Dimethylamino azobenzene	12 U	18 UJ	15 UJ	13 U
Pentachlorobenzene	10 U	15 UJ	13 UJ	11 U
Pentachloronitrobenzene	9.7 U	15 UJ	13 UJ	11 U
Pentachlorophenol	14 UJ	21 UJ	18 UJ	15 UJ
Phenacetin	7.7 U	12 UJ	10 UJ	8.6 U
Phenanthrene	24	4.2 UJ	6.1 J	5.4 J
Phenol	7.9 U	88 J	10 UJ	8.8 U
p-Phenylene diamine	260 UJ	400 UJ	340 UJ	290 UJ
Pronamide	15 U	22 UJ	19 UJ	17 U
Pyrene	950	48 J	16 J	12 J
Pyridine	18 U	27 UJ	23 UJ	20 U
Safrole, Total	14 U	21 UJ	18 UJ	15 U

Pesticides (ug/kg)

4,4'-DDD	24 UJ	36 UJ	30 UJ	26 UJ
4,4'-DDE	21 UJ	32 UJ	27 UJ	23 UJ
4,4'-DDT	34 UJ	52 UJ	44 UJ	38 UJ
Aldrin	7.2 UJ	11 UJ	9.3 UJ	8.1 UJ
alpha-BHC	5.5 UJ	8.2 UJ	7 UJ	6.1 UJ
beta-BHC	14 UJ	22 UJ	19 UJ	16 UJ

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**SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
SWMU 60 - LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SD01	60SD02	60SD03	60SD03
Sample ID	60SD01	60SD02	60SD03	60SD03D
Date	1/17/2009	1/17/2009	1/17/2009	1/17/2009
Depth Range	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5

Pesticides (ug/kg)

Chlordane (technical)	92 UJ	140 UJ	120 UJ	100 UJ
Chlorobenzilate	310 UJ	470 UJ	400 UJ	340 UJ
delta-BHC	7.9 UJ	12 UJ	10 UJ	8.8 UJ
Dieldrin	20 UJ	31 UJ	26 UJ	23 UJ
Endosulfan I	18 UJ	28 UJ	24 UJ	21 UJ
Endosulfan II	45 UJ	67 UJ	57 UJ	50 UJ
Endosulfan sulfate	18 UJ	27 UJ	23 UJ	20 UJ
Endrin	22 UJ	34 UJ	29 UJ	25 UJ
Endrin aldehyde	42 UJ	63 UJ	54 UJ	47 UJ
gamma-BHC (Lindane)	6.6 UJ	9.9 UJ	8.4 UJ	7.3 UJ
Heptachlor	15 UJ	23 UJ	19 UJ	17 UJ
Heptachlor epoxide	6.6 UJ	9.9 UJ	8.4 UJ	7.3 UJ
Isodrin	14 UJ	22 UJ	19 UJ	16 UJ
Kepone	92 UJ	140 UJ	120 UJ	100 UJ
Methoxychlor	53 UJ	79 UJ	67 UJ	59 UJ
Toxaphene	2800 UJ	4200 UJ	3500 UJ	3100 UJ

Metals (mg/kg)

Antimony	0.34 UJ	0.35 UJ	0.25 UJ	0.21 UJ
Arsenic	14	14 J	2.9 J	3
Barium	13	12 J	8.3 J	12 J
Beryllium	0.08 J	0.12 J	0.037 UJ	0.03 U
Cadmium	0.46	0.065 UJ	0.064 UJ	0.051 U
Chromium	23	27 J	6.6 J	9.6 J
Cobalt	4.5	4.6 J	1.6 J	3.4 J
Copper	60	54 J	7.1 J	9.5
Lead	6.3	7.9 J	2 J	1.8
Mercury	0.064	0.097 J	0.024 J	0.0083 J
Nickel	5.7	7.8 J	2.5 J	3.9 J
Selenium	0.24 J	0.45 J	0.25 UJ	0.2 U

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SWMU 60 - LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SD01	60SD02	60SD03	60SD03
	Sample ID	60SD01	60SD02	60SD03	60SD03D
	Date	1/17/2009	1/17/2009	1/17/2009	1/17/2009
	Depth Range	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5
Metals (mg/kg)					
Silver		0.053 U	0.057 UJ	0.033 UJ	0.026 U
Thallium		0.19 U	0.25 UJ	0.25 UJ	0.2 U
Tin		6.3 U	8.4 UJ	8.3 UJ	6.6 U
Vanadium		38	43 J	11 J	15
Zinc		66	43 J	9.8 J	12

GROUNDWATER

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**SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	60SB02	60SB04	60SB04	60SB05
Sample ID	60GW02	60GW04	60GW04D	60GW05
Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009

Volatile Organic Compounds (ug/L)

1,1,1,2-Tetrachloroethane	0.29 U	0.29 R	0.29 R	0.29 U
1,1,1-Trichloroethane	0.39 U	0.39 R	0.39 R	0.39 U
1,1,2,2-Tetrachloroethane	0.26 U	0.26 R	0.26 R	0.26 U
1,1,2-Trichloroethane	0.51 U	0.51 R	0.51 R	0.51 U
1,1-Dichloroethane	0.32 U	0.32 R	0.32 R	0.32 U
1,1-Dichloroethene	0.36 U	0.36 R	0.36 R	0.36 U
1,2,3-Trichloropropane	0.42 U	0.42 R	0.42 R	0.42 U
1,2-Dibromo-3-Chloropropane	0.48 U	0.48 R	0.48 R	0.48 U
1,2-Dichloroethane	0.31 U	0.31 R	0.31 R	0.31 U
1,2-Dichloropropane	0.36 U	0.36 R	0.36 R	0.36 U
2-Butanone (MEK)	0.6 U	0.6 R	1.1 R	0.6 U
2-Chloro-1,3-butadiene	0.35 UJ	0.35 R	0.35 R	0.35 UJ
2-Hexanone	0.68 U	0.68 R	1.2 J	0.68 U
3-Chloro-1-propene	0.46 U	0.46 R	0.46 R	0.46 U
4-Methyl-2-pentanone (MIBK)	0.6 U	0.6 R	0.6 R	0.6 U
Acetone	5 U	6 J	5 R	5 U
Acetonitrile	15 U	15 R	15 R	15 U
Acrolein	18 U	18 R	18 R	18 U
Acrylonitrile	3.8 U	3.8 R	3.8 R	3.8 U
Benzene	0.32 U	0.32 R	0.32 R	0.32 U
Bromoform	0.41 U	0.41 R	0.41 R	0.41 U
Bromomethane	0.5 U	0.5 R	0.5 R	0.5 U
Carbon disulfide	0.6 U	0.94 J	1.1 J	0.6 U
Carbon tetrachloride	0.27 U	0.27 R	0.27 R	0.27 U
Chlorobenzene	0.34 U	0.34 R	0.34 R	0.34 U
Chlorodibromomethane	0.3 U	0.3 R	0.3 R	0.3 U
Chloroethane	1 U	1 R	1 R	1 U
Chloroform	0.29 U	0.29 R	0.29 R	0.29 U
Chloromethane	0.28 U	0.28 R	0.28 R	0.28 U
cis-1,3-Dichloropropene	0.37 U	0.37 R	0.37 R	0.37 U

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**SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB02	60SB04	60SB04	60SB05
	Sample ID	60GW02	60GW04	60GW04D	60GW05
	Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009
Volatile Organic Compounds (ug/L)					
Dibromomethane		0.29 U	0.29 R	0.29 R	0.29 U
Dichlorobromomethane		0.34 U	0.34 R	0.34 R	0.34 U
Dichlorodifluoromethane		0.33 U	0.33 R	0.33 R	0.33 U
Ethyl methacrylate		1 U	1 R	1 R	1 U
Ethylbenzene		0.3 U	0.3 R	0.3 R	0.96 J
Ethylene Dibromide		0.3 U	0.3 R	0.3 R	0.3 U
Iodomethane		1 UJ	1 R	1 R	1 UJ
Isobutanol		19 R	19 R	19 R	19 R
Methacrylonitrile		6.6 U	6.6 R	6.6 R	6.6 U
Methyl methacrylate		0.38 U	0.38 R	0.38 R	0.38 U
Methylene Chloride		1 U	1 R	1 R	1 U
Pentachloroethane		1.3 UJ	1.3 R	1.3 R	1.3 UJ
Propionitrile		9.2 U	9.2 R	9.2 R	9.2 U
Styrene		0.36 U	0.36 R	0.36 R	0.36 U
Tetrachloroethene		0.28 U	0.28 R	0.28 R	0.28 U
Toluene		0.31 U	0.31 R	0.31 R	0.31 U
trans-1,2-Dichloroethene		0.3 U	0.3 R	0.3 R	0.3 U
trans-1,3-Dichloropropene		0.27 U	0.27 R	0.27 R	0.27 U
trans-1,4-Dichloro-2-butene		0.83 U	0.83 R	0.83 R	0.83 U
Trichloroethene		0.4 U	0.4 R	0.4 R	0.4 U
Trichlorofluoromethane		0.29 U	0.29 R	0.29 R	0.29 U
Vinyl acetate		0.62 U	0.62 R	0.62 R	0.62 U
Vinyl chloride		0.2 U	0.2 R	0.2 R	0.2 U
Xylenes, Total		0.87 U	0.87 R	0.87 R	2.3 J
Semivolatile Organic Compounds (ug/L)					
1,2,4,5-Tetrachlorobenzene		0.23 UJ	1.2 U	1.2 U	0.23 U
1,2,4-Trichlorobenzene		0.13 UJ	0.63 U	0.63 U	0.13 U
1,2-Dichlorobenzene		0.13 UJ	0.63 U	0.63 U	0.13 U
1,3,5-Trinitrobenzene		0.2 UJ	1 UJ	1 U	0.2 UJ
1,3-Dichlorobenzene		0.12 UJ	0.58 U	0.58 U	0.12 U

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**SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB02	60SB04	60SB04	60SB05
	Sample ID	60GW02	60GW04	60GW04D	60GW05
	Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009
Semivolatile Organic Compounds (ug/L)					
1,3-Dinitrobenzene		0.22 UJ	1.1 U	1.1 U	0.22 U
1,4-Dichlorobenzene		0.12 UJ	0.58 U	0.58 U	0.12 U
1,4-Dioxane		0.49 UJ	2.4 U	2.4 U	0.49 U
1,4-Naphthoquinone		0.16 UJ	0.78 U	0.78 U	0.16 U
1-Naphthylamine		0.33 UJ	1.7 U	1.7 UJ	0.33 U
2,2'-oxybis[1-chloropropane]		0.097 UJ	0.49 U	0.49 U	0.097 U
2,3,4,6-Tetrachlorophenol		0.29 UJ	1.5 U	1.5 U	0.29 U
2,4,5-Trichlorophenol		0.16 UJ	0.78 U	0.78 U	0.16 U
2,4,6-Trichlorophenol		0.16 UJ	0.78 U	0.78 U	0.16 U
2,4-Dichlorophenol		0.15 UJ	0.73 U	0.73 U	0.15 U
2,4-Dimethylphenol		0.4 UJ	2 U	2 U	0.4 U
2,4-Dinitrophenol		2.4 UJ	12 U	12 U	2.4 U
2,4-Dinitrotoluene		0.17 UJ	0.87 U	0.87 U	0.17 U
2,6-Dichlorophenol		0.21 UJ	1.1 U	1.1 U	0.21 U
2,6-Dinitrotoluene		0.15 UJ	0.73 U	0.73 U	0.15 U
2-Acetylaminofluorene		0.19 UJ	0.97 U	0.97 U	0.19 U
2-Chloronaphthalene		0.12 UJ	0.58 U	0.58 U	0.12 U
2-Chlorophenol		0.15 UJ	0.73 U	0.73 U	0.15 U
2-Methylnaphthalene		0.022 UJ	0.11 U	0.11 U	0.78
2-Methylphenol		0.15 UJ	0.73 U	0.73 U	0.15 U
2-Naphthylamine		1.1 UJ	5.3 U	5.3 U	1.1 U
2-Nitroaniline		0.14 UJ	0.68 U	0.68 U	0.14 U
2-Nitrophenol		0.17 UJ	0.83 U	0.83 U	0.17 U
2-Picoline		0.57 UJ	2.9 U	2.9 U	0.57 U
2-Toluidine		0.32 UJ	1.6 U	1.6 U	0.32 U
3 & 4 Methylphenol		0.5 J	0.73 U	0.73 U	0.39 J
3,3'-Dichlorobenzidine		3.7 UJ	18 UJ	18 U	3.7 UJ
3,3'-Dimethylbenzidine		3.7 UJ	18 UJ	18 UJ	3.7 UJ
3-Methylcholanthrene		0.2 UJ	1 U	1 U	0.2 U
3-Nitroaniline		0.28 UJ	1.4 U	1.4 U	0.28 U

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SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB02	60SB04	60SB04	60SB05
	Sample ID	60GW02	60GW04	60GW04D	60GW05
	Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009
Semivolatile Organic Compounds (ug/L)					
4,6-Dinitro-2-methylphenol		0.49 UJ	2.4 U	2.4 U	0.49 U
4-Aminobiphenyl		0.68 UJ	3.4 U	3.4 U	0.68 U
4-Bromophenyl phenyl ether		0.16 UJ	0.78 U	0.78 U	0.16 U
4-Chloro-3-methylphenol		0.16 UJ	0.78 U	0.78 U	0.16 U
4-Chloroaniline		0.4 UJ	2 U	2 U	0.4 U
4-Chlorophenyl phenyl ether		0.15 UJ	0.73 U	0.73 U	0.15 U
4-Nitroaniline		0.26 UJ	1.3 U	1.3 U	0.26 U
4-Nitrophenol		0.18 UJ	0.92 U	0.92 U	0.18 U
4-Nitroquinoline-1-oxide		0.26 R	1.3 R	1.3 R	0.26 R
7,12-Dimethylbenz(a)anthracene		0.2 UJ	1 U	1 U	0.2 U
Acenaphthene		0.022 UJ	0.11 U	0.11 U	0.022 U
Acenaphthylene		0.019 UJ	0.097 U	0.097 U	0.019 U
Acetophenone		0.19 UJ	0.97 U	0.97 U	0.19 U
alpha,alpha-Dimethyl phenethylamine		1.3 UJ	6.3 U	6.3 U	1.3 U
Aniline		0.4 UJ	2 U	2 U	0.4 U
Anthracene		0.025 UJ	0.13 U	0.13 U	0.025 U
Aramite, Total		0.49 UJ	2.4 U	2.4 U	0.49 U
Benzo[a]anthracene		0.049 UJ	0.24 U	0.24 U	0.066 J
Benzo[a]pyrene		0.017 UJ	0.083 U	0.083 U	0.064 J
Benzo[b]fluoranthene		0.02 UJ	0.1 U	0.1 UJ	0.078 J
Benzo[g,h,i]perylene		0.049 UJ	0.24 UJ	0.24 UJ	0.093 J
Benzo[k]fluoranthene		0.034 UJ	0.17 UJ	0.17 UJ	0.082 J
Benzyl alcohol		0.16 UJ	0.78 U	0.78 U	0.16 U
Bis(2-chloroethoxy)methane		0.15 UJ	0.73 U	0.73 U	0.15 U
Bis(2-chloroethyl)ether		0.14 UJ	0.68 U	0.68 U	0.14 U
Bis(2-ethylhexyl) phthalate		0.38 UJ	1.7 UJ	1.7 UJ	0.73 J
Butyl benzyl phthalate		0.17 UJ	0.83 U	0.83 U	0.17 U
Chrysene		0.049 UJ	0.24 U	0.24 U	0.072 J
Diallate		0.19 UJ	0.97 U	0.97 U	0.19 U
Dibenz(a,h)anthracene		0.021 UJ	0.11 UJ	0.11 UJ	0.098 J

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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB02	60SB04	60SB04	60SB05
	Sample ID	60GW02	60GW04	60GW04D	60GW05
	Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009
Semivolatile Organic Compounds (ug/L)					
Dibenzofuran		0.097 UJ	0.49 U	0.49 U	0.097 U
Diethyl phthalate		0.18 UJ	0.92 U	0.92 U	0.18 U
Dimethyl phthalate		0.17 UJ	0.87 U	0.87 U	0.17 U
Di-n-butyl phthalate		0.11 UJ	0.53 U	0.53 U	0.12 U
Di-n-octyl phthalate		0.097 UJ	0.49 UJ	0.49 UJ	0.097 U
Dinoseb		0.49 UJ	2.4 U	2.4 U	0.49 U
Ethyl methanesulfonate		0.23 UJ	1.2 U	1.2 U	0.23 U
Fluoranthene		0.04 J	0.092 U	0.092 U	0.031 J
Fluorene		0.025 UJ	0.13 U	0.13 U	0.027 J
Hexachlorobenzene		0.16 UJ	0.78 U	0.78 U	0.16 U
Hexachlorobutadiene		0.13 UJ	0.63 U	0.63 U	0.13 U
Hexachlorocyclopentadiene		0.49 UJ	2.4 U	2.4 UJ	0.49 U
Hexachloroethane		0.15 UJ	0.73 U	0.73 U	0.15 U
Hexachlorophene		49 UJ	240 UJ	240 U	49 UJ
Hexachloropropene		0.12 UJ	0.58 UJ	0.58 UJ	0.12 UJ
Indeno[1,2,3-cd]pyrene		0.049 UJ	0.24 UJ	0.24 UJ	0.087 J
Isophorone		0.15 UJ	0.73 U	0.73 U	0.15 U
Isosafrole		0.3 UJ	1.5 U	1.5 U	0.3 U
Methapyrilene		0.26 UJ	1.3 U	1.3 U	0.26 U
Methyl methanesulfonate		0.46 UJ	2.3 U	2.3 U	0.46 U
Naphthalene		0.025 UJ	0.13 U	0.13 U	1.5
Nitrobenzene		0.14 UJ	0.68 U	0.68 U	0.14 U
N-Nitro-o-toluidine		0.24 UJ	1.2 U	1.2 U	0.24 U
N-Nitrosodiethylamine		0.32 UJ	1.6 U	1.6 U	0.32 U
N-Nitrosodimethylamine		0.19 UJ	0.97 U	0.97 U	0.19 U
N-Nitrosodi-n-butylamine		0.18 UJ	0.92 U	0.92 U	0.18 U
N-Nitrosodi-n-propylamine		0.13 UJ	0.63 U	0.63 U	0.13 U
N-Nitrosodiphenylamine		0.17 UJ	0.87 U	0.87 U	0.17 U
N-Nitrosomethylethylamine		0.28 UJ	1.4 U	1.4 U	0.28 U
N-Nitrosomorpholine		0.19 UJ	0.97 U	0.97 U	0.19 U

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**SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB02	60SB04	60SB04	60SB05
	Sample ID	60GW02	60GW04	60GW04D	60GW05
	Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009
Semivolatile Organic Compounds (ug/L)					
N-Nitrosopiperidine		0.22 UJ	1.1 U	1.1 U	0.22 U
N-Nitrosopyrrolidine		0.25 UJ	1.3 U	1.3 U	0.25 U
p-Dimethylamino azobenzene		0.6 UJ	3 U	3 U	0.6 U
Pentachlorobenzene		0.27 UJ	1.4 U	1.4 U	0.27 U
Pentachloronitrobenzene		0.3 UJ	1.5 U	1.5 U	0.3 U
Pentachlorophenol		0.18 UJ	0.92 U	0.92 U	0.18 U
Phenacetin		0.2 UJ	1 U	1 U	0.2 U
Phenanthrene		0.03 UJ	0.15 U	0.15 U	0.03 U
Phenol		0.23 UJ	0.68 U	0.68 U	0.22 U
p-Phenylene diamine		2.4 UJ	12 UJ	12 U	2.4 UJ
Pronamide		0.25 UJ	1.3 U	1.3 U	0.25 U
Pyrene		0.039 J	0.11 U	0.11 U	0.033 J
Pyridine		0.22 UJ	1.1 U	1.1 U	0.22 U
Safrole, Total		0.23 UJ	1.2 U	1.2 U	0.23 U
Pesticides (ug/L)					
4,4'-DDD		0.0057 U	0.11 UJ	0.11 UJ	0.0057 U
4,4'-DDE		0.0095 U	0.19 UJ	0.19 UJ	0.0095 U
4,4'-DDT		0.015 U	0.29 UJ	0.29 UJ	0.015 U
Aldrin		0.0058 U	0.12 UJ	0.12 UJ	0.0058 U
alpha-BHC		0.0079 U	0.16 UJ	0.16 UJ	0.0079 U
beta-BHC		0.008 U	0.16 UJ	0.16 UJ	0.008 U
Chlordane (technical)		0.048 U	0.95 UJ	0.95 UJ	0.048 U
Chlorobenzilate		0.14 U	2.7 UJ	2.7 UJ	0.14 U
delta-BHC		0.0067 U	0.13 UJ	0.13 UJ	0.0067 U
Dieldrin		0.0076 U	0.15 UJ	0.15 UJ	0.0076 U
Endosulfan I		0.0053 U	0.11 UJ	0.11 UJ	0.0053 U
Endosulfan II		0.0049 U	0.097 UJ	0.097 UJ	0.0049 U
Endosulfan sulfate		0.0068 U	0.14 UJ	0.14 UJ	0.0068 U
Endrin		0.0076 U	0.15 UJ	0.15 UJ	0.0076 U
Endrin aldehyde		0.0087 U	0.17 UJ	0.17 UJ	0.0087 U

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SWMU 60 - FORMER LANDFILL AT THE MARINA
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NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB02	60SB04	60SB04	60SB05
	Sample ID	60GW02	60GW04	60GW04D	60GW05
	Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009
Pesticides (ug/L)					
gamma-BHC (Lindane)		0.0057 U	0.11 UJ	0.11 UJ	0.0057 U
Heptachlor		0.0044 U	0.087 UJ	0.087 UJ	0.0044 U
Heptachlor epoxide		0.0068 U	0.14 UJ	0.14 UJ	0.0068 U
Isodrin		0.0096 U	0.19 UJ	0.19 UJ	0.0096 U
Kepone		0.97 U	0.97 UJ	0.97 UJ	0.97 U
Methoxychlor		0.022 U	0.45 UJ	0.45 UJ	0.022 U
Toxaphene		1.3 U	25 UJ	25 UJ	1.3 U
Total Metals (ug/L)					
Antimony		7.2 U	7.2 U	7.6 U	7.2 U
Arsenic		5.6 U	54	63	5.6 U
Barium		1000	53 J	47 J	210
Beryllium		1.3 U	1.3 U	1.3 U	1.3 U
Cadmium		2.4 U	2.4 U	2.4 U	2.4 U
Chromium		12 U	14 U	13 U	18 U
Cobalt		0.58 U	1.7 U	1.4 U	1.3 U
Copper		24 U	24 U	24 U	24 U
Lead		4.3 J	3 U	3 U	3 U
Mercury		0.08 U	0.08 UJ	0.08 UJ	0.08 U
Nickel		6.4 U	14 U	12 U	12 J
Selenium		12 U	12 UJ	12 UJ	12 U
Silver		1.8 U	1.8 U	1.8 U	1.8 U
Thallium		11 U	11 U	11 U	11 U
Tin		18 U	18 U	18 U	18 U
Vanadium		16 U	16 U	16 U	16 U
Zinc		130 U	130 U	130 U	130 U
Dissolved Metals (ug/L)					
Antimony		7.2 U	7.2 U	7.2 U	7.2 U
Arsenic		5.6 U	41 U	50	5.6 U
Barium		820	40 U	54 J	200
Beryllium		1.3 U	1.3 U	1.3 U	1.3 U

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SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

	Site ID	60SB02	60SB04	60SB04	60SB05
	Sample ID	60GW02	60GW04	60GW04D	60GW05
	Date	1/18/2009	1/15/2009	1/15/2009	1/18/2009
Dissolved Metals (ug/L)					
Cadmium		2.4 U	2.4 U	2.4 U	2.4 U
Chromium		12 U	12 U	12 U	12 U
Cobalt		1.4 U	0.97 U	2.1 U	1.9 U
Copper		24 UJ	24 U	24 U	24 UJ
Lead		3 U	3 U	3 U	3 U
Mercury		0.08 UJ	0.08 UJ	0.08 UJ	0.08 UJ
Nickel		6.4 U	6.4 U	8.8 U	11 J
Selenium		12 U	12 UJ	12 UJ	12 U
Silver		1.8 U	1.8 U	1.8 U	1.8 U
Thallium		11 U	11 U	11 U	11 U
Tin		18 U	18 U	18 U	18 U
Vanadium		16 U	16 U	16 U	16 U
Zinc		130 U	130 U	130 U	130 U
TPH DRO and GRO (mg/L)					
Diesel Range Organics		1.1	0.5	0.48	0.34
Gasoline Range Organics		0.012 U	0.012 R	0.012 U	0.093

QA/QC DATA

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**SUMMARY OF ANALYTICAL RESULTS - EQUIPMENT RINSATE AND FIELD BLANKS
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Sample ID	JAN09-ER01	JAN09-ER02	JAN09-ER04	JAN09-ER06	JAN09-FB01	JAN09-FB02
Date	1/12/2009	1/13/2009	1/15/2009	1/17/2009	1/14/2009	1/20/2009
Volatile Organic Compounds (ug/L)						
1,1,1,2-Tetrachloroethane	0.29 U					
1,1,1-Trichloroethane	0.39 U					
1,1,2,2-Tetrachloroethane	0.26 U					
1,1,2-Trichloroethane	0.51 U					
1,1-Dichloroethane	0.32 U					
1,1-Dichloroethene	0.36 U					
1,2,3-Trichloropropane	0.42 U					
1,2-Dibromo-3-Chloropropane	0.48 U					
1,2-Dichloroethane	0.31 U					
1,2-Dichloropropane	0.36 U					
2-Butanone (MEK)	0.9 J	0.83 J	0.6 U	0.6 U	0.75 J	0.6 U
2-Chloro-1,3-butadiene	0.35 U	0.35 U	0.35 U	0.35 UJ	0.35 U	0.35 UJ
2-Hexanone	0.68 U					
3-Chloro-1-propene	0.46 U					
4-Methyl-2-pentanone (MIBK)	0.6 U					
Acetone	5 U	5.7 J	5 U	5 U	5 U	5 U
Acetonitrile	15 U					
Acrolein	18 U					
Acrylonitrile	3.8 U					
Benzene	0.32 U					
Bromoform	0.41 UJ	0.41 UJ	0.41 U	0.41 U	0.41 U	0.41 U
Bromomethane	0.5 UJ					
Carbon disulfide	0.6 U					
Carbon tetrachloride	0.27 U					
Chlorobenzene	0.34 U					
Chlorodibromomethane	0.3 U	4.1				
Chloroethane	1 U	1 U	1 U	1 UJ	1 U	1 U
Chloroform	0.29 U	53				
Chloromethane	0.28 U					
cis-1,3-Dichloropropene	0.37 U					

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SWMU 60 - FORMER LANDFILL AT THE MARINA
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NAPR, CEIBA, PUERTO RICO**

Sample ID Date	JAN09-ER01 1/12/2009	JAN09-ER02 1/13/2009	JAN09-ER04 1/15/2009	JAN09-ER06 1/17/2009	JAN09-FB01 1/14/2009	JAN09-FB02 1/20/2009
Volatile Organic Compounds (ug/L)						
Dibromomethane	0.29 U					
Dichlorobromomethane	0.34 U	13				
Dichlorodifluoromethane	0.33 U					
Ethyl methacrylate	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	0.3 U					
Ethylene Dibromide	0.3 U					
Iodomethane	1 U	1 U	1 U	1 UJ	1 U	1 U
Isobutanol	19 R					
Methacrylonitrile	6.6 U					
Methyl methacrylate	0.38 U					
Methylene Chloride	1 U	1 U	1 U	1 U	1 U	1 U
Pentachloroethane	1.3 UJ					
Propionitrile	9.2 U					
Styrene	0.36 U					
Tetrachloroethene	0.28 U					
Toluene	0.31 U	0.31 U	1.2	0.45 J	0.31 U	0.31 U
trans-1,2-Dichloroethene	0.3 U					
trans-1,3-Dichloropropene	0.27 U					
trans-1,4-Dichloro-2-butene	0.83 U					
Trichloroethene	0.4 U					
Trichlorofluoromethane	0.29 UJ	0.29 UJ	0.29 U	0.29 U	0.29 U	0.29 U
Vinyl acetate	0.62 U	0.62 U	0.62 UJ	0.62 U	0.62 UJ	0.62 U
Vinyl chloride	0.2 U					
Xylenes, Total	0.87 U					
Semivolatile Organic Compounds (ug/L)						
1,2,4,5-Tetrachlorobenzene	0.23 U					
1,2,4-Trichlorobenzene	0.13 U					
1,2-Dichlorobenzene	0.13 U					
1,3,5-Trinitrobenzene	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ
1,3-Dichlorobenzene	0.12 U					
1,3-Dinitrobenzene	0.22 U					

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Sample ID Date	JAN09-ER01 1/12/2009	JAN09-ER02 1/13/2009	JAN09-ER04 1/15/2009	JAN09-ER06 1/17/2009	JAN09-FB01 1/14/2009	JAN09-FB02 1/20/2009
Semivolatile Organic Compounds (ug/L)						
1,4-Dichlorobenzene	0.12 U					
1,4-Dioxane	0.49 U					
1,4-Naphthoquinone	0.16 U					
1-Naphthylamine	0.33 U	0.33 U	0.33 UJ	0.33 UJ	0.33 U	0.33 U
2,2'-oxybis[1-chloropropane]	0.097 U					
2,3,4,6-Tetrachlorophenol	0.29 U	0.29 R				
2,4,5-Trichlorophenol	0.16 U	0.16 R				
2,4,6-Trichlorophenol	0.16 U	0.16 R				
2,4-Dichlorophenol	0.15 U	0.15 U	0.15 U	0.15 UJ	0.15 U	0.15 R
2,4-Dimethylphenol	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U	0.4 R
2,4-Dinitrophenol	2.4 UJ	2.4 U	2.4 U	2.4 UJ	2.4 UJ	2.4 R
2,4-Dinitrotoluene	0.17 U					
2,6-Dichlorophenol	0.21 U	0.21 R				
2,6-Dinitrotoluene	0.15 U	0.15 U	0.15 UJ	0.15 U	0.15 U	0.15 U
2-Acetylaminofluorene	0.19 U					
2-Chloronaphthalene	0.12 U					
2-Chlorophenol	0.15 U	0.15 U	0.15 U	0.15 UJ	0.15 U	0.15 R
2-Methylnaphthalene	0.022 U					
2-Methylphenol	0.15 U	0.15 U	0.15 U	0.15 UJ	0.15 U	0.15 R
2-Naphthylamine	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 U	1.1 U
2-Nitroaniline	0.14 U	0.14 U	0.14 UJ	0.14 UJ	0.14 U	0.14 UJ
2-Nitrophenol	0.17 U	0.17 U	0.17 U	0.17 UJ	0.17 U	0.17 R
2-Picoline	0.57 U					
2-Toluidine	0.32 U					
3 & 4 Methylphenol	0.15 U	0.15 U	0.15 U	0.15 UJ	0.15 U	0.15 R
3,3'-Dichlorobenzidine	3.7 U	3.7 UJ				
3,3'-Dimethylbenzidine	3.7 UJ	3.7 U	3.7 U	3.7 UJ	3.7 U	3.7 UJ
3-Methylcholanthrene	0.2 U					
3-Nitroaniline	0.28 U	0.28 U	0.28 U	0.28 UJ	0.28 U	0.28 UJ
4,6-Dinitro-2-methylphenol	0.49 UJ	0.49 U	0.49 U	0.49 UJ	0.49 UJ	0.49 R
4-Aminobiphenyl	0.68 U					

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SWMU 60 - FORMER LANDFILL AT THE MARINA
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NAPR, CEIBA, PUERTO RICO**

Sample ID Date	JAN09-ER01 1/12/2009	JAN09-ER02 1/13/2009	JAN09-ER04 1/15/2009	JAN09-ER06 1/17/2009	JAN09-FB01 1/14/2009	JAN09-FB02 1/20/2009
Semivolatile Organic Compounds (ug/L)						
4-Bromophenyl phenyl ether	0.16 U	0.16 R				
4-Chloro-3-methylphenol	0.16 U	0.16 U	0.16 U	0.16 UJ	0.16 U	0.16 R
4-Chloroaniline	0.4 U					
4-Chlorophenyl phenyl ether	0.15 U					
4-Nitroaniline	0.26 U	0.26 U	0.26 U	0.26 UJ	0.26 U	0.26 UJ
4-Nitrophenol	0.18 U	0.18 R				
4-Nitroquinoline-1-oxide	0.26 R					
7,12-Dimethylbenz(a)anthracene	0.2 U					
Acenaphthene	0.022 U					
Acenaphthylene	0.019 U	0.019 U	0.019 U	0.019 UJ	0.019 U	0.019 UJ
Acetophenone	0.97	1.2	0.19 U	0.21 J	0.19 U	0.19 U
alpha,alpha-Dimethyl phenethylamine	1.3 U					
Aniline	0.4 U					
Anthracene	0.025 U					
Aramite, Total	0.49 U					
Benzo[a]anthracene	0.049 U					
Benzo[a]pyrene	0.017 U					
Benzo[b]fluoranthene	0.02 U	0.02 UJ	0.02 U	0.02 UJ	0.02 U	0.02 U
Benzo[g,h,i]perylene	0.049 UJ	0.049 U	0.049 U	0.049 UJ	0.049 U	0.049 U
Benzo[k]fluoranthene	0.034 U					
Benzyl alcohol	3.8	5.8	0.65 J	1.6	3.6	0.16 R
Bis(2-chloroethoxy)methane	0.15 U					
Bis(2-chloroethyl)ether	0.14 U					
Bis(2-ethylhexyl) phthalate	0.34 U	0.34 U	0.34 UJ	0.43 J	0.34 U	0.34 U
Butyl benzyl phthalate	0.8 J	0.91 J	0.17 U	0.17 J	1	0.17 U
Chrysene	0.049 U					
Diallate	0.19 U					
Dibenz(a,h)anthracene	0.021 UJ	0.021 U	0.021 U	0.021 UJ	0.021 U	0.021 U
Dibenzofuran	0.097 U					
Diethyl phthalate	1.4	2.4	0.18 U	0.18 U	0.18 U	0.18 U
Dimethyl phthalate	0.17 U					

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Sample ID Date	JAN09-ER01 1/12/2009	JAN09-ER02 1/13/2009	JAN09-ER04 1/15/2009	JAN09-ER06 1/17/2009	JAN09-FB01 1/14/2009	JAN09-FB02 1/20/2009
Semivolatile Organic Compounds (ug/L)						
Di-n-butyl phthalate	1.3	1.7	0.11 UJ	0.21 J	3.5	0.11 R
Di-n-octyl phthalate	0.097 U					
Dinoseb	0.49 U	0.49 U	0.49 U	0.49 U	0.49 UJ	0.49 U
Ethyl methanesulfonate	0.23 U					
Fluoranthene	0.018 U					
Fluorene	0.025 U	0.025 U	0.025 U	0.025 UJ	0.025 U	0.025 UJ
Hexachlorobenzene	0.16 U					
Hexachlorobutadiene	0.13 U					
Hexachlorocyclopentadiene	0.49 UJ	0.49 UJ	0.49 U	0.49 UJ	0.49 UJ	0.49 UJ
Hexachloroethane	0.15 U					
Hexachlorophene	49 UJ	49 UJ	49 U	49 UJ	49 U	49 U
Hexachloropropene	0.12 U	0.12 UJ				
Indeno[1,2,3-cd]pyrene	0.049 UJ	0.049 U	0.049 U	0.049 UJ	0.049 U	0.049 U
Isophorone	0.15 U	0.15 U	0.15 U	0.15 UJ	0.15 U	0.15 UJ
Isosafrole	0.3 U					
Methapyrilene	0.26 U	0.26 U	0.26 U	0.26 U	0.26 UJ	0.26 U
Methyl methanesulfonate	0.46 U					
Naphthalene	0.025 U					
Nitrobenzene	0.14 U					
N-Nitro-o-toluidine	0.24 U					
N-Nitrosodiethylamine	0.32 U					
N-Nitrosodimethylamine	0.19 U	0.19 U	0.19 UJ	0.19 U	0.19 U	0.19 U
N-Nitrosodi-n-butylamine	0.18 U					
N-Nitrosodi-n-propylamine	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U	0.13 UJ
N-Nitrosodiphenylamine	0.17 U	0.17 U	0.17 U	0.17 UJ	0.17 U	0.17 UJ
N-Nitrosomethylethylamine	0.28 U					
N-Nitrosomorpholine	0.19 U					
N-Nitrosopiperidine	0.22 U					
N-Nitrosopyrrolidine	0.25 U					
p-Dimethylamino azobenzene	0.6 U					
Pentachlorobenzene	0.27 U					

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SWMU 60 - FORMER LANDFILL AT THE MARINA
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Sample ID Date	JAN09-ER01 1/12/2009	JAN09-ER02 1/13/2009	JAN09-ER04 1/15/2009	JAN09-ER06 1/17/2009	JAN09-FB01 1/14/2009	JAN09-FB02 1/20/2009
Semivolatile Organic Compounds (ug/L)						
Pentachloronitrobenzene	0.3 U					
Pentachlorophenol	0.18 U	0.18 U	0.18 U	0.18 UJ	0.18 U	0.18 R
Phenacetin	0.2 U					
Phenanthrene	0.03 U					
Phenol	0.2 J	0.14 U	0.14 U	0.14 UJ	0.5 J	0.14 U
p-Phenylene diamine	2.4 UJ	2.4 UJ	2.4 U	2.4 U	2.4 UJ	2.4 UJ
Pronamide	0.25 U					
Pyrene	0.021 U					
Pyridine	0.22 U					
Safrole, Total	0.23 U					
Pesticides/PCBs (ug/L)						
4,4'-DDD	0.006 UJ	0.006 U	0.0057 U	0.0056 U	0.0057 U	0.0057 U
4,4'-DDE	0.01 UJ	0.01 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U
4,4'-DDT	0.015 UJ	0.015 U	0.015 U	0.014 U	0.015 U	0.015 U
Aldrin	0.0061 UJ	0.0061 U	0.0058 U	0.0057 U	0.0058 U	0.0058 U
alpha-BHC	0.0083 UJ	0.0083 U	0.0079 U	0.0076 U	0.0079 U	0.0079 U
beta-BHC	0.0084 UJ	0.0084 U	0.008 U	0.0077 U	0.008 U	0.008 U
Chlordane (technical)	0.05 UJ	0.05 U	0.048 U	0.046 U	0.048 U	0.048 U
Chlorobenzilate	0.14 UJ	0.14 UJ	0.14 U	0.13 U	0.14 U	0.14 UJ
delta-BHC	0.007 UJ	0.007 U	0.0067 U	0.0065 U	0.0067 U	0.0067 U
Dieldrin	0.008 UJ	0.008 U	0.0076 U	0.0074 U	0.0076 U	0.0076 U
Endosulfan I	0.0056 UJ	0.0056 U	0.0053 U	0.0052 U	0.0053 U	0.0053 U
Endosulfan II	0.0051 UJ	0.0051 U	0.0049 U	0.0047 U	0.0049 U	0.0049 U
Endosulfan sulfate	0.0071 UJ	0.0071 U	0.0068 U	0.0066 U	0.0068 U	0.0068 U
Endrin	0.008 UJ	0.008 U	0.0076 U	0.0074 U	0.0076 U	0.0076 U
Endrin aldehyde	0.0092 UJ	0.0092 U	0.0087 U	0.0085 U	0.0087 U	0.0087 U
gamma-BHC (Lindane)	0.006 UJ	0.006 U	0.0057 U	0.0056 U	0.0057 U	0.0057 U
Heptachlor	0.0046 UJ	0.0046 U	0.0044 U	0.0042 U	0.0044 U	0.0044 U
Heptachlor epoxide	0.0071 UJ	0.0071 U	0.0068 U	0.0066 U	0.0068 U	0.0068 U
Isodrin	0.01 UJ	0.01 U	0.0096 U	0.0093 U	0.0096 U	0.0096 U
Kepone	0.051 UJ	0.051 UJ	0.049 U	0.047 U	0.049 U	0.049 UJ

APPENDIX D

Revised: July 22, 2011

**SUMMARY OF ANALYTICAL RESULTS - EQUIPMENT RINSATE AND FIELD BLANKS
SWMU 60 - FORMER LANDFILL AT THE MARINA
PHASE I RFI REPORT
NAPR, CEIBA, PUERTO RICO**

Sample ID Date	JAN09-ER01 1/12/2009	JAN09-ER02 1/13/2009	JAN09-ER04 1/15/2009	JAN09-ER06 1/17/2009	JAN09-FB01 1/14/2009	JAN09-FB02 1/20/2009
Pesticides/PCBs (ug/L)						
Methoxychlor	0.023 UJ	0.023 U	0.022 U	0.022 U	0.022 U	0.022 U
Toxaphene	1.3 UJ	1.3 U	1.3 U	1.2 U	1.3 U	1.3 U
PCB-1016	NA	NA	NA	0.092 U	0.094 U	0.094 U
PCB-1221	NA	NA	NA	0.38 U	0.39 U	0.39 U
PCB-1232	NA	NA	NA	0.078 U	0.081 U	0.081 U
PCB-1242	NA	NA	NA	0.091 U	0.093 U	0.093 U
PCB-1248	NA	NA	NA	0.078 U	0.081 U	0.081 U
PCB-1254	NA	NA	NA	0.086 U	0.088 U	0.088 U
PCB-1260	NA	NA	NA	0.094 U	0.097 U	0.097 U
Total Metals (ug/L)						
Antimony	1.2 J	1.9 J	1.1 J	0.51 J	1.2 J	1.1 J
Arsenic	0.45 J	0.63 J	0.7 J	0.29 J	0.54 J	0.74 J
Barium	2 U	2 U	2 U	2 U	2 U	2 U
Beryllium	0.065 U					
Cadmium	0.12 U					
Chromium	0.6 U	1.4 J	0.86 J	0.6 U	0.94 J	0.79 J
Cobalt	0.029 U	0.034 J				
Copper	1.2 U	6.1	1.2 U	1.2 U	1.2 U	18
Lead	0.15 U	0.65 J	0.15 U	0.15 U	0.15 U	0.6 J
Mercury	0.08 U					
Nickel	0.32 U	1.5	0.33 J	0.32 U	0.32 U	0.32 U
Selenium	0.6 U					
Silver	0.09 U	0.099 J	0.09 U	0.09 U	0.09 U	0.09 U
Thallium	0.55 U					
Tin	0.9 U					
Vanadium	0.99 J	1 J	0.99 J	0.8 U	1.1 J	2.7 J
Zinc	6.5 U	14 J	6.5 U	6.5 U	7.2 J	30
TPH DRO and GRO (mg/L)						
Diesel Range Organics	0.41	0.36	0.028 U	0.038 J	0.25	0.028 U
Gasoline Range Organics	0.012 U	0.016 J				

APPENDIX E
PHASE I RFI DATA VALIDATION SUMMARIES

TEST AMERICA SAVANNAH SDG NAPR43887-1

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

April 22, 2009
SDG# NAPR43887-1, Test America-Savannah
NAPR SWMU 60, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR43887-1. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22 and 8081B, October 2006-SOP#HW-44), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	Pest	GRO	DRO	Metals
60-SB01-00	680-43887-1	soil	X	X	X			X
60-SB02-00	680-43887-2	soil	X	X	X			X
60-SB03-00	680-43887-3	soil	X	X	X			X
60-SB03-00D	680-43887-4	soil	X	X	X			X
60-SB04-00	680-43887-5	soil	X	X	X	X	X	X
60-SB04-01	680-43887-6	soil	X	X	X	X	X	X
60-SB04-01D	680-43887-7	soil	X	X	X	X	X	X
60-SB04-03	680-43887-8	soil	X	X	X	X	X	X
60-SB03-01	680-43887-11	soil	X	X	X			X
60-SB03-00 MS	680-43887-3MS	soil	X	X	X			X
60-SB03-00 MSD	680-43887-3MSD	soil	X	X	X			X
60-SB04-01 MS	680-43887-6MS	soil	X	X	X	X	X	X
60-SB04-01 MSD	680-43887-6MSD	soil	X	X	X	X	X	X

The following quality control samples were provided with this SDG: sample 60-SB03-00D was the field duplicate of sample 60-SB03-00; and sample 60-SB04-01D was the field duplicate of sample 60-SB04-01.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks
- Internal Standards
- Surrogate Recoveries
- Laboratory Control Samples *
- Matrix Spike Recoveries
- Matrix Duplicate RPDs *
- Serial Dilutions *
- Field Duplicates
- Identification/Quantitation
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

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One of the matrix spike and matrix spike duplicates did not exhibit results within criteria for one compound that resulted in qualifications to the associated sample.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

The matrix spikes and matrix spike duplicates did not exhibit results within criteria for several compounds that resulted in qualifications to the associated sample.

One of the field duplicate pairs did not exhibit comparable results for several compounds that required qualifications to the data.

Pest

Samples in this SDG were diluted due to matrix issues that caused the calibration criteria to be exceeded for many target compounds. The undiluted analyses of the samples were rejected in favor of the diluted analyses. The reporting limits and method detection limits were adjusted accordingly.

Some compounds exhibited non-compliant %Ds that resulted in qualification as estimated in associated samples.

Reported positive results that exhibited column quantitation %Ds greater than 25% were qualified based on Region II guidelines.

GRO

Three samples exhibited non-compliant internal standard area recoveries that added qualifications to the data.

One sample exhibited high surrogate recovery; therefore the positive results for GRO were qualified as estimated (J).

DRO

No qualifications to the data were required.

Metals

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Blank contamination was noted and qualification was required in the samples in this SDG.

The associated MS/MSD pairs exhibited non-compliant recoveries and/or RPDs for which qualifications were required. Some recoveries were >200%, however positive results were not rejected because at least one recovery was acceptable (mercury, barium, cobalt, and copper) or the reported positive results should be considered potentially biased high but not unusable (zinc).

Field duplicate pairs exhibited some analytes that exceeded Region II criteria. Qualifications were required.

Specific Evaluation of Data

Data Completeness

Resubmissions were required for the SVOA fraction because one of the Form VIIIs did not contain all pages. The laboratory was contacted and all required pages were submitted. Resubmissions were required for the Pesticide fraction due to incorrectly transcribed retention time window forms, missing raw data, incorrect case narrative and clarification questions. Resubmission was required for the DRO fraction due to missing sample raw data. Copies of e-mail correspondence are included in the validation worksheets.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/12-13/09 and samples were received at the laboratory 01/14/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/16/09	acrolein acrylonitrile	49.0% 44.9%	all samples	J/UJ

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SVOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/15/09	4-nitroquinoline-1-oxide	0.0334	all samples	J/R
CC 01/22/09	2,4-dinitrophenol	31.0%	60-SB01-00, 60-SB02-00, 60-SB03-00D, 60-SB04-00, 60-SB04-01D, 60-SB03-01, 60-SB04-03, 60-SB04-01	J/UJ
	4,6-dinitro-2-methylphenol	21.2%		
	dibenzo(a,h)anthracene	23.3%		
	indeno(1,2,3-cd)pyrene	41.3%		
	benzo(g,h,i)pyrene	32.0%		
	hexachlorocyclopentadiene	27.5%		
	p-phenylene diamine	54.5%		
	2-naphthylamine	45.7%		
	1,3,5-trinitrobenzene	40.9%		
	3,3'-dimethylbenzidine	45.6%		
	hexachlorophene	23.7%		
	4-nitroquinoline-1-oxide	0.0303		J/R
CC 01/26/09	2,4,5-trichlorophenol	21.7%	60-SB03-00	J/UJ
	2-nitroaniline	28.9%		
	3-nitroaniline	22.3%		
	di-n-butyl phthalate	33.5%		
	bis(2-ethylhexyl)phthalate	30.5%		
	3,3'-dichlorobenzidene	33.6%		
	indeno(1,2,3-cd)pyrene	32.8%		
	p-phenylene diamine	53.9%		
	1-naphthylamine	27.9%		
	2-naphthylamine	54.0%		
	methapyrilene	24.9%		
	3,3'-dimethylbenzidine	56.2%		
	4-nitroquinoline-1-oxide	0.0333		J/R

Pesticides

Calibration standards exhibited %Ds that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
MB20034	kepone	93	60SB01-00	J/UJ
MB20053	chlorobenzilate	60.4	60SB02-00	
	kepone	60.4101.9		

Blanks

VOA

The associated method and/or QC blanks exhibited contamination as noted in the

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following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
JAN09-ER02	acetone	5.7 ug/L	25 ug/L	2X RL
	2-butanone	0.83	10	2X RL
JAN09-FB01	2-butanone	0.75J ug/L	1 ug/L	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
60-SB-03-00, 60-SB03-00D, 60-SB04-01, 60-SB04-01, 60SB-04-03, 60-SB-03-01	acetone	U at reported value
60-SB04-01, 60-SB04-01, 60SB-04-03	2-butanone	U at reported value

SVOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
Method Blank	bis(2-ethylhexyl)phthalate	7.3J ug/Kg	33 ug/Kg	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
60-SB01-00, 60-SB02-00, 60-SB03-00D, 60-SB04-00, 60-SB04-01D, 60-SB03-01, 60-SB03-00	bis(2-ethylhexyl)phthalate	U at reported value

Metals

Associated blanks exhibited contamination as noted in the following table. The laboratory reported non-detect results to the MDL for this project. Therefore, the blank flagging actions were modified to take this into consideration. Please see the Glossary of Qualification Flags and Abbreviations for details.

Blank ID	Analyte	Concentration	Action Level	Q Flag
MB 680-127816/20-A	antimony	0.24J mg/Kg	RL	U at reported value
	silver	0.034J mg/Kg	RL	U at reported value
	zinc	0.98J mg/Kg	RL	U at reported value
ICB	beryllium	0.026J mg/L	RL	U at reported value
	cadmium	0.035J mg/L	RL	U at reported value
JAN09-ER02	copper	6.1 mg/L	blank level up to 10X blank level	J
	nickel	1.5 mg/L		
FB02	zinc	30 mg/L	<RL up to blank level	R
			blank level up to 10X blank level	J

Please note, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.

Associated samples and required qualifications are noted in the following table.

Sample ID	Analyte	Q Flag
all samples >MDL up to RL	antimony	U
all samples >MDL up to RL	silver	U
all samples >MDL up to RL	beryllium	U
all samples >MDL up to RL	cadmium	U
all samples >MDL up to RL	zinc	U
60SB04-01, 60SB04-01D, 60SB04-03	copper	J
60SB03-00D, 60SB04-00, 60SB04-01, 60SB04-01D, 60SB04-03	nickel	J
60SB04-01	zinc	R
60SB04-01D, 60SB04-03	zinc	J

Internal Standards

GRO

Samples 60-SB04-00, 60-SB04-01 and 60-SB04-01D exhibited low internal standard area recovery; therefore the GRO compound result was qualified as estimated (J/UJ).

Surrogates

GRO

Sample 60-SB04-01D exhibited high surrogate recovery; therefore the positive result was qualified as estimated (J).

Matrix Spikes

VOA

The matrix spike and matrix spike duplicate associated with sample 60-SB03-00 and duplicate 60-SB03-00D exhibited 0% recovery for vinyl acetate; therefore the non-detected results for this compound was qualified as estimated (UJ).

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SVOA

The matrix spike and matrix spike duplicate associated with sample 60-SB03-00 and duplicate 60-SB03-00D exhibited non compliant recoveries for the compounds listed in the table below, qualifications were applied as listed.

Compound	MS % Rec	MSD % Rec	QC Limit	Qualifier	
aniline	5	4	10-110	J/UJ	
4-chloroaniline	10	8	21-110		
3,3'-dichlorobenzidine	12	6	27-110		
2,4-dimethylphenol	5	6	44-110		
4,6-dinitro-2-methylphenol	9	16	10-126		
2,4-dinitrotoluene	36	44	46-116		
hexachlorobutadiene	40	42	44-110		
hexachlorocyclopentadiene	6	14	26-110		
2-methylphenol	29	29	44-110		
3&4-methylphenol	34	35	43-110		
pentachlorophenol	22	26	28-117		
benzo(a)anthracene	175	176	44-116		J
benzo(a)pyrene	147	155	41-115		
benzo(b)fluoranthene	139	161	40-112		
benzo(g,h,i)perylene	150	167	37-119		
chrysene	206	210	46-115		
fluoranthene	207	229	41-116		
indeno(1,2,3-cd)pyrene	145	157	35-126		
phenanthrene	132	147	38-110		
pyrene	349	407	41-111		

The matrix spike and matrix spike duplicate associated with sample 60-SB04-01 and duplicate 60-SB04-01D exhibited low recoveries for 2,4-dimethylphenol at 32% and 43% (QC limit 44-110%), 2,4-dinitrotoluene at 39% and 42% (QC limit 46-116%) and pentachlorophenol at 21% and 15% (QC limit 28-117%); therefore the non-detected results for this compound was qualified as estimated (UJ).

Metals

The matrix spike pairs submitted in this SDG exhibited non-compliant %R's for several analytes, requiring qualification in the field samples. Please note that although some analytes were recovered above 200% positive results were not rejected but should be considered potentially biased high. A summary of these non-compliances and affected samples are noted in the following table.

MS	Analytes	Samples	%R	Q Flag
60SB03-00	cadmium	all samples	63/148	J/UJ
	mercury		597/194	J
60SB04-01	barium		152/264	J
	cobalt		383/165	
	copper		176/285	
	lead		151/181	
	zinc		231/202	
mercury	72/52	J/UJ		

Matrix Duplicates

Metals

The matrix duplicate pairs submitted in this SDG exhibited non-compliant RPD's for two analytes, requiring qualification in the field samples. A summary of these non-compliances and affected samples are noted in the following table.

MD	Analytes	Samples	RPD	Q Flag
60SB03-00	cadmium	all samples		J/UJ
	mercury			

Field Duplicates

SVOA

Sample 60-SB04-01 and duplicate 60-SB04-01D exhibited non-comparable results for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene and pyrene with 200% RPD for all compounds; therefore results for these compounds were qualified as estimated (J/UJ).

Metals

Sample 60SB03-00 and duplicate sample 60SB03-00D exhibited RPDs greater than 35% or absolute differences >2X RL but less than 4X RL for antimony (67%), arsenic (80%), barium (56%), chromium (43%), copper (69%), tin (42), nickel (54%) and zinc (111%). Therefore results for these analytes were qualified as estimated J/UJ in the field duplicate pair. Sample 60SB03-00 and duplicate sample 60SB03-00D exhibited RPDs greater than 120% for cadmium (151%) and lead (143%). Therefore based on Region II guidelines results for these analytes were rejected R in the field duplicate pair.

Sample 60SB04-01 and duplicate sample 60SB04-01D exhibited RPDs greater than 35% for cobalt (54%), lead (55%), and zinc (45%). Therefore results for these analytes were qualified as estimated J/UJ in the field duplicate pair.

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Identification/Quantitation

Pesticides

Dilutions were required for several samples due to matrix interferences that caused the continuing calibrations to significantly exceed criteria for some analytes. For this reason all undiluted analyses for samples 60SB03-00, 60SB03-00D, 60SB04-00, 60SB04-01, 60SB04-01D, 60SB04-03, and 60SB03-01 were not used in favor of the dilution analyses. Reporting limits and method detection limits were adjusted accordingly.

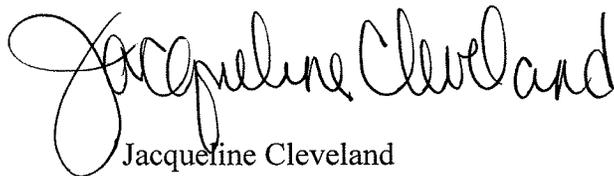
The reported positive result for 4,4'-DDD in sample 60SB04-01 exhibited a column quantitation %D greater than 25% but less than 70% at 47.6%. This result is qualified as estimated J based on Region II guidelines.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
all samples	acrolein acrylonitrile	+/-	J/UJ
60-SB-03-00, 60-SB03-00D, 60-SB04-01, 60-SB04-01, 60SB-04-03, 60-SB-03-01	acetone	+	U at reported value
60-SB04-01, 60-SB04-01, 60SB-04-03	2-butanone	+	U at reported value
60-SB03-00, 60-SB03-00D	vinyl acetate	-	UJ

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
60-SB01-00, 60-SB02-00, 60-SB03-00D, 60-SB04-00, 60-SB04-01D, 60-SB03-01, 60-SB04-03, 60-SB04-01	2,4-dinitrophenol 4,6-dinitro-2-methylphenol dibenzo(a,h)anthracene indeno(1,2,3-cd)pyrene benzo(g,h,i)pyrene hexachlorocyclopentadiene p-phenylene diamine 2-naphthylamine 1,3,5-trinitrobenzene 3,3'-dimethylbenzidine hexachlorophene	+/-	J/UJ
60-SB01-00, 60-SB02-00, 60-SB03-00D, 60-SB04-00, 60-SB04-01D, 60-SB03-01, 60-SB04-03, 60-SB04-01	4-nitroquinoline-1-oxide	+/-	J/R
60-SB03-00	2,4,5-trichlorophenol 2-nitroaniline 3-nitroaniline di-n-butyl phthalate bis(2-ethylhexyl)phthalate 3,3'-dichlorobenzidene indeno(1,2,3-cd)pyrene p-phenylene diamine 1-naphthylamine 2-naphthylamine methapyrilene 3,3'-dimethylbenzidine	+/-	J/UJ
60-SB03-00	4-nitroquinoline-1-oxide	+/-	J/R
60-SB01-00, 60-SB02-00, 60-SB03-00D, 60-SB04-00, 60-SB04-01D, 60-SB03-01, 60-SB03-00	bis(2-ethylhexyl)phthalate	+	U at reported value

Summary of Data Qualifications

SVOA

Sample ID	Compound	Results	Q flag
60-SB03-00, 60-SB03-00D	aniline 4-chloroaniline 3,3'-dichlorobenzidine 2,4-dimethylphenol 4,6-dinitro-2-methylphenol 2,4-dinitrotoluene hexachlorobutadiene hexachlorocyclopentadiene 2-methylphenol 3&4-methylphenol pentachlorophenol	+/-	J/UJ
60-SB03-00, 60-SB03-00D	benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g,h,i)perylene chrysene fluoranthene indeno(1,2,3-cd)pyrene phenanthrene pyrene	+	J
60-SB04-01, 60-SB04-01D	2,4-dimethylphenol, 2,4-dinitrotoluene, pentachlorophenol	-	UJ
60-SB04-01, 60-SB04-01D	benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene	+/-	J/UJ

Pesticides

Sample ID	Compound	Results	Q flag
60SB01-00, 60SB02-00	chlorobenzilate kepone	+/-	J/UJ
60SB03-00, 60SB03-00D, 60SB04-00, 60SB04-01, 60SB04-01D, 60SB04-03, 60SB03-01	all compounds	+/-	R
60SB04-01	4,4'-DDD	+	J

GRO

Sample ID	Compound	Results	Q flag
60-SB04-00, 60-SB04-01, 60-SB04-01D	GRO	+/-	J/UJ
60-SB04-01D	GRO	+	J

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Summary of Data Qualifications

DRO

Sample ID	Compound	Results	Q flag
No qualifications were required			

Metals

Sample ID	Analyte	Results	Q flag
all samples >MDL up to RL	antimony	+J	U
all samples >MDL up to RL	silver	+J	U
all samples >MDL up to RL	beryllium	+J	U
all samples >MDL up to RL	cadmium	+J	U
all samples >MDL up to RL	zinc	+J	U
60SB04-01, 60SB04-01D, 60SB04-03	copper	+	J
60SB03-00D, 60SB04-00, 60SB04-01, 60SB04-01D, 60SB04-03	nickel	+	J
60SB04-01	zinc	+	R
60SB04-01D, 60SB04-03	zinc	+	J
all samples	cadmium mercury	+/-	J/UJ
all samples	barium cobalt copper lead zinc	+	J
60SB03-00, 60SB03-00D	antimony arsenic barium chromium copper nickel tin zinc	+	J
60SB03-00, 60SB03-00D	cadmium lead	+	R
60SB04-01, 60SB04-01D	cobalt zinc lead	+	J

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.
- R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
- J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR43887-2

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airsides Business Park
100 Airside Drive
Moon Township, PA 15108

April 24, 2009
SDG# NAPR43887-2, Test America-Savannah
NAPR SWMU 60, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR43887-2. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW22 and 8081B, October 2006-SOP#HW-44), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7470A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	Pesticides	GRO	DRO	Metals
JAN09-ER01	680-43887-9	water	X	X	X	X	X	X
JAN09-ER02	680-43887-10	water	X	X	X	X	X	X
JAN09-TB01	680-43887-12	water	X			X		

The following quality control samples were provided with this SDG: samples JAN09-ER01 and JAN09-ER02- equipment blanks and JAN09-TB01-trip blanks.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks *
- Internal Standards *
- Surrogate Recoveries

- Laboratory Control Samples *
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs *
- Serial Dilutions *
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

All sample vials for sample JAN09-TB01 were received with headspace; therefore all non-detected results were qualified as rejected.

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Pesticides

The continuing calibrations exhibited high %D values, which resulted in the qualification of two compounds.

One sample exhibited a low surrogate recovery. Positive and non-detect results were qualified as estimated J/UJ.

GRO

All sample vials for sample JAN09-TB01 were received with headspace; therefore all non-detected results were qualified as rejected.

DRO

No qualifications were required in these field QC blanks.

Metals

No qualifications were required in these field QC blanks.

Specific Evaluation of Data

Data Completeness

Resubmissions were required for the Pesticide fraction due to incorrectly transcribed retention time window forms and clarification questions.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/12-13/09 and samples were received at the laboratory 01/14/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Sample Condition

VOA and GRO

All sample vials for sample JAN09-TB01 were received with headspace; therefore all non-detected results were qualified as rejected.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/07/09	isobutanol	0.03294	all samples	J/R
CC 01/16/09	isobutanol	0.02906	all samples	J/R
	pentachloroethane	44.3%		J/UJ
	bromomethane	24.6%		
	trichlorofluoromethane	25.6%		
	bromoform	20.6%		

SVOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/15/09	4-nitroquinoline-1-oxide	0.0334	all samples	J/R
CC 01/21/09	4-nitroquinoline-1-oxide	0.0318	JAN09-ER02	J/R
	p-phenylene diamine	47.6%		J/UJ
	2-naphthylamine	30.4%		
	3,3'-dimethylbenzidine	31.0%		
	hexachlorophene	24.7%		
	hexachlorocyclopentadiene	25.9%		
CC 01/22/09	benzo(b)fluoranthene	20.8%	JAN09-ER01	J/UJ
	2,4-dinitrophenol	31.0%		
	4,6-dinitro-2-methylphenol	21.2%		
	dibenzo(a,h)anthracene	23.3%		
	indeno(1,2,3-cd)pyrene	41.3%		
	benzo(g,h,i)pyrene	32.0%		
	hexachlorocyclopentadiene	27.5%		
	p-phenylene diamine	54.5%		
	2-naphthylamine	45.7%		
	1,3,5-trinitrobenzene	40.9%		
	3,3'-dimethylbenzidine	45.6%		
hexachlorophene	23.7%			
	4-nitroquinoline-1-oxide	0.0303		J/R

Pesticides

Calibration standards exhibited %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	%D	Samples	Q Flag
CCV	kepone	26.8/85.2	all samples	J/UJ
	chlorobenzilate	26.8		

Surrogate Recoveries

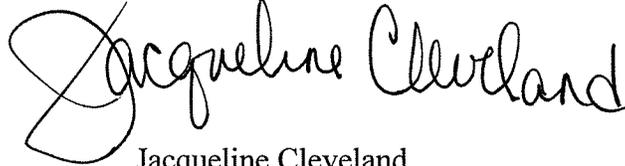
Pesticides

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NAPR SWMU 60, Puerto Rico
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Sample JAN09-ER01 exhibited a low recovery for TCX (52%). Positive and non-detect results for the sample were qualified as estimated J/UJ.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

A handwritten signature in black ink that reads "Jacqueline Cleveland". The signature is written in a cursive style with a large, looping initial "J".

Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
JAN09-TB01	all results	+/-	J/R
all samples	isobutanol	+/-	J/R
all samples	isobutanol	+/-	J/R
all samples	pentachloroethane bromomethane trichlorofluoromethane bromoform	+/-	J/UJ

PAH

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
JAN09-ER02	4-nitroquinoline-1-oxide	+/-	J/R
JAN09-ER02	p-phenylene diamine 2-naphthylamine 3,3'-dimethylbenzidine hexachlorophene hexachlorocyclopentadiene benzo(b)fluoranthene	+/-	J/UJ
JAN09-ER01	2,4-dinitrophenol 4,6-dinitro-2-methylphenol dibenzo(a,h)anthracene indeno(1,2,3-cd)pyrene benzo(g,h,i)pyrene hexachlorocyclopentadiene p-phenylene diamine 2-naphthylamine 1,3,5-trinitrobenzene 3,3'-dimethylbenzidine hexachlorophene	+/-	J/UJ
JAN09-ER01	4-nitroquinoline-1-oxide	+/-	J/R

Pesticides

Sample ID	Compound	Results	Q flag
all samples	kepone chlorobenzilate	+/-	J/UJ
JAN09-ER01	all compounds	+/-	J/UJ

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Summary of Data Qualifications

GRO

Sample ID	Compound	Results	Q flag
JAN09-TB01	GRO	+/-	J/R

DRO

Sample ID	Compound	Results	Q flag
No qualifications			

Metals

Sample ID	Analyte	Results	Q flag
No qualifications			

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

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NAPR SWMU 60, Puerto Rico
SDG# NAPR43887-2

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Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.
- R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
- J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR43925-1

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

March 26, 2008
SDG# NAPR43925-1, Test America-Savannah
NAPR SWMU 70, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR43925-1. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22, and 8082A, October2006-SOP #HW-45), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	PCB	GRO	DRO	Metals
70SB01-00	680-43925-1	soil	X	X	X	X	X	X
70SB01-01	680-43925-2	soil	X	X	X	X	X	X
70SB02-00	680-43925-3	soil	X	X	X	X	X	X
70SB02-01	680-43925-4	soil	X	X	X	X	X	X
JAN09-TB02	680-43925-7	water	X			X		

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations *
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *

- Matrix Duplicate RPDs *
- Serial Dilutions
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The sample vials for sample JAN09-TB02 were received at the laboratory with headspace. As according to Region II guidelines when all the vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, all positive results were qualified as estimated (J) and non-detected results were rejected (R).

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %RSD and %D values, in the initial and continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

PCB

No qualifications to the data were required.

GRO

The sample vials for sample JAN09-TB02 were received at the laboratory with headspace. As according to Region II guidelines when all the vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, all positive results were qualified as estimated (J) and non-detected results were rejected (R).

DRO

Blank contamination was noted in the associated field QC blanks. Qualifications to the data were required.

Metals

Blank contamination was noted and qualification was required in the samples in this SDG.

The serial dilution submitted in this SDG exhibited a non-compliant %D for several analytes. All results for non-compliant analytes were qualified as estimated J/UJ.

Specific Evaluation of Data

Data Completeness

Resubmissions were required. Retention times were not correctly transcribed from raw data to data summary forms in the PCB fraction. The laboratory was contacted and corrected forms were received. A copy of the e-mail correspondence is included in the validation worksheets. Corrections to the metals case narrative were requested and received due to typographical errors.

Sample Condition

VOA and GRO

The sample vials for sample JAN09-TB02 were received at the laboratory with headspace. As according to Region II guidelines when all the vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, all positive results were qualified as estimated (J) and non-detected results were rejected (R).

Technical Holding Times

According to chain of custody records, sampling was performed on 01/14/09 and samples were received at the laboratory 01/15/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited RRF, %RSD and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/16/09	acrolein acrylonitrile	49.0% 44.9%	70SB01-00, 70SB01-01, 70SB02-00, 70SB02-01	J/UJ
IC 01/07/09	isobutanol	0.0329	JAN09-TB02	J/R
CC 01/16/09	isobutanol	0.02906	JAN09-TB02	J/R
	pentachloroethane	44.3%		J/UJ
	bromomethane	24.6%		
	trichlorofluoromethane	25.6%		
	bromoform	20.6%		

SVOA

Calibration standards exhibited RRF, %RSD and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/15/09	4-nitroquinoline-1-oxide	0.0334	70SB01-00, 70SB02-00	J/R
	dimethyl phthalate	0.0426		
	acenaphthylene	0.0499		
	dibenzofuran	0.0499		
CC 01/21/09	hexachlorocyclopentadiene	25.9%	70SB02-00	J/UJ
	benzo(b)fluoranthene	20.8%		
	p-phenylene diamine	47.6%		
	2-naphthylamine	30.4%		
	3,3'-dimethylbenzidine	31.0%		
	hexachlorophene	24.7%		
	4-nitroquinoline-1-oxide	0.0318		J/R

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/22/09	hexachlorocyclopentadiene	27.5%	70SB01-00	J/UJ
	2,4-dinitrophenol	31.0%		
	4,6-dinitro-2-methylphenol	21.2%		
	dibenz(a,h)anthracene	23.3%		
	indeno(1,2,3-cd)pyrene	41.3%		
	benzo(g,h,i)perylene	32.0%		
	aramite, total	34.0%		
	p-phenylene diamine	54.5%		
	1,2,4,5-tetrachlorobenzene	22.1%		
	1-naphthylamine	25.7%		
	2-naphthylamine	45.7%		
	1,3,5-trinitrobenzene	40.9%		
	3,3'-dimethylbenzidine	45.6%		
hexachlorophene	23.7%			
	4-nitroquinoline-1-oxide	0.0303		J/R

Blanks

VOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
JAN09-TB02	acetone	9.8J ug/L	25 ug/L	2X RL
	2-butanone	0.74J	10	2X RL
JAN09-ER03	2-butanone	1.0J ug/L	10 ug/L	2X RL
JAN09-FB01	2-butanone	0.75J ug/L	10 ug/L	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
70SB01-01, 70SB02-01	acetone	U at reported value
70SB02-01	2-butanone	U at reported value

SVOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the

Michael Baker, Jr., Inc.
NAPR SWMU 70, Puerto Rico
SDG# NAPR43925-1

CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
Method Blank	bis(2-ethylhexyl)phthalate	7.7J ug/Kg	33 ug/Kg	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
all samples	bis(2-ethylhexyl)phthalate	U at reported value

DRO

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Action Level	Q Flag
JAN09-FB01	DRO	0.25 mg/L	8.325 mg/Kg	U
JAN09-ER03	DRO	0.26 mg/L	8.658 mg/Kg	U

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
all samples	DRO	U

Metals

Associated blanks exhibited contamination as noted in the following table. The laboratory reported non-detect results to the MDL for this project. Therefore, the blank flagging actions were modified to take this into consideration. Please see the Glossary of Qualification Flags and Abbreviations for details.

Blank ID	Analyte	Concentration	Action Level	Q Flag
MB 680-127817/20-A	antimony	0.26J mg/Kg	>MDL up to RL	U
	vanadium	0.15J mg/Kg	>MDL up to RL	U
	zinc	0.88J mg/Kg		
JAN09-ER03	arsenic	0.55J ug/L	>MDL up to RL	U
	chromium	1.4J ug/L		
JAN09-FB02	copper	18 ug/L	>blank level up to 10X blank level	J
	lead	0.60 ug/L	>MDL up to RL	U

Please note, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination. Please note that JAN09-FB02 was only associated with the soil borings with a -01 in the sample ID.

Associated samples and required qualifications are noted in the following table.

Sample ID	Analyte	Q Flag
70SB01-00, 70SB01-01	antimony	U
70SB01-01	vanadium	U
70SB01-00, 70SB02-00, 70SB02-01	zinc	U
70SB02-00	arsenic	U
70SB01-01	chromium	U
70SB02-01	lead	U
70SB02-01	copper	J

Serial Dilutions

Metals

The serial dilution analysis submitted in this SDG exhibited a non-compliant %D for several analytes, requiring qualification in the field samples. A summary of these non-compliances and affected samples are noted in the following table.

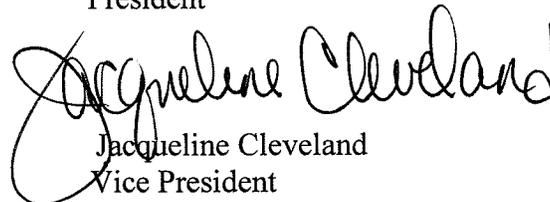
SD	Analytes	Samples	%D	Q Flag
60SB05-00 (from SDG NAPR43925-2)	barium	all samples	28	J/UJ
	chromium		30	
	cobalt		27	
	copper		22	
	lead		22	
	nickel		24	
	vanadium		33	
	zinc		15	

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
JAN09-TB02	all results	+/-	J/R
70SB01-00, 70SB01-01, 70SB02-00, 70SB02-01	acrolein acrylonitrile	+/-	J/UJ
JAN09-TB02	isobutanol	+/-	J/R
JAN09-TB02	isobutanol	+/-	J/R
JAN09-TB02	pentachloroethane bromomethane trichlorofluoromethane bromoform	+/-	J/UJ
70SB01-01, 70SB02-01	acetone	+	U at reported value
70SB02-01	2-butanone	+	U at reported value

SVOA

Sample ID	Compound	Results	Q flag
70SB01-00, 70SB02-00	4-nitroquinoline-1-oxide dimethyl phthalate acenaphthylene dibenzofuran	+/-	J/R
70SB02-00	hexachlorocyclopentadiene benzo(b)fluoranthene p-phenylene diamine 2-naphthylamine 3,3'-dimethylbenzidine hexachlorophene	+/-	J/UJ
70SB02-00	4-nitroquinoline-1-oxide	+/-	J/R
70SB01-00	hexachlorocyclopentadiene 2,4-dinitrophenol 4,6-dinitro-2-methylphenol dibenz(a,h)anthracene indeno(1,2,3-cd)pyrene benzo(g,h,i)perylene aramite, total p-phenylene diamine 1,2,4,5-tetrachlorobenzene 1-naphthylamine 2-naphthylamine 1,3,5-trinitrobenzene 3,3'-dimethylbenzidine hexachlorophene	+/-	J/UJ
70SB01-00	4-nitroquinoline-1-oxide	+/-	J/R
all samples	bis(2-ethylhexyl)phthalate	+	U at reported value

Summary of Data Qualifications

PCB

Sample ID	Compound	Results	Q flag
No qualifications were required			

GRO

Sample ID	Compound	Results	Q flag
JAN09-TB02	all results	+/-	J/R

DRO

Sample ID	Compound	Results	Q flag
all samples	DRO	+	U

Metals

Sample ID	Analyte	Results	Q flag
70SB01-00, 70SB01-01	antimony	+J	U
70SB01-01	vanadium	+J	U
70SB01-00, 70SB02-00, 70SB02-01	zinc	+J	U
70SB02-00	arsenic	+J	U
70SB01-01	chromium	+J	U
70SB02-01	lead	+J	U
70SB02-01	copper	+ >RL up to 10X blank level	J
all samples	barium chromium cobalt copper lead nickel vanadium zinc	+/-	J/UJ

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.
- R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
- J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR43925-2

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

April 22, 2009
SDG# NAPR43925-2, Test America-Savannah
NAPR SWMU 60, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR43925-2. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22 and 8081B, October 2006-SOP#HW-44), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	Pest	GRO	DRO	Metals
60SB05-00	680-43925-5	soil	X	X	X	X	X	X
60SB05-01	680-43925-6	soil	X	X	X	X	X	X

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs *
- Serial Dilutions

- Field Duplicates NA
- Identification/Quantitation
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and QC blank associated with samples in this batch. Qualifications were added to the data.

SVOA

The continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and QC blank associated with samples in this batch. Qualifications were added to the data.

Pest

One compound required qualification in one sample due to non-compliant continuing calibration %Ds.

One of the samples in this SDG was diluted due to matrix issues that caused the calibration criteria to be exceeded for many target compounds. The undiluted analysis of the sample was rejected in favor of the diluted analysis. The reporting limits and method detection limits were adjusted accordingly.

Michael Baker, Jr., Inc.
NAPR SWMU 60, Puerto Rico
SDG# NAPR43925-2

GRO

No qualifications were required to the data.

DRO

No qualifications to the data were required.

Metals

Blank contamination was noted and qualification was required in the samples in this SDG.

The serial dilution exhibited several analytes with high %Ds. Qualifications were required for these analytes.

Specific Evaluation of Data

Data Completeness

Resubmissions were required for the Pesticide fraction due to incorrectly transcribed retention time window forms, incorrect case narrative and clarification questions.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/12-13/09 and samples were received at the laboratory 01/14/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/16/09	acrolein acrylonitrile	49.0% 44.9%	all samples	J/UJ

SVOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/15/09	4-nitroquinoline-1-oxide	0.0334	all samples	J/R
CCV 01/21/09	4-nitroquinoline-1-oxide	0.0318	all samples	J/R
	p-phenylene diamine	47.6%		J/UJ
	2-naphthylamine	30.4%		
	3,3'-dimethylbenzidine	31.0%		
	hexachlorophene	24.7%		
	hexachlorocyclopentadiene	25.9%		
	benzo(b)fluoranthene	20.8%		

Pesticides

Calibration standards exhibited %Ds that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CCV	kepone	-27.9, -93, 101.9, 60.4	60SB05-01	J/UJ

Blanks

VOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
JAN09-TB02	acetone	9.8J ug/L	25 ug/L	2X RL
	2-butanone	0.74J	10	2X RL
JAN09-ER02	acetone	5.7 ug/L	25 ug/L	2X RL
	2-butanone	0.83	10	2X RL
FB01	2-butanone	0.75J ug/L	10 ug/L	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
60SB05-00, 60-SB05-01	acetone	U at reported value
60SB05-00	2-butanone	U at reported value

Michael Baker, Jr., Inc.
 NAPR SWMU 60, Puerto Rico
 SDG# NAPR43925-2

SVOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
Method Blank	bis(2-ethylhexyl)phthalate	7.7J ug/Kg	33 ug/Kg	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
all samples	bis(2-ethylhexyl)phthalate	U at reported value

Metals

Associated blanks exhibited contamination as noted in the following table. The laboratory reported non-detect results to the MDL for this project. Therefore, the blank flagging actions were modified to take this into consideration. Please see the Glossary of Qualification Flags and Abbreviations for details.

Blank ID	Analyte	Concentration	Action Level	Q Flag
MB 680-127817/20-A	antimony	0.26J mg/Kg	>MDL up to RL	U
	silver	0.051J mg/Kg	>MDL up to RL	U
ICB	beryllium	0.026J mg/L	>MDL up to RL	U
	cadmium	0.035J mg/L	>MDL up to RL	U
JAN09-ER02	copper	6.1 ug/L	>blank level up to 10X blank level	J
	nickel	1.5 ug/L		
JAN09-FB02	copper	18 ug/L	>blank level up to 10X blank level	J
	zinc	30 ug/L		

Please note, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.

Associated samples and required qualifications are noted in the following table.

Sample ID	Analyte	Q Flag
all samples >MDL up to RL	antimony	U
all samples >MDL up to RL	silver	U
all samples >MDL up to RL	beryllium	U
all samples >MDL up to RL	cadmium	U
all samples	copper	J
all samples	nickel	J
60SB05-01	zinc	J

Serial Dilutions

Metals

The serial dilution analysis submitted in this SDG exhibited a non-compliant %D for several analytes, requiring qualification in the field samples. A summary of these non-compliances and affected samples are noted in the following table.

SD	Analytes	Samples	%D	Q Flag
60SB05-00 (from SDG NAPR43925-2)	barium	all samples	28	J/UJ
	chromium		30	
	cobalt		27	
	copper		22	
	lead		22	
	nickel		24	
	vanadium		33	
	zinc		15	

Identification/Quantitation

Pesticides

Dilution was required for one sample due to matrix interferences that caused the continuing calibrations to significantly exceed criteria for some analytes. For this reason the undiluted analysis for sample 60SB05-00 was not used in favor of the dilution analyses. Reporting limits and method detection limits were adjusted accordingly.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Michael Baker, Jr., Inc.
NAPR SWMU 60, Puerto Rico
SDG# NAPR43925-2

Page 6

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Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
all samples	acrolein acrylonitrile	+/-	J/UJ
60SB05-00, 60-SB05-01	acetone	+	U at reported value
60SB05-00	2-butanone	+	U at reported value

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
all samples	4-nitroquinoline-1-oxide	+/-	J/R
all samples	p-phenylene diamine 2-naphthylamine 3,3'-dimethylbenzidine hexachlorophene hexachlorocyclopentadiene benzo(b)fluoranthene	+/-	J/UJ
all samples	bis(2-ethylhexyl)phthalate	+	U at reported value

Pesticides

Sample ID	Compound	Results	Q flag
60SB05-01	kepone	+/-	J/UJ
60SB05-00	all compounds	+/-	R

GRO

Sample ID	Compound	Results	Q flag
No qualifications			

DRO

Sample ID	Compound	Results	Q flag
No qualifications			

Summary of Data Qualifications

Metals

Sample ID	Analyte	Results	Q flag
all samples >MDL up to RL	antimony	+J	U
all samples >MDL up to RL	silver	+J	U
all samples >MDL up to RL	beryllium	+J	U
all samples >MDL up to RL	cadmium	+J	U
all samples	copper	+	J
all samples	nickel	+	J
60SB05-01	zinc	+	J
all samples	barium chromium cobalt copper lead nickel vanadium zinc	+/-	J/UJ

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR43961-2

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

March 26, 2008
SDG# NAPR43961-2, Test America-Savannah
NAPR QC, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR43961-2. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22, 8081B, October 2006-SOP#HW-44, and 8082A, October 2006-SOP #HW-45), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	Pest	PCB	GRO	DRO	Metals
JAN09-TB03	680-43961-7	water	X				X		
JAN09-ER03	680-43961-8	water	X	X	X	X	X	X	X
JAN09-FB01	680-43961-9	water	X	X	X	X	X	X	X

The following quality control samples were provided with this SDG: sample JAN09-TB03- trip blank; sample JAN09-FB01- field blank and sample JAN09-ER03- equipment blank. The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations *
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *

- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Serial Dilutions *
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Pesticides

No qualifications to the data were required.

PCB

No qualifications to the data were required.

GRO

Sample JAN09-TB03 was received with headspace; therefore the non-detected GRO result was qualified as rejected, as according to Region II guidelines.

DRO

No qualifications to the data were required.

Metals

No qualifications to the data were required.

Specific Evaluation of Data

Data Completeness

Resubmissions were required. Retention times were not correctly transcribed from raw data to data summary forms in the Pesticide/PCB fraction. The laboratory was contacted and corrected forms were received. A copy of the e-mail correspondence is included in the validation worksheets.

Sample Condition

GRO

Sample JAN09-TB03 was received with headspace; therefore the non-detected GRO result was qualified as rejected, as according to Region II guidelines.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/14/09 and samples were received at the laboratory 01/16/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/20/09	isobutanol	0.0460	all samples	J/R
CC 01/26/09	pentachloroethane	27.0%	all samples	J/UJ
	bromomethane	32.5%		
	vinyl acetate	21.5%		
	isobutanol	0.0414		J/R

SVOA

Calibration standards exhibited RRF and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 02/05/09	4-nitroquinoline-1-oxide	0.0212	all samples	J/R
CC 02/05/09	hexachlorocyclopentadiene	20.5%	all samples	J/UJ
	2,4-dinitrophenol	42.1%		
	4,6-dinitro-2-methylphenol	34.4%		
	dinoseb	26.6%		
	3,3'-dichlorobenzidine	32.0%		
	p-phenylene diamine	24.1%		
	methapyrilene	26.1%		
	4-nitroquinoline-1-oxide	0.0275		J/R

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
all samples	isobutanol	+/-	J/R
all samples	pentachloroethane bromomethane vinyl acetate	+/-	J/UJ
all samples	isobutanol	+/-	J/R

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
all samples	hexachlorocyclopentadiene 2,4-dinitrophenol 4,6-dinitro-2-methylphenol dinoseb 3,3'-dichlorobenzidine p-phenylene diamine methapyrilene	+/-	J/UJ
all samples	4-nitroquinoline-1-oxide	+/-	J/R

Pesticides

Sample ID	Compound	Results	Q flag
No qualifications			

PCB

Sample ID	Compound	Results	Q flag
No qualifications			

GRO

Sample ID	Compound	Results	Q flag
JAN09-TB03	GRO	-	R

DRO

Sample ID	Compound	Results	Q flag
No qualifications			

Metals

Sample ID	Analyte	Results	Q flag
No qualifications			

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR43991-2

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

March 26, 2008
SDG# NAPR43991-2, Test America-Savannah
NAPR QC, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR43991-2. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22, and 8081B, October 2006-SOP#HW-44), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	Pest	GRO	DRO	Metals
JAN09-ER04	680-43991-4	water	X	X	X	X	X	X
JAN09-TB04	680-43991-5	water	X			X		

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations *
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Serial Dilutions *

- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Pesticides

No qualifications to the data were required.

GRO

No qualifications to the data were required.

DRO

No qualifications to the data were required.

Metals

No qualifications to the data were required.

Specific Evaluation of Data

Data Completeness

Resubmissions were required. The data package did not contain cooler temperature information. The laboratory was contacted and the required information was provided. Retention times were not correctly transcribed from raw data to data summary forms in the Pesticide fraction. The laboratory was contacted and corrected forms were received. A copy of the e-mail correspondence is included in the validation worksheets.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/15/09 and samples were received at the laboratory 01/17/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited RRF and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/21/09	isobutanol	0.04600	all samples	J/R
CC 01/21/09	isobutanol	0.04138	all samples	J/R
	bromomethane	32.5%		J/UJ
	vinyl acetate	21.5%		
	pentachloroethane	27.0%		

SVOA

Calibration standards exhibited RRF and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

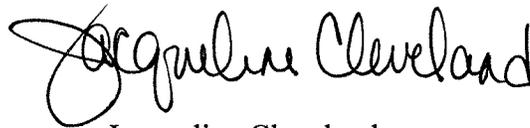
Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/23/09	4-nitroquinoline-1-oxide	0.0334	all samples	J/R
CC 01/29/09	4-nitroquinoline-1-oxide	0.0320	all samples	J/R
	n-nitrosodimethylamine	30.0%		J/UJ
	2-nitroaniline	27.6%		
	2,6-dinitrotoluene	22.3%		
	di-n-butyl phthalate	302%		
	bis(2-ethylhexyl)phthalate	22.5%		
	3,3'-dichlorobenzidine	43.1%		
1-naphthylamine	31.0%			
2-naphthylamine	54.1%			

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
all samples	isobutanol	+/-	J/R
all samples	isobutanol	+/-	J/R
all samples	bromomethane vinyl acetate pentachloroethane	+/-	J/UJ

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
all samples	4-nitroquinoline-1-oxide	+/-	J/R
all samples	n-nitrosodimethylamine 2-nitroaniline 2,6-dinitrotoluene di-n-butyl phthalate bis(2-ethylhexyl)phthalate 3,3'-dichlorobenzidine 1-naphthylamine 2-naphthylamine	+/-	J/UJ

Pesticides

Sample ID	Compound	Results	Q flag
No qualifications required.			

GRO

Sample ID	Compound	Results	Q flag
No qualifications required.			

DRO

Sample ID	Compound	Results	Q flag
No qualifications required.			

Metals

Sample ID	Analyte	Results	Q flag
No qualifications required			

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR44002-1

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

April 22, 2009
SDG# NAPR44002-1, Test America-Savannah
NAPR SWMU 60, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR44002-1. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22 and 8081B, October 2006-SOP#HW-44), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	Pest	GRO	DRO	TMetals	DMetals
60GW04	680-44002-1	water	X	X	X	X	X	X	X
60GW04D	680-44002-2	water	X	X	X	X	X	X	X
60GW04 MS	680-44002-1MS	water	X	X	X	X	X	X	X
60GW04 MSD	680-44002-1MSD	water	X	X	X	X	X	X	X

The following quality control samples were provided with this SDG: sample 60GW04D was the field duplicate of sample 60GW04.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations *
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *

- Laboratory Control Samples *
- Matrix Spike Recoveries
- Matrix Duplicate RPDs *
- Serial Dilutions *
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The sample vials for sample 60GW04D contained headspace; therefore all positive results were qualified as estimated (J) and non-detected results were qualified as rejected (R).

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

The matrix spike and matrix spike duplicate exhibited several compounds with low recoveries that resulted qualifications to the data.

Pesticides

Results in the samples were qualified as estimated due to matrix interferences noted in chromatography. Samples were analyzed at a 1:40 dilution due to this interference and no undiluted runs were provided. Chromatography interferences were apparent in the diluted runs.

GRO

No qualifications were required for the data.

DRO

No qualifications to the data were required.

Metals

Blank contamination was noted and qualification was required in the samples in this SDG.

The matrix spikes pairs submitted in this SDG exhibited non-compliant recoveries in both the MS and the MSD for several analytes for which qualifications were required. All positive results for barium, cobalt, copper, lead and zinc were qualified as estimated J and all positive and non-detect results for cadmium and nickel were qualified as estimated J/UJ.

Specific Evaluation of Data

Data Completeness

Resubmissions were required for the VOA fraction. A new the case narrative was submitted to clarify that sample 60GW04D was analyzed with sample vials that contained headspace. Resubmissions were required for the Pesticide fraction due to incorrectly transcribed retention time window forms and clarification questions.

Sample Condition

VOA

The sample vials for sample 60GW04D contained headspace; therefore all positive results were qualified as estimated (J) and non-detected results were qualified as rejected (R).

Technical Holding Times

According to chain of custody records, sampling was performed on 01/15/09 and samples were received at the laboratory 01/17/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 01/20/09	isobutanol	0.0460	all samples	J/R
CC 01/21/09	bromomethane	32.5%	all samples	J/UJ
	vinyl acetate	21.5%		
	pentachloroethane	27.0%		
	isobutanol	0.04138		J/R

SVOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 02/05/09	4-nitroquinoline-1-oxide	0.0212	all samples	J/R
CC 02/06/09	4-nitroquinoline-1-oxide	0.0299	60GW04	J/R
	3,3'-dichlorobenzidine	37.5%		J/UJ
	hexachloropropene	29.1%		
	p-phenylene diamine	29.8%		
	1,3,5-trinitrobenzene	28.1%		
	3,3'-dimethylbenzidine	20.7%		
	hexachlorophene	26.0%		

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 02/09/09	4-nitroquinoline-1-oxide	0.0314	60GW04D	J/R
	hexachlorocyclopentadiene	28.5%		J/UJ
	benzo(b)fluoranthene	20.7%		
	indeno(1,2,3-cd)pyrene	26.5%		
	dibenz(a,h)anthracene	34.1%		
	benzo(g,h,i)perylene	38.9%		
	hexachloropropene	20.6%		
	1-naphthylamine	23.5%		
2-naphthylamine	43.6%			
	3,3'-dimethylbenzidine	28.8%		

Blanks

VOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
JAN09-FB01	2-butanone	0.75J ug/L	1 ug/L	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
60GW04D	2-butanone	U at reported value

Metals

Associated blanks exhibited contamination as noted in the following table. The laboratory reported non-detect results to the MDL for this project. Therefore, the blank flagging actions were modified to take this into consideration. Please see the Glossary of Qualification Flags and Abbreviations for details.

Blank ID	Analyte	Concentration	Action Level	Q Flag
MB TOTAL	antimony	1.8J mg/L	RL	U at reported value
	chromium	0.96J mg/L	RL	U at reported value
MB DISSOLVED	arsenic	0.61J mg/L	RL	U at reported value
ICB	cobalt	0.033J mg/L	RL	U at reported value
JAN09-ER04	nickel	0.33J mg/L	RL	U at reported value

Please note, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.

Associated samples and required qualifications are noted in the following table.

Sample ID	Analyte	Q Flag
all total metals samples >MDL up to RL	chromium antimony	U
all dissolved metals samples >MDL up to RL	arsenic	U
all samples >MDL up to RL	cobalt	U
all samples >MDL up to RL	nickel	U

Matrix Spikes

SVOA

The matrix spike and matrix spike duplicate associated with sample 60GW04 and duplicate 60GW04D exhibited low recoveries for benzo(g,h,i)perylene at 42% and 37% (QC limit 46-117%), benzo(k)fluoranthene at 49% and 51% (QC limit 53-119%), bis(2-ethylhexyl)phthalate at 25% and 25% (QC limit 47-134%), dibenz(a,h)anthracene at 37% and 37% (QC limit 42-112%), di-n-octyl phthalate at 9% and 12% (QC limit 44-134%) and indeno(1,2,3-cd)pyrene at 31% and 34% (QC limit 39-125%); therefore all results were qualified as estimated (J/UJ).

Metals

The matrix spike pairs associated with the samples exhibited non-compliant %R's for antimony and mercury in both the total and dissolved metals analysis, requiring qualification in the field samples. A summary of these non-compliances and affected samples are noted in the following table.

MS	Analytes	Samples	%R	Q Flag
60GW04 total	selenium	all total metals samples	67/62	J/UJ
	mercury		50/54	
60GW04 dissolved	selenium	all dissolved metals samples	73/72	J/UJ
	mercury		68/63	

Identification/Quantitation

Pesticides

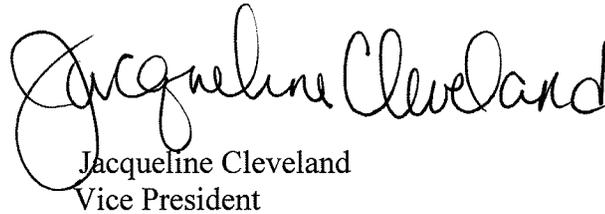
Results in all of the samples were qualified as estimated due to matrix interferences noted in chromatography. Samples were analyzed at a 1:20 dilution due to this interference and no undiluted runs were provided. Chromatography interferences were apparent in the diluted runs.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

A handwritten signature in black ink that reads "Laura Maschhoff". The signature is fluid and cursive, with a large, stylized initial "L".

Laura Maschhoff
President

A handwritten signature in black ink that reads "Jacqueline Cleveland". The signature is fluid and cursive, with a large, stylized initial "J".

Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
60GW04D	all results	+/-	J/R
all samples	isobutanol	+/-	J/R
all samples	bromomethane vinyl acetate pentachloroethane	+/-	J/UJ
all samples	isobutanol	+/-	J/R
60GW04D	2-butanone	+	U at reported value

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
60GW04	4-nitroquinoline-1-oxide	+/-	J/R
60GW04	3,3'-dichlorobenzidine hexachloropropene p-phenylene diamine 1,3,5-trinitrobenzene 3,3'-dimethylbenzidine hexachlorophene	+/-	J/UJ
60GW04D	4-nitroquinoline-1-oxide	+/-	J/R
60GW04D	hexachlorocyclopentadiene benzo(b)fluoranthene indeno(1,2,3-cd)pyrene dibenz(a,h)anthracene benzo(g,h,i)perylene hexachloropropene 1-naphthylamine 2-naphthylamine 3,3'-dimethylbenzidine	+/-	J/UJ
60GW04, 60GW04D	benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, di-n-octyl phthalate, indeno(1,2,3-cd)pyrene		

Pesticides

Sample ID	Compound	Results	Q flag
all samples	all compounds	+/-	J/UJ

Summary of Data Qualifications

GRO

Sample ID	Compound	Results	Q flag
No qualifications			

DRO

Sample ID	Compound	Results	Q flag
No qualifications			

Metals

Sample ID	Analyte	Results	Q flag
all total metals samples >MDL up to RL	chromium antimony	+J	U
all dissolved metals samples >MDL up to RL	arsenic	+J	U
all samples >MDL up to RL	cobalt	+J	U
all samples >MDL up to RL	nickel	+J	U
all samples	selenium mercury	+/-	J/UJ

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.
- R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
- J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

August 25, 2009
SDG# NAPR44002-1, Test America-Savannah
NAPR SWMU 60, Puerto Rico

Dear Mr. Kimes,

The following report is an addendum to the data validation for SDG # NAPR44002-1. The Form Is supplied herein are to replace the Form Is found within the previous portion of the validation report.

Sample ID	Lab ID	Matrix	VOA App IX	GRO
60GW04	680-44002-1	water	X	X

VOA and GRO

Based on field notes, sample 60GW04 experienced a reaction to the HCl preservative in the VOA vial; therefore all positive results were qualified as estimated (J) and non-detected results were qualified as rejected (R).

Specific Evaluation of Data

Sample Condition

VOA and GRO

Based on field notes, sample 60GW04 experienced a reaction to the HCl preservative in the VOA vial; therefore all positive results were qualified as estimated (J) and non-detected results were qualified as rejected (R).

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President

Summary of Data Qualifications

VOA and GRO

Sample ID	Compound	Results	Q flag
60GW04	all results	+/-	J/R

TEST AMERICA SAVANNAH SDG NAPR44016-1

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

March 26, 2008
SDG# NAPR44016-1, Test America-Savannah
NAPR SWMU 60, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR44016-1. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22, and 8081B, October 2006-SOP#HW-44), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	PEST	GRO	DRO	TM	DM
60GW05	680-44016-1	water	X	X	X	X	X	X	X
60GW02	680-44016-2	water	X	X	X	X	X	X	X
JAN09-TB06	680-44016-3	water	X			X			

The following quality control samples were provided with this SDG: sample JAN09-TB06- trip blank. The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks
- Internal Standards *
- Surrogate Recoveries
- Laboratory Control Samples *
- Matrix Spike Recoveries NA

- Matrix Duplicate RPDs NA
- Serial Dilutions *
- Field Duplicates NA
- Identification/Quantitation
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that the reviewer added an F to the ID to distinguish a dissolved metals sample from a total metals sample as needed.

VOA

The continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %RSD and %D values, in the initial and continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

One sample exhibited low recovery for four of the six surrogates that resulted in qualifying all results as estimated.

Pesticides

No qualifications to the data were required.

GRO

No qualifications to the data were required.

DRO

No qualifications to the data were required.

Metals

Blank contamination was noted and qualification was required in the samples in this SDG.

The matrix spikes pairs submitted in this SDG exhibited non-compliant recoveries in both the MS and the MSD for the analytes copper and mercury for which qualifications were required.

Specific Evaluation of Data

Data Completeness

Resubmissions were required. Retention times were not correctly transcribed from raw data to data summary forms in the Pesticide fraction. The laboratory was contacted and corrected forms were received. A copy of the e-mail correspondence is included in the validation worksheets.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/18/09 and samples were received at the laboratory 01/20/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/22/09	iodomethane	45.8%	all samples	J/UJ
	2-chloro-1,3-butadiene	43.8%		
	pentachloroethane	37.6%		
	isobutanol	0.03212	J/R	

SVOA

Calibration standards exhibited RRF and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 02/05/09	4-nitroquinoline-1-oxide	0.0212	all samples	J/R
CC 02/06/09	3,3'-dichlorobenzidene	37.5%	60GW02	J/UJ
	hexachloropropene	29.1%		
	p-phenylene diamine	29.8%		
	1,3,5-trinitrobenzene	28.1%		
	3,3'-dimethylbenzidine	20.7%		
	hexachlorophene	26.0%		
	4-nitroquinoline-1-oxide	0.0299		
CC 02/09/09	hexachlorocyclopentadiene	28.5%	60GW05	J/UJ
	benzo(b)fluoranthene	20.7%		
	indeno(1,2,3-cd)pyrene	26.5%		
	dibenz(a,h)anthracene	34.1%		
	benzo(g,h,i)perylene	38.9%		
	hexachloropropene	20.6%		
	1-naphthylamine	23.5%		
	2-naphthylamine	43.6%		
	3,3'-dimethylbenzidine	28.8%		
4-nitroquinoline-1-oxide	0.0314	J/R		

Blanks

SVOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
Method Blank	di-n-butylphthalate	0.12J ug/L	1 ug/L	2X RL
JAN09-FB01	phenol	0.5J	0.97	RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
60GW05	di-n-butylphthalate	U at reported value
60GW05, 60GW02	phenol	U at reported value

Metals

Associated blanks exhibited contamination as noted in the following table. The laboratory reported non-detect results to the MDL for this project. Therefore, the blank flagging actions were modified to take this into consideration. Please see the Glossary of Qualification Flags and Abbreviations for details.

Blank ID	Analyte	Concentration	Action Level	Q Flag
CCB	cobalt	0.012J ug/L	>MDL up to RL	U
JAN09-ER04	chromium	0.86J ug/L	>MDL up to RL	U

Please note, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.

Associated samples and required qualifications are noted in the following table.

Sample ID	Analyte	Q Flag
all samples >MDL up to RL	cobalt	U
60GW05	chromium	U

Surrogates

SVOA

Sample 60GW02 exhibited low recoveries for 2-fluorophenol at 31% (QC limit 36-110%), phenol-d5 at 34% (QC limit 38-116%), nitrobenzene-d5 at 34% (QC limit 45-112%) and 2-fluorobiphenyl at 40% (QC limit 50-113%); therefore all results were qualified as estimated (J/UJ). The sample was re-analyzed out of holding time, however low recoveries were also exhibited.

Matrix Spikes

Metals

The matrix spike pairs submitted in this SDG exhibited non-compliant %R's for copper and mercury, requiring qualification in the field samples. A summary of these non-compliances and affected samples are noted in the following table.

MS	Analytes	Samples	%R	Q Flag
70GW02	copper	all samples	73/66	J/UJ
44002-1	mercury	all samples	68/63	J/UJ

Identification/Quantitation

SVOA

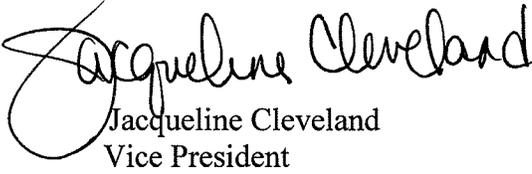
Sample 60GW02RE was not used in favor of the initial analysis due to exceeded holding times and non-compliant surrogate recoveries.

Michael Baker, Jr., Inc.
NAPR SWMU 60, Puerto Rico
SDG# NAPR44016-1

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,


Laura Maschhoff
President


Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
all samples	iodomethane 2-chloro-1,3-butadiene pentachloroethane	+/-	J/UJ
all samples	isobutanol	+/-	J/R

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
60GW02	3,3'-dichlorobenzidene hexachloropropene p-phenylene diamine 1,3,5-trinitrobenzene 3,3'-dimethylbenzidine hexachlorophene	+/-	J/UJ
60GW02	4-nitroquinoline-1-oxide	+/-	J/R
60GW05	hexachlorocyclopentadiene benzo(b)fluoranthene indeno(1,2,3-cd)pyrene dibenz(a,h)anthracene benzo(g,h,i)perylene hexachloropropene 1-naphthylamine 2-naphthylamine 3,3'-dimethylbenzidine	+/-	J/UJ
60GW05	4-nitroquinoline-1-oxide	+/-	J/R
60GW05	di-n-butylphthalate	+	U at reported value
60GW05, 60GW02	phenol	+	U at reported value
60GW02	all results	+/-	J/UJ
60GW02RE	all results	+/-	R

Pesticides

Sample ID	Compound	Results	Q flag
No qualifications			

GRO

Sample ID	Compound	Results	Q flag
No qualifications			

Summary of Data Qualifications

DRO

Sample ID	Compound	Results	Q flag
No qualifications			

Metals

Sample ID	Analyte	Results	Q flag
all samples >MDL up to RL	cobalt	>MDL up to RL	U
60GW05	chromium	>MDL up to RL	U
all dissolved metals samples	copper mercury	+/-	J/UJ

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR44016-2

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

April 22, 2009
SDG# NAPR44016-2, Test America-Savannah
NAPR SWMU 60, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR44016-2. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8270D-Rev 3, October 2006-SOP #HW-22 and 8081B, October 2006-SOP#HW-44), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	SVOA App IX	Pest	Metals
60SD01	680-44016-4	soil	X	X	X
60SD02	680-44016-5	soil	X	X	X
60SD03	680-44016-6	soil	X	X	X
60SD03D	680-44016-7	soil	X	X	X
60SD01MS	680-44016-4MS	soil		X	
60SD01MSD	680-44016-4MSD	soil		X	

The following quality control samples were provided with this SDG: sample 60SD03D was the field duplicate of sample 60SD03.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks

- Surrogate Recoveries *
- Laboratory Control Samples
- Matrix Spike Recoveries
- Matrix Duplicate RPDs *
- Serial Dilutions *
- Field Duplicates *
- Identification/Quantitation
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

All Fractions

Samples 60SD02 AND 60SD03 contained 50-90% water that resulted in qualifying the data results as estimated.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

The associated LCS exhibited two compounds with low recoveries that required qualifications to the data.

One sample required a dilution to obtain results within the calibration range.

Pesticides

Results in the samples were qualified as estimated due to matrix interferences noted in chromatography. Samples were analyzed at a 1:40 dilution due to this interference and no undiluted runs were provided. Chromatography interferences were apparent in the diluted runs.

Metals

Blank contamination was noted and qualification was required in the samples in this SDG.

The MS/MSD pair associated with the samples exhibited non-compliant recoveries for antimony. This analyte was qualified as estimated J/UJ in the samples.

Specific Evaluation of Data

Data Completeness

Resubmissions were required for the Pesticide fraction due to incorrectly transcribed retention time window forms, incorrect case narrative and clarification questions.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/17-18/09 and samples were received at the laboratory 01/20/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Sample Condition

All Fractions

The following soil samples contained 50-90% water that resulted in qualifying the results as estimated.

Sample ID	% Moisture
60SD02	60.0%
60SD03	53.4%

Initial/Continuing Calibration

SVOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 02/05/09	4-nitroquinoline-1-oxide	0.0212	all samples	J/R
CC 02/06/09	4-nitroquinoline-1-oxide	0.0299	all samples	J/R
	hexachloropropene	29.1%		J/UJ
	p-phenylene diamine	29.8%		
	1,3,5-trinitrobenzene	28.1%		
	3,3'-dimethylbenzidine	20.7%		
	hexachlorophene	26.0%		

Blanks

SVOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
Method Blank	bis(2-ethylhexyl)phthalate	9.4J ug/Kg	33 ug/Kg	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
60SD02, 60SD03, 60SD03D	bis(2-ethylhexyl)phthalate	U at reported value

Metals

Associated blanks exhibited contamination as noted in the following table. The laboratory reported non-detect results to the MDL for this project. Therefore, the blank flagging actions were modified to take this into consideration. Please see the Glossary of Qualification Flags and Abbreviations for details.

Blank ID	Analyte	Concentration	Action Level	Q Flag
MB 680-128333/27-A	antimony	0.26J mg/Kg	RL	U at reported value
	silver	0.019J mg/Kg	RL	U at reported value

Please note, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.

Associated samples and required qualifications are noted in the following table.

Michael Baker, Jr., Inc.
 NAPR SWMU 60, Puerto Rico
 SDG# NAPR44016-2
 Page 4

Sample ID	Analyte	Q Flag
all samples >MDL up to RL	antimony	U
all samples >MDL up to RL	silver	U

Matrix Spikes

Metals

The matrix spike pair submitted in this SDG exhibited non-compliant %R's for one analyte, requiring qualification in the field samples. A summary of these non-compliances and affected samples are noted in the following table.

MS	Analytes	Samples	%R	Q Flag
CABSS04	antimony	all samples	67/60	J/UJ

Laboratory control Samples

SVOA

The LCS associated with the samples exhibited non-compliant results for 3,3'-dichlorobenzidine at 6% (Qc limit 27-110%) and pentachlorophenol at 21% (QC limit 28-117%); therefore results were qualified as estimated (J/UJ).

Field Duplicates

Metals

Sample 60SD03 and duplicate 60SD03D exhibited non-comparable results for the analytes barium, cobalt, chromium, and nickel; therefore results for this compound were qualified as estimated J in the field duplicate pair.

Identification/Quantitation

SVOA

A dilution was required for sample 60SD01, due to results that exceeded the calibration range in the initial analysis. Therefore, the J-flagged compounds in the initial analysis were not used in favor of the corresponding result.

Pesticides

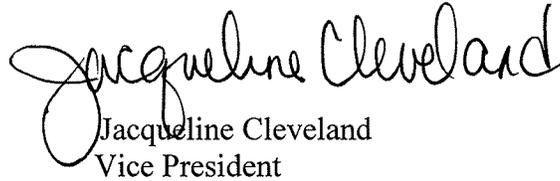
Results in all of the samples were qualified as estimated due to matrix interferences noted in chromatography. Samples were analyzed at a 1:40 dilution due to this interference and no undiluted runs were provided. Chromatography interferences were apparent in the diluted runs.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

SVOA

Sample ID	Compound	Results	Q flag
60SD02, 60SD03	all compounds	+/-	J/UJ
all samples	4-nitroquinoline-1-oxide	+/-	J/R
all samples	4-nitroquinoline-1-oxide	+/-	J/R
all samples	hexachloropropene p-phenylene diamine 1,3,5-trinitrobenzene 3,3'-dimethylbenzidine hexachlorophene	+/-	J/UJ
60SD02, 60SD03, 60SD03D	bis(2-ethylhexyl)phthalate	+	U at reported value
all samples	3,3'-dichlorobenzidine pentachlorophenol	+/-	J/UJ
60SD01	pyrene	+	R
60SD01DL	all compounds except pyrene	+/-	R

Pesticides

Sample ID	Compound	Results	Q flag
60SD02, 60SD03	all compounds	+/-	J/UJ
all samples	all compounds	+/-	J/UJ

Metals

Sample ID	Analyte	Results	Q flag
all samples	all results	+/-	J/UJ
all samples >MDL up to RL	antimony	+J	U
all samples >MDL up to RL	silver	+J	U
all samples	antimony	+/-	J/UJ
9SD03, 9SD03D	barium cobalt chromium nickel	+	J

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.
- R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
- J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR44044-3

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

March 26, 2008
SDG# NAPR44044-3, Test America-Savannah
NAPR SWMU 9, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR44044-3. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24 and 8270D-Rev 3, October 2006- SOP #HW-22), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7470A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	LL PAH	GRO	DRO	Metals
JAN09-TB07	680-44044-24	water	X		X		
9GW37	680-44044-36	water	X	X	X	X	
9GW44	680-440144-38	water	X	X	X	X	
13GW05	680-44044-39	water	X	X	X	X	
JAN09-ER07	680-44044-40	water	X	X	X	X	X
JAN09-TB08	680-44044-41	water	X		X		

The following quality control samples were provided with this SDG: samples JAN09-TB07 and JAN09-TB08- trip blanks and sample JAN09-ER07- equipment blank. The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks *
- Internal Standards *

- Surrogate Recoveries *
- Laboratory Control Samples
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Serial Dilutions *
- Field Duplicates NA
- Identification/Quantitation
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

PAH

The associated LCS exhibited several low recoveries that resulted in qualifications to the data.

GRO

No qualifications to the data were required.

DRO

No qualifications to the data were required.

Metals

No qualifications to the data were required.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/18-20/09 and samples were received at the laboratory 01/21/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/23/09	iodomethane	39.5%	JAN09-ER07 JAN09-TB08 JAN09-TB07	J/UJ
	2-chloro-1,3-butadiene	43.6%		
	pentachloroethane	45.4%		
	bromomethane	44.4%		
	chloroethane	49.1%		
	isobutanol	0.03638		J/R
CC 01/26/09	2-chloro-1,3-butadiene	43.3%	9GW37 9GW44	J/UJ
	pentachloroethane	46.5%		
	bromomethane	25.3%		
	isobutanol	0.03589		
CC 01/29/09	2-chloro-1,3-butadiene	31.3%	13GW05	J/UJ
	pentachloroethane	33.5%		
	dichlorodifluoromethane	21.4%		
	bromomethane	21.0%		
	isobutanol	0.03849		

Laboratory Control Samples

PAH

The LCS exhibited low recoveries for the following compounds listed in the table below, all associated samples were qualified as estimated (J/UJ) for these compounds.

Michael Baker, Jr., Inc.
NAPR SWMU 9, Puerto Rico
SDG# NAPR44044-3

Compound	% Rec	QC Limit
acenaphthene	46	54-110
acenaphthylene	49	50-110
1-methylnaphthalene	49	51-110
benzo(k)fluoranthene	51	53-119
fluoranthene	47	110
fluorene	50	57-110
anthracene	51	54-110
phenanthrene	47	58-110

Identification/Quantitation

PAH

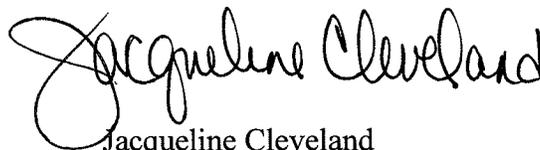
Samples 9GW37RE, 13GW05RE, JAN09-ER07 and 9GW44RE were not used in favor of the initial analysis due to exceeded holding times.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
JAN09-ER07, JAN09-TB08, JAN09-TB07	iodomethane 2-chloro-1,3-butadiene pentachloroethane bromomethane chloroethane	+/-	J/UJ
JAN09-ER07, JAN09-TB08, JAN09-TB07	isobutanol	+/-	J/R
9GW37, 9GW44	2-chloro-1,3-butadiene pentachloroethane bromomethane	+/-	J/UJ
9GW37, 9GW44	isobutanol	+/-	J/R
13GW05	2-chloro-1,3-butadiene pentachloroethane dichlorodifluoromethane bromomethane	+/-	J/UJ
13GW05	isobutanol	+/-	J/R

SVOA

Sample ID	Compound	Results	Q flag
all samples	acenaphthene acenaphthylene 1-methylnaphthalene benzo(k)fluoranthene fluoranthene fluorene anthracene phenanthrene	+/-	J/UJ
9GW37RE, 13GW05RE, JAN09-ER07, 9GW44RE	all results	+/-	R

GRO

Sample ID	Compound	Results	Q flag
No qualifications			

DRO

Sample ID	Compound	Results	Q flag
No qualifications			

Metals

Sample ID	Analyte	Results	Q flag
No qualifications			

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR44056-2

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airsides Business Park
100 Airside Drive
Moon Township, PA 15108

March 26, 2008
SDG# NAPR44056-2, Test America-Savannah
NAPR QC, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR44056-2. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22, 8081B, October 2006-SOP#HW-44, and 8082A, October 2006-SOP #HW-45), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	Pest	PCB	GRO	DRO	Metals
JAN09-ER06	680-44056-7	water	X	X	X	X	X	X	X

The following quality control samples were provided with this SDG: sample JAN09-ER06- equipment blank. The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA

- Serial Dilutions *
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

The associated LCS and LCSD exhibited several low recoveries that resulted in qualifications to the data.

Pesticides

No qualifications to the data were required.

PCB

No qualifications to the data were required.

GRO

No qualifications to the data were required.

DRO

No qualifications to the data were required.

Metals

No qualifications to the data were required.

Specific Evaluation of Data

Data Completeness

Resubmissions were required. Retention times were not correctly transcribed from raw data to data summary forms in the Pesticide/PCB fraction. The laboratory was contacted and corrected forms were received. A copy of the e-mail correspondence is included in the validation worksheets.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/17/09 and samples were received at the laboratory 01/22/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/23/09	iodomethane	39.5%	JAN09-ER06	J/UJ
	2-chloro-1,3-butadiene	43.6%		
	pentachloroethane	45.4%		
	bromomethane	44.4%		
	chloroethane	49.1%		
	isobutanol	0.03638		J/R

SVOA

Calibration standards exhibited RRF and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 02/05/09	4-nitroquinoline-1-oxide	0.0212	all samples	J/R
CC 02/09/09	hexachlorocyclopentadiene	28.5%	JAN09-ER06	J/UJ
	benzo(b)fluoranthene	20.7%		
	indeno(1,2,3-cd)pyrene	26.5%		
	dibenz(a,h)anthracene	34.1%		
	benzo(g,h,i)perylene	38.9%		
	hexachlorophene	20.6%		
	1-naphthylamine	23.5%		
	2-naphthylamine	43.6%		
	3,3'-dimethylbenzidine	28.8%		
	4-nitroquinoline-1-oxide	0.0314		J/R

Laboratory Control Samples

SVOA

The LCS and LCSD exhibited low recoveries for the following compounds listed in the table below, all associated samples were qualified as estimated (J/UJ) for these compounds.

Compound	LCS % Rec	LCSD % Rec	QC Limit
acenaphthene	38	19	50-110
4-chloro-3-methylphenol	44	29	46-118
2-chlorophenol	36	23	47-110
3,3'-dichlorobenzidine	4	6	10-113
2,4-dichlorophenol	43	23	46-115
2,4-dimethylphenol	26	22	36-110
4,6-dinitro-2-methylphenol	12	2	29-167
2,4-dinitrophenol	4	0	10-189
fluorene	55	29	57-110
hexachlorocyclopentadiene	4	0	10-110
isophorone	49	24	50-111
2-methylphenol	31	26	46-110
3&4-methylphenol	29	24	43-110
2-nitroaniline	34	31	45-122
3-nitroaniline	21	17	30-116
4-nitroaniline	12	21	36-125
2-nitrophenol	34	13	42-120
n-nitroso-di-n-propylamine	29	3	45-112
n-nitrosodiphenylamine	8	12	47-119
acenaphthene	49	24	54-110
pentachlorophenol	33	16	37-132
phenol	15	12	39-110

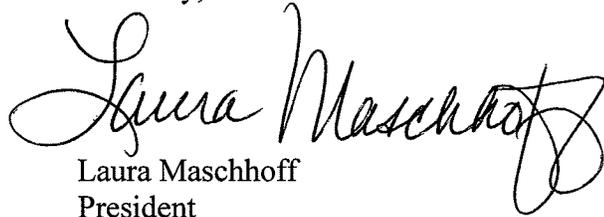
Identification/Quantitation

SVOA

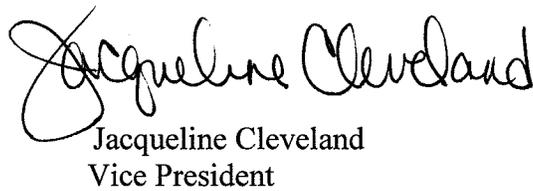
Sample JAN09-ER06RE was not used due to exceeded holding time.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
JAN09-ER06	iodomethane 2-chloro-1,3-butadiene pentachloroethane bromomethane chloroethane	+/-	J/UJ
JAN09-ER06	isobutanol	+/-	J/R

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
JAN09-ER06	hexachlorocyclopentadiene benzo(b)fluoranthene indeno(1,2,3-cd)pyrene dibenz(a,h)anthracene benzo(g,h,i)perylene hexachlorophene 1-naphthylamine 2-naphthylamine 3,3'-dimethylbenzidine	+/-	J/UJ
JAN09-ER06	4-nitroquinoline-1-oxide	+/-	J/R
JAN09-ER06	acenaphthene 4-chloro-3-methylphenol 2-chlorophenol 3,3'-dichlorobenzidine 2,4-dichlorophenol 2,4-dimethylphenol 4,6-dinitro-2-methylphenol 2,4-dinitrophenol fluorene hexachlorocyclopentadiene isophorone 2-methylphenol 3&4-methylphenol 2-nitroaniline 3-nitroaniline 4-nitroaniline 2-nitrophenol n-nitroso-di-n-propylamine n-nitrosodiphenylamine acenaphthene pentachlorophenol phenol	+/-	J/UJ
JAN09-ER06RE	all results	+/-	R

Summary of Data Qualifications

Pesticides

Sample ID	Compound	Results	Q flag
No qualifications required.			

PCBs

Sample ID	Compound	Results	Q flag
No qualifications required.			

GRO

Sample ID	Compound	Results	Q flag
No qualifications required.			

DRO

Sample ID	Compound	Results	Q flag
No qualifications required.			

Metals

Sample ID	Compound	Results	Q flag
No qualifications required.			

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

TEST AMERICA SAVANNAH SDG NAPR44077-3

DataQual

Environmental Services, LLC

Michael Baker, Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

March 26, 2008
SDG# NAPR44077-3, Test America-Savannah
NAPR SWMU 9, Puerto Rico

Dear Mr. Kimes,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # NAPR44077-3. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3, October 2006-SOP #HW-22, 8081B, October 2006-SOP#HW-44, and 8082A, October 2006-SOP #HW-45), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the organic methods for hydrocarbons and inorganic methods in this SDG (SW-846 methods 8015_DRO, 8015_GRO, 6020B and 7471A). Therefore, alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA App IX	SVOA App IX	LL PAH	Pest	PCB	GRO	DRO	Metals
9GW40	680-44077-17	water	X		X			X	X	
9GW41	680-44077-18	water	X		X			X	X	
9GW41D	680-44077-19	water	X		X			X	X	
9GW42	680-44077-20	water	X		X			X	X	
JAN09-FB02	680-44077-21	water	X	X		X	X	X	X	X
JAN09-TB09	680-44077-22	water	X					X		
JAN90-ER08	680-44077-23	water	X	X				X	X	

The following quality control samples were provided with this SDG: sample 9GW41D was the field duplicate of sample 9GW41; sample JAN09-TB09- trip blank; sample JAN09-FB02- field blank and sample JAN09-ER08- equipment blank. The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times
- GC/MS Tuning *
- GC Performance *
- Initial/Continuing Calibrations
- ICSA/ICSAB Standards *
- CRDL Standards *

- Blanks
- Internal Standards *
- Surrogate Recoveries
- Laboratory Control Samples
- Matrix Spike Recoveries/RPDs NA
- Serial Dilutions *
- Field Duplicates *
- Identification/Quantitation
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

VOA

The continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Blank contamination was noted in the method and/or QC blanks associated with samples in this batch. Qualifications were added to the data.

SVOA

The initial and continuing calibration exhibited some compounds with low RRF values, which resulted in qualifying non-detected values as rejected for these compounds. Due to high %D values, in the continuing calibrations, some compounds were qualified as estimated.

Non-compliant surrogates were exhibited for one sample that resulted in qualifying all results as estimated. Due to surrogate results below 10% for one sample all positive results were qualified as estimated and non-detected results were rejected for acid fraction compounds.

The associated LCS exhibited several low recoveries that resulted in qualifications to the data.

PAH

No qualifications to the data were required.

Pesticides

The sample was qualified due to some non-compliant continuing calibration %Ds.

PCB

No qualifications to the data were required.

GRO

One sample dilution was analysis exceeded the holding time and positive results were qualified as estimated.

The field duplicate pair did not exhibit comparable results and therefore qualifications were added to the data.

DRO

One sample was re-extracted outside holding time due to low surrogate recoveries. The DRO result for this sample was qualified as estimated J. The original sample was not used in favor of the re-extracted sample.

Blank contamination was noted in the field QC blanks and qualification was required in one of the samples in this SDG.

Metals

No qualifications to the data were required.

Specific Evaluation of Data

Data Completeness

Resubmissions were required. Retention times were not correctly transcribed from raw data to data summary forms in the Pesticide/PCB fraction. The laboratory was contacted and corrected forms were received. A copy of the e-mail correspondence is included in the validation worksheets.

Technical Holding Times

According to chain of custody records, sampling was performed on 01/20/09 and samples were received at the laboratory 01/22/09. All sample preparation and analysis was performed within Region II and/or method holding time requirements with the following exceptions.

GRO

Sample 9GW42DL was analyzed outside the 14 day holding time; therefore all positive results were qualified as estimated (J).

DRO

Sample 9GW40 was extracted 2 days outside the holding time due to very low surrogate recovery in the original analysis. The RE sample was reported instead of the original analysis and the reported DRO result was flagged as estimated J. Please note that this result was below the RL and was negated due to field blank contamination so the flag on the result is UJ.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds and RRF values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
CC 01/23/09	iodomethane	39.5%	JAN09-TB09	J/UJ
	2-chloro-1,3-butadiene	43.6%		
	pentachloroethane	45.4%		
	bromomethane	44.4%		
	chloroethane	49.1%		
isobutanol	0.03638	J/R		
CC 01/26/09	2-chloro-1,3-butadiene	43.3%	JAN09-FB02, 9GW40, 9GW41, 9GW41D, JAN09-ER08, 9GW42	J/UJ
	pentachloroethane	46.5%		
	bromomethane	25.3%		
	isobutanol	0.03589		J/R

SVOA

Calibration standards exhibited RRF and %Ds values that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag
IC 02/05/09	4-nitroquinoline-1-oxide	0.0212	all samples	J/R
CC 02/06/09	hexachloropropene	29.1%	JAN09-FB02	J/UJ
	p-phenylene diamine	29.8%		
	1,3,5-trinitrobenzene	28.1%		
	3,3'-dimethylbenzidine	20.7%		
	4-nitroquinoline-1-oxide	0.0299		J/R
CC 02/09/09	hexachlorocyclopentadiene	28.5%	JAN09-ER08	J/UJ
	benzo(b)fluoranthene	20.7%		
	indeno(1,2,3-cd)pyrene	26.5%		
	dibenz(a,h)anthracene	34.1%		
	benzo(g,h,i)perylene	38.9%		
	hexachlorophene	20.6%		
	1-naphthylamine	23.5%		
	2-naphthylamine	43.6%		
	4-nitroquinoline-1-oxide	0.0314		J/R

Pesticides

Calibration standards exhibited %Ds that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated. Please note that these compounds co-elute on the CLPI column, however they are sufficiently separated on the CLPII column.

Standard ID	Compound(s)	%D	Samples	Q Flag
MB06047	chlorobenzilate	26.8	JAN09-FB02	J/UJ
	kepone	26.8/85.2		

Blanks

VOA

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Reporting Limit	Action Level
JAN09-ER10	acetone	6.3J	25	2X RL

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
9GW40, 9GW41, 9GW41D	acetone	U at reported value

DRO

The associated method and/or QC blanks exhibited contamination as noted in the following table. Compounds for which there was no action required, are not included in the following table. Please note that the laboratory reported non-detect results down to the MDL for this project. Therefore, the blank flagging actions were modified as follows to take this into consideration. Positive results greater than the MDL but less than the CRQL are qualified as U at the reported concentration when affected by blank contamination.

Blank ID	Compound	Concentration	Action Level	Q Flag
JAN09-FB01	DRO	0.25 mg/L	0.25 mg/L	U
JAN09-ER10	DRO	0.27 mg/L	0.27 mg/L	U

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
9GW40RE	DRO	U

Surrogates

SVOA

Sample JAN09-FB02 exhibited 1% recovery for phenol-d5 (QC limit 38-116%); therefore all positive results were qualified as estimated (J) and non-detected results were qualified as rejected (R) for acid fraction compounds. Sample JAN09-ER08 exhibited low recoveries for 2-fluorophenol at 16% (QC limit 36-110%), phenol-d5 at 13% (QC limit 38-116%), nitrobenzene-d5 at 41% (QC limit 45-112%) and 2-fluorobiphenyl at 37% (QC limit 50-113%); therefore all results were qualified as estimated (J/UJ).

Laboratory Control Samples

SVOA

The LCS and LCSD exhibited low recoveries for the following compounds listed in the table below. All associated samples were qualified as estimated (J/UJ) for these compounds.

Compound	LCS % Rec	LCSD % Rec	QC Limit
acenaphthylene	38	19	50-110
4-chloro-3-methylphenol	44	29	46-118
2-chlorophenol	36	23	47-110
3,3'-dichlorobenzidine	4	6	10-113
2,4-dichlorophenol	43	23	46-115
2,4-dimethylphenol	26	22	36-110
4,6-dinitro-2-methylphenol	12	2	29-167
2,4-dinitrophenol	4	0	10-189

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Compound	LCS % Rec	LCSD % Rec	QC Limit
fluorene	55	29	57-110
hexachlorocyclopentadiene	4	0	10-110
isophorone	49	24	50-111
2-methyphenol	31	26	46-110
3&4-methylphenol	29	24	43-110
2-nitroaniline	34	31	45-122
3-nitroaniline	21	17	30-116
4-nitroaniline	12	21	36-125
2-nitrophenol	34	13	42-120
n-nitroso-di-n-propylamine	29	3	45-112
n-nitrosodiphenylamine	8	12	47-119
acenaphthene	49	24	54-110
pentachlorophenol	33	16	37-132
phenol	15	12	39-110

Field Duplicates

GRO

Sample 9GW41 and duplicate sample 9GW41D did not exhibit comparable results for GRO with 114% RPD; therefore results were qualified as estimated (J).

Identification/Quantitation

VOA

Sample JAN09-FB02 was re-analyzed to confirm positive results; therefore the re-analysis was not used in favor of the initial analysis.

SVOA

Samples JAN09-FB02RE and JAN09-ER08RE were not used due to exceeded holding times.

GRO

Sample 9GW42 was not used in favor of the dilution.

DRO

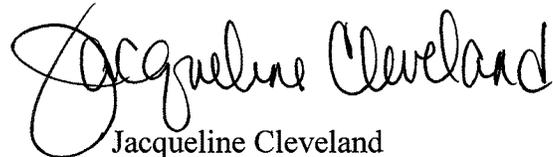
Sample 9GW40 was not used in favor of the reanalysis.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,



Laura Maschhoff
President



Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag
JAN09-TB09	iodomethane 2-chloro-1,3-butadiene pentachloroethane bromomethane chloroethane	+/-	J/UJ
JAN09-TB09	isobutanol	+/-	J/R
JAN09-FB02, 9GW40, 9GW41, 9GW41D, JAN09-ER08, 9GW42	2-chloro-1,3-butadiene pentachloroethane bromomethane	+/-	J/UJ
JAN09-FB02, 9GW40, 9GW41, 9GW41D, JAN09-ER08, 9GW42	isobutanol	+/-	J/R
9GW40, 9GW41, 9GW41D	acetone	+	U at reported value
JAN09-FB02RE	all results	+/-	R

SVOA

Sample ID	Compound	Results	Q flag
all samples	4-nitroquinoline-1-oxide	+/-	J/R
JAN09-FB02	hexachloropropene p-phenylene diamine 1,3,5-trinitrobenzene 3,3'-dimethylbenzidine	+/-	J/UJ
JAN09-FB02	4-nitroquinoline-1-oxide	+/-	J/R
JAN09-ER08	hexachlorocyclopentadiene benzo(b)fluoranthene indeno(1,2,3-cd)pyrene dibenz(a,h)anthracene benzo(g,h,i)perylene hexachlorophene 1-naphthylamine 2-naphthylamine	+/-	J/UJ
JAN09-ER08	4-nitroquinoline-1-oxide	+/-	J/R
JAN09-FB02	all acid fraction compound results	+/-	J/R
JAN09-ER08	all results	+/-	J/UJ
all samples	acenaphthylene, 4-chloro-3-methylphenol, 2-chlorophenol, 3,3'-dichlorobenzidine, 2,4-dichlorophenol, 2,4-dimethylphenol, 4,6-dinitro-2-methylphenol, 2,4-dinitrophenol, fluorene, hexachlorocyclopentadiene, isophorone, 2-methylphenol, 3&4-methylphenol, 2-nitroaniline, 3-nitroaniline, 4-nitroaniline, 2-nitrophenol, n-nitroso-di-n-propylamine, n-nitrosodiphenylamine, acenaphthene, pentachlorophenol, phenol	+/-	J/UJ
JAN09-FB02RE, JAN09-ER08RE	all results	+/-	R

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Summary of Data Qualifications

PAH

Sample ID	Compound	Results	Q flag
No qualifications			

Pesticides

Sample ID	Compound	Results	Q flag
JAN09-FB02	chlorobenzilate kepone	+/-	J/UJ

PCB

Sample ID	Compound	Results	Q flag
No qualifications			

GRO

Sample ID	Compound	Results	Q flag
9GW42DL	GRO	+	J
9GW41, 9GW41D	GRO	+	J
9GW42	GRO	+	R

DRO

Sample ID	Compound	Results	Q flag
9GW40RE	DRO	+JH	J
9GW40RE	DRO	+JH	U
9GW40	DRO	+J	R

Metals

Sample ID	Analyte	Results	Q flag
No qualifications were required			

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

- No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.
- U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

- R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
- J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
- J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the reported concentration, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

General Abbreviations

RL	reporting limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

PUERTO RICAN CHEMIST CERTIFICATIONS

PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-43887-1**, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number 680-43887-2, and to the best of my knowledge, the results are correct and reliable.

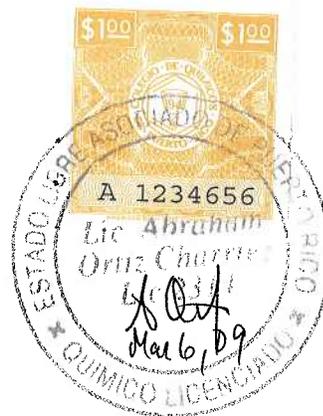
Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-43925-1**, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-43925-2**, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-43961-2**, and to the best of my knowledge, the results are correct and reliable.

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PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-43991-2**, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number 680-44002-1, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-44016-1**, and to the best of my knowledge, the results are correct and reliable.

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I Herby certify that I have reviewed the Quality Assurance Data for Project Number 680-44016-2, and to the best of my knowledge, the results are correct and reliable.

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PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-44044-3**, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-44056-2** and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-44077-3** and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz



APPENDIX F
EQUILIBRIUM PARTITIONING APPROACH

APPENDIX F

EQUILIBRIUM PARTITIONING APPROACH

The United States Environmental Protection Agency (USEPA, 1993) has chosen the equilibrium partitioning (EqP) approach for developing sediment quality criteria for nonionic organic chemicals. This approach was used in this Phase I RCRA Facility Investigation for SWMU 60 to derive sediment screening values for organic chemicals lacking literature-based, bulk sediment screening values.

There are three underlying assumptions to the derivation of sediment quality criteria using EqP. First, it is assumed that sediment toxicity correlates with the concentration of the chemical in the sediment pore water and not the bulk sediment concentration (i.e., the pore water concentration represents the bioavailable fraction). Second, partitioning between sediment pore water and bulk sediment is assumed to be dependent on the organic content of the sediment with little dependence upon other chemical or physical properties. Third, the EqP approach assumes that equilibrium has been attained between the sediment pore water concentration and the bulk sediment concentration.

The relationship between the concentration of a nonionic organic chemical in sediment pore water and bulk sediment is described by the partitioning coefficient, K_p (USEPA, 1993):

$$K_p = (C_s)/(C_{pw}) \quad (\text{Equation F-1})$$

Where C_s is the concentration in bulk sediment and C_{pw} is the concentration in sediment pore water. For a given organic chemical, the partition coefficient can be derived by multiplying the fraction of organic carbon (f_{oc}) present in the sediment by the chemical's organic carbon partition coefficient (K_{oc}) (USEPA, 1993):

$$K_p = (f_{oc})(K_{oc}) \quad (\text{Equation F-2})$$

Combining Equations F-1 and F-2 yields the following:

$$C_s = (K_{oc})(f_{oc})(C_{pw}) \quad (\text{Equation F-3})$$

If the organic carbon content of the sediment is known, a site-specific sediment screening value (SSV) can be calculated for a given organic chemical by setting C_{pw} equivalent to a conservative surface water screening value for that chemical (SWSV):

$$SSV = (K_{oc})(f_{oc})(SWSV) \quad (\text{Equation F-4})$$

In this equation, SSV represents the concentration of the chemical in bulk sediment that, at equilibrium, will result in a sediment pore water concentration equal to the surface water screening value. Sediment concentrations less than SSV would be protective of sediment-associated biota. The use of surface water screening values (i.e., criteria and toxicological benchmarks) in Equation F-4 assumes that the sensitivities of sediment-associated biota and the species typically tested to derive surface water screening values such as USEPA NAWQC (predominantly water column species) are similar. Furthermore, it assumes that levels of protection afforded by the surface water screening values are appropriate for sediment-associated biota. It is noted that the EqP approach can only be used if the total organic carbon (TOC) content in sediment is greater than 0.2 percent (i.e., 2,000 mg/kg). At TOC concentrations less

than 0.2 percent, other factors (e.g., particle size, sorption to nonorganic mineral fractions) become relatively more important (USEPA, 1993).

Although the EqP approach was developed by the USEPA for nonionic organic chemicals (e.g. semi-volatile organic chemicals [SVOCs]), this method was used to derive sediment screening values for all organic chemicals lacking literature-based, bulk sediment screening values, including ionic organic chemicals (e.g., volatile organic chemicals [VOCs]). Application of the EqP approach to ionic organic chemicals likely overestimates their pore water concentrations since adsorption mechanisms other than hydrophobicity may significantly increase the fraction of the chemical sorbed to sediment particles (Jones et al., 1997). The overly conservative nature of sediment quality benchmarks derived using EqP is documented in the literature (Fuschman, 2003). Regardless, application of the EqP approach to the development of sediment screening values for ionic chemicals is documented in the literature (USEPA, 1996 and Jones et al., 1997).

As evidenced by Table 6-4, all organic chemicals detected in SWMU 60 sediment have established bulk sediment screening values. Therefore, the derivation of EqP-based sediment screening values using Equation F-4 was not necessary.

Appendix F References

Fuchsman, P.C. 2003. Modification of the Equilibrium Partitioning Approach for Volatile Organic Compounds in Sediment. Environ. Toxicol. Chem. 22(7):1532-1534.

U.S. Environmental Protection Agency (USEPA). 1993. Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of Benthic Organisms by Using Equilibrium Partitioning. Office of Water, Washington, D.C. EPA-822-R-93-011.

USEPA. 1996. Ecotox Thresholds. Eco Update, Volume 3, Number 2. Office of Solid Waste and Emergency Response, Washington, D.C. EPA 540/F-95/038.

Jones, D.S., G.W. Suter II., and R.N. Hull. 1997. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 revision. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-95/R4.

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Although the EqP approach was developed by the USEPA for nonionic organic chemicals (e.g. semi-volatile organic chemicals [SVOCs]), this method was used to derive sediment screening values for all organic chemicals lacking literature-based, bulk sediment screening values, including ionic organic chemicals (e.g., volatile organic chemicals [VOCs]). Application of the EqP approach to ionic organic chemicals likely overestimates their pore water concentrations since adsorption mechanisms other than hydrophobicity may significantly increase the fraction of the chemical sorbed to sediment particles (Jones et al., 1997). The overly conservative nature of sediment quality benchmarks derived using EqP is documented in the literature (Fuschman, 2003). Regardless, application of the EqP approach to the development of sediment screening values for ionic chemicals is documented in the literature (USEPA, 1996 and Jones et al., 1997).

Sediment screening values derived using EqP (see Table 6-3 and 6-4) are conservatively based on a default f_{oc} of 0.01 (USEPA, 1996). K_{oc} values used in the derivation of EqP-based sediment screening values were estimated from the following equation (USEPA, 1993 and 1996):

$$\text{Log } K_{oc} = 0.00028 + (0.983)(\text{Log } K_{ow}) \quad (\text{Equation E-5})$$

In this equation, $\log K_{ow}$ represented the log octanol-water partition coefficient. The surface water screening values used in the derivation of EqP-based sediment screening values for organic chemicals lacking bulk sediment screening values were identified using the procedure described in Section 6.1.2.3. The specific chemicals for which EqP-based screening values were derived, as well as their K_{oc} and SWSV values are summarized in the table below.

Chemical	K_{oc} (L/kg)	SWSV (ug/L)
Acetone	0.58	1,000
Benzene	124	109
Carbon disulfide	92.5	15
Methylene chloride	16.9	2,560

Appendix E References

Fuchsman, P.C. 2003. Modification of the Equilibrium Partitioning Approach for Volatile Organic Compounds in Sediment. Environ. Toxicol. Chem. 22(7):1532-1534.

U.S. Environmental Protection Agency (USEPA). 1993. Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of Benthic Organisms by Using Equilibrium Partitioning. Office of Water, Washington, D.C. EPA-822-R-93-011.

USEPA. 1996. Ecotox Thresholds. Eco Update, Volume 3, Number 2. Office of Solid Waste and Emergency Response, Washington, D.C. EPA 540/F-95/038.

Jones, D.S., G.W. Suter II., and R.N. Hull. 1997. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 revision. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-95/R4.