N40003.AR.001278
PUERTO RICO NA
5090.3a

Final

Phase I RCRA Facility Investigation Report

SWMU 16

Naval Activity Puerto Rico
EPA I.D. No. PR2170027203
Ceiba, Puerto Rico

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Norfolk, Virginia

Contract No. N62470-02-D-3052
CTO-0121

November 20, 2007

Prepared by

CH2M HILL
Federal Group, Inc.

Baker
Environmental, Inc.

CDM
Federal Programs Corp.

FINAL

PHASE I RCRA FACILITY INVESTIGATION REPORT
SWMU 16 – BUILDING 1666 – WASTE EXPLOSIVES STORAGE BUILDING

NAVAL ACTIVITY PUERTO RICO
EPA I.D. NO. PR2170027203
CEIBA, PUERTO RICO

CONTRACT TASK ORDER 0121

NOVEMBER 20, 2007

Prepared for:

DEPARTMENT OF THE NAVY
NAVAL FACILITIESENGINEERING COMMAND
ATLANTIC DIVISION
Norfolk, Virginia

Under the:

LANTDIV CLEAN Program
Contract N62470-02-D-3052

Prepared by:

BAKER ENVIRONMENTAL, INC.
Moon Township, Pennsylvania

CH2M Hill
Herndon, Virginia

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

Signature _____

Name: **Jeffrey G Meyers**

Title: **BRAC Env. Coordinator**

Date: **November 20, 2007**

TABLE OF CONTENTS

Page

LIST OF ACRONYMS AND ABBREVIATIONS iii

1.0 INTRODUCTION 1-1
1.1 Purpose 1-1
1.2 Objectives 1-1
1.3 Organization of the RFI Report 1-1

2.0 FACILITY BACKGROUND 2-1
2.1 NAPR Description and History 2-1
2.2 SWMU 16 Description and History 2-1
2.3 Current Conditions/Usage 2-2
2.4 Previous Investigations 2-2

3.0 PHYSICAL CHARACTERISTICS OF STUDY AREA 3-1
3.1 Climatology 3-1
3.2 Topography 3-1
3.3 Geology, Hydrology, and Hydrogeology 3-2
3.3.1 Soils 3-2
3.3.2 Regional Geology 3-3
3.3.3 Regional Hydrology 3-3
3.3.4 Site-Specific Hydrogeology 3-4

4.0 2006 RCRA FACILITY INVESTIGATION ACTIVITIES 4-1
4.1 Soil Boring Advancement and Temporary Well Installation 4-1
4.2 Environmental Sampling and Analysis Program 4-1
4.2.1 Surface and Subsurface Soils 4-1
4.2.2 Groundwater 4-2
4.2.3 Water Levels 4-2
4.3 Quality Assurance/Quality Control Sampling and Analysis Program 4-2
4.3.1 Field Duplicates 4-2
4.3.2 Matrix Spike/Matrix Spike Duplicates 4-2
4.3.3 Trip Blanks 4-2
4.3.4 Field Blanks 4-3
4.3.5 Equipment Rinsates 4-3

5.0 NATURE AND EXTENT OF CONTAMINATION 5-1
5.1 Human Health and Ecological Screening Values 5-1
5.1.1 Human Health 5-1
5.1.2 Ecological 5-2
5.2 Surface Soils 5-2
5.3 Subsurface Soils 5-3
5.4 Groundwater 5-3
5.5 2006 Laboratory Data Validation Summary 5-3
5.5.1 Summary of Detected Compounds in Field QA/QC Samples 5-3
5.5.2 STL Savannah SDG 22012-2 5-3
5.5.3 STL Savannah SDG 22139-3 5-4

TABLE OF CONTENTS
(continued)

6.0 CONCLUSIONS AND RECOMMENDATIONS.....6-1
6.1 Conclusions.....6-1
6.2 Recommendations.....6-3

7.0 REFERENCES.....7-1

LIST OF TABLES

4-1 Summary of 2006 RFI Surface Soil, Subsurface Soil, and Groundwater Sampling and Analysis
4-2 Summary of 2006 RFI Quality Assurance / Quality Control Sampling and Analysis
4-3 Parameter Lists and Contract Required Quantitation Limits (CRQL)
4-4 Groundwater Elevation Summary

5-1 Summary of Detected Results – Surface Soil
5-2 Summary of Detected Results – Subsurface Soil
5-3 Summary of Detected Results – Groundwater
5-4 Summary of Detected Results – Quality Assurance / Quality Control

LIST OF FIGURES

2-1 Regional Location Map
2-2 NAPR Location Map
2-3 SWMU 16 Site Location Map

4-1 Soil and Groundwater Sampling Locations

LIST OF APPENDICIES

A 2006 Field Activities
- SWMU 16 Field Log Book Notes
- Chain-of-Custody Forms
- Soil Boring Logs and Well Construction Records

B Laboratory Analytical Results
- Surface Soil (2006)
- Subsurface Soil (2006)
- Groundwater (2006)
- Quality Assurance / Quality Control (2006)

C 2006 RFI Data Validation Summaries
- STL Savannah SDG 22012-2
- STL Savannah SDG 22139-3
- Puerto Rican Chemist Certifications

LIST OF ACRONYMS AND ABBREVIATIONS

AFWTF	Atlantic Fleet Weapons Training Facility
AOC	Areas of Concern
Baker	Baker Environmental, Inc.
bgs	below ground surface
CCME	Canadian Council of Ministers of the Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy Program
COPC	Chemicals of Potential Concern
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
CSF	Carcinogenic Slope Factor
CTO	Contract Task Order
DPT	Direct Push Technology
DRMO	Defense Restoration and Marketing Office
ECO-SSLs	Ecological Soil Screening Levels
ECP	Environmental Condition of Property
F	Fahrenheit
GPS	Global Positioning System
HI	Hazard Index
HSWA	Hazardous and Solid Waste Amendments (to RCRA)
IAS	Initial Assessment Study
ILCR	Incremental Lifetime Cancer Risk
Inc.	Incorporated
IR	Installation Restoration
LANTDIV	Department of the Navy, Atlantic Division
MCL	Maximum Contaminant Level
mgd	Million Gallons per Day
NAPR	Naval Activity Puerto Rico
NAVFAC	Naval Facilities Engineering Command Atlantic Division
NEESA	Navel Energy and Environmental Support Activity
NSRR	Naval Station Roosevelt Roads
PID	Photoionization Detector
PRG	Preliminary Remediation Goal
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS AND ABBREVIATIONS
(continued)

RfD	Reference Dose
RFI	RCRA Facility Investigation
SDG	Sample Delivery Group
SWMU	Solid Waste Management Unit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank

1.0 INTRODUCTION

This document presents the results from the performance of a Phase I Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) at the Solid Waste Management Unit (SWMU) 16 - Building 1666 - Waste Explosives Storage Building located at Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico.

This document was prepared by Baker Environmental, Inc. (Baker), for the Naval Facilities Engineering Command Atlantic Division (NAVFAC). This RFI Report is being developed under Contract Task Order (CTO) 121 under the NAVFAC Atlantic Division (LANTDIV) Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62470-02-D-3052.

1.1 Purpose

This report has been prepared to document the findings of the 2006 Phase I RFI field work. All data is compared against current evaluation criteria to identify chemicals of potential concern (COPC) and conducting preliminary screening of human health and ecological criteria.

1.2 Objectives

The objectives of the RFI are to determine if any contaminants are present from past operations at Building 1666, the Waste Explosives Storage Building, to the extent practical, from the completion of field activities (surface soil, subsurface soil and groundwater sampling) as described in the 2006 RFI Work Plan (Baker, 2006a).

Specific elements of the 2006 field effort performed to support this RFI include:

- Surface soil sampling at six locations;
- Subsurface soil sampling collected at two depths from six locations;
- The installation of four temporary monitoring wells; and
- Groundwater sampling at the four temporary monitoring wells.

1.3 Organization of the RFI Report

This report is organized into seven sections. Section 1.0 of this document discusses the purpose and objectives of this RFI. Section 2.0 provides a description of the current conditions of the site, including the history of SWMU 16, and a summary of previous investigations. Section 3.0 provides a description of the physical characteristics of the study area including climatology, topography, and geology, hydrology, hydrogeology. The scope of field investigation that was conducted in 2006 is provided in Section 4.0 (work plan summary) – this includes a surface and subsurface soil sampling and analysis program, a temporary monitoring well installation program, a groundwater sampling and analysis program, a quality assurance/quality control (QA/QC) sampling program, as well as other investigation considerations. The nature and extent of contamination as determined from the results is reported in Section 5.0. Section 6.0 presents the conclusions and recommendations from the RFI, while Section 7.0 lists relative report references.

2.0 FACILITY BACKGROUND

This section provides the history and description of NAPR and SWMU 16, as well as the current conditions at SWMU 16.

2.1 NAPR Description and History

NAPR occupies over 8,890 acres of the northern portion of the east coast of Puerto Rico, along Vieques Passage with Vieques Island lying to the east about 10 miles off the harbor entrance, see Figure 2-1. NAPR also occupies the immediately adjacent islands of Piñeros and Cabeza de Perro. The northern entrance to NAPR is about 35 miles east along the coast road (Route 3) from San Juan. The property consists of 3,938 acres of upland (developable) property and 4,955 acres of environmentally sensitive areas including wetlands, mangrove, and wildlife habitat. The closest large town is Fajardo (population approximately 37,000), which is about 5 miles north of NAPR off Route 3. Ceiba (population approximately 17,000) adjoins the west boundary of NAPR.

The facility was commissioned in 1943 as a Naval Operations Base and re-designated Naval Station Roosevelt Roads (NSRR) in 1957. NSRR operated until March 31, 2004 when NSRR underwent operational closure. On April 1, 2004 NSRR was re-designated as NAPR. The current primary 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.

On October 20, 1994, a Final RCRA Part B permit was issued by USEPA Region II to NSRR. This permit listed 52 SWMUs and 4 AOCs and contained requirements for RFI activities at 24 of these SWMUs and three of these AOCs. An additional 25 SWMUs and 2 AOCs were added to the program over the years. Prior to 1993, environmental activities at NSRR, exclusive of underground storage tanks (USTs), were conducted in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations under the Department of the Navy's Installation Restoration (IR) Program. The RCRA Part B permit, issued for the Defense Reutilization and Marketing Office (DRMO) at NSRR, included provisions for corrective action under the Hazardous and Solid Waste Amendments (HSWA) to RCRA.

The USEPA issued a RCRA 7003 Administrative Order on Consent (EPA Docket No. RCRA-02-2007-7301), which became effective on January 29, 2007. SWMU 16 is identified as one of several SWMUs which had no further actions required under the November 1994 RCRA permit, but now warrant Phase I RFIs, because of the NAPR closure. Figure 2-2 shows all 77 SWMUs and 6 AOCs currently listed under the RCRA 7003 Administrative Order on Consent.

2.2 SWMU 16 Description and History

The Waste Explosives Storage Building was not inspected during the 1988 RCRA Visual Site Inspection (VSI), due to the special security clearances required to gain access to this facility. However, it was inspected during a follow-up VSI, conducted in June, 1993. No evidence of releases from this building was observed. Permitee has verbally indicated it has no knowledge or evidence of systematic and routine releases of hazardous wastes or constituents from this unit during the June 1993 RCRA VSI.

2.3 Current Conditions/Usage

Building 1666 is no longer utilized and has been explosives clean closed and explosives certified clean by the Naval Ordnance Safety and Security Activity on March 8, 2005. The building has not been used since the operational closure of Naval Station Roosevelt Roads on March 31, 2004. Building 1665 is adjacent to Building 1666 to the north and Buildings 1667 and 1668 are adjacent to Building 1666 to the south as shown on Figure 2-3. The area surrounding the building is a relatively flat grassy field that is maintained through grass cutting. The general grade of the topography in this grassy area is down gradient to the north east.

2.4 Previous Investigations

A Visual Site Inspection was conducted in June 1993. No visual evidence of releases of hazardous wastes or constituents was observed during the investigation. In addition, verbal indication was given by the permittee that no knowledge or evidence of systemic and routine releases of hazardous wastes was emitted from this site.

On September 15, 2006 the Phase I RFI Work Plans (Baker, 2006a) were developed and later approved by USEPA. Mobilization for the RFI field activities occurred November 12, 2006 with demobilization on November 20, 2006.

3.0 PHYSICAL CHARACTERISTICS OF STUDY AREA

The physical setting of NAPR was documented in the 1984 IAS (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 16 area. In 2004, Baker conducted a series of Phase II Environmental Condition of Property (ECP) investigations across NAPR (NAVFAC, 2004). Subsection 3.3.4 discusses hydrogeologic information most relevant to SWMU 16 gained from the ECP investigations.

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.

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 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.

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 Site-Specific Hydrogeology

In 2004, Baker conducted a Phase II ECP investigation involving 20 sites throughout NAPR. Some consistent stratigraphic trends were observed during the ECP. The site-specific 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 includes 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 be 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.

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.

SWMU 16 is located in the hilly upland area. A consistent stratigraphic sequence was observed during the Phase I RFI. Clay, described as red and gray in color, was observed on top of a yellow brown sapprolite encountered between 5 and 8.5 feet below ground surface at the six borings. The clay and sapprolite zones were damp at best and no significant groundwater production was observed. A single boring, 16SB02, was advanced into the sapprolite zone to a depth of 37 feet below ground surface in search of groundwater. Geoprobe refusal was encountered at 37 feet. A limited “moist” zone was found in 16SB06 at approximately 6.8 feet below ground surface, so a temporary monitoring well was installed at this location only.

4.0 2006 RCRA FACILITY INVESTIGATION ACTIVITIES

The areas around Building 1666 were investigated at SWMU 16 during November 2006. Section 4.1 discusses soil boring advancement and temporary monitoring well installation. Section 4.2 discusses the soil and groundwater sampling and analysis program and Section 4.3 presents a discussion of the QA/QC sampling programs involved with the 2006 RFI. Analytical results are discussed in detail in Section 5.0. Figure 4-1 depicts the sampling locations at SWMU 16.

Some minor deviations to the approved work plan were decided in the field due to conditions encountered. The approved work plan proposed to install four temporary monitoring wells at four of the six soil boring locations. Due to the lack of groundwater encountered, only one temporary monitoring well was installed at 16SB06/TW06, and subsequently only one groundwater sample was collected for explosives.

4.1 Soil Boring Advancement and Temporary Well Installation

Surface and subsurface soil samples were collected using direct-push technology (DPT) through the use of a Geoprobe® Macro Core Sampler in conjunction with a Geoprobe® 66DT track-mounted rig. GeoEnviroTech of San Juan, Puerto Rico was the DPT contractor. As presented in the Final RFI Work Plan (Baker, 2006a), a total of six soil borings (16SB01 through 16SB06) were advanced at SWMU 16 (Figure 4-1). Each boring site was field located with a survey grade Global Positioning System (GPS) receiver. An elevation was obtained from the top of the PVC casing for water level elevation calculations and a spot ground surface elevation. Soil boring logs have been produced and are provided in Appendix A.

No elevated PID levels were observed at the six soil borings. One temporary monitoring well was installed at soil boring 16SB06. The work plan called for temporary wells at the soil boring locations; however, groundwater was not present to a significant extent beneath the site. The temporary well that was installed during the investigation was screened at a depth of 10 feet bgs. Groundwater was not encountered at the site at any other location, despite borings being advanced to a depth of up to 37 feet bgs. The temporary monitoring well was installed by hand by placing one inch diameter 10-feet long PVC screen threaded to an appropriate length of PVC casing.

GeoEnviroTech personnel pulled all well materials from the bore holes upon completion of groundwater sampling. Spent well materials were decontaminated and subsequently disposed. Soil produced by drilling, that was not sampled, was placed back into the open boreholes following the removal of well materials. Because of the lack of an evidence of contamination (e.g., PID readings, visual/olfactory observations), it was deemed suitable to return the excess soil into the boreholes in accordance with Section 3.8.2 of the work plan. Therefore, no investigation-derived waste (IDW) was generated. The remaining borehole annulus was grouted to ground surface with bentonite grout.

4.2 Environmental Sampling and Analysis Program

Table 4-1 provides a summary of the soil and groundwater sampling and analytical program performed for the 2006 RFI program at SWMU 16. In addition, this table shows information related to field duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples (since these are collected concurrent with the environmental samples). Other QA/QC samples (trip blanks, field blanks, and equipment rinsates) were collected and analyzed in accordance with Table 4-2. Also, analytical methods/descriptions, parameter lists, and Contract Required Quantitation Levels (CRQL) are presented in Table 4-3.

4.2.1 Surface and Subsurface Soils

Surface soil samples were collected at soil borings 16SB01 through 16SB06 from a depth of 0 to 1-foot bgs. This is a deviation from the work plan, which erroneously specified surface soil sampling depths of 0 to 0.5 foot bgs. Subsurface soil samples were collected at all soil borings from one-foot intervals (e.g., 1 to 2 feet bgs, 4 to 5 feet bgs, etc) down to groundwater. All soil borings were advanced to a depth of 8 to 37-feet bgs.

Each of the surface and several of the subsurface soil samples were screened in the field using a PID; screening results were recorded in a field logbook and are presented on the boring logs in Appendix A.

Six surface soil samples and twelve subsurface soil primary environmental samples were submitted to Severn Trent Laboratory in Savannah, Georgia for analysis of explosives.

4.2.2 Groundwater

Groundwater recharge was slow and therefore, well development and low-flow purging procedures were not followed. Groundwater sampling was conducted at the rate limited by the recharge. Groundwater was sampled when water levels recovered over a 24-hour period after initial dewatering, as explained in Section 4.2.3. One groundwater sample was collected from the single temporary well, 16TW06, and was analyzed for explosives. Due to the lack of groundwater found during logging of the other five borings only one groundwater monitoring well was installed within the deeper boring, 16SB06.

4.2.3 Water Levels

Water level measurements were collected using an electronic water level meter. Measurements were taken following well completion and then typically the morning of each day following completion. Since only one temporary monitoring well was installed, water levels could not be used to determine a groundwater flow direction. 16SB06/TW06 accumulated groundwater to approximately 2 feet below ground surface over approximately 24 hours see Table 4-4. Prior to sampling, the well volume (an 8-foot water column) was removed and dried up the well. Some recovery occurred within the next 24 hours and this water was sampled.

4.3 Quality Assurance/Quality Control Sampling and Analysis Program

4.3.1 Field Duplicates

A total of eighteen soil samples were collected as part of the 2006 RFI field sampling activity at SWMU 16. The RFI Work Plan specifies one duplicate sample to be collected for every ten primary soil samples collected. Thus, two field duplicate samples (16SB06-00D, and 16SB06-03D) were collected concurrently. One sample, 16SB06-00D is associated with the surface soil samples and sample 16SB06-03D is associated with the subsurface soil samples. Each was analyzed for explosives. One groundwater duplicate sample was collected at 16TW06. Duplicate samples are useful in evaluating the field sampling methodology.

4.3.2 Matrix Spike/Matrix Spike Duplicates

A total of eighteen soils samples were collected as part of the 2006 RFI field sampling activity. The RFI Work Plan specifies one matrix spike/matrix spike duplicate sample be collected for every 20 primary samples collected (for each matrix). Therefore, one QA/QC soil sample,

16SB06-00MS/MSD, were collected from the surface and subsurface soil to evaluate the matrix effect upon the analytical methodology. Separate MS and MSD samples of groundwater were collected at sample location 16TW06.

4.3.3 Trip Blanks

Trip blanks were not required for SWMU 16 because only explosives were analyzed.

4.3.4 Field Blanks

Field blank samples were collected from two different source waters encountered during this investigation. One field blank sample (2006FB01) was collected from lab grade deionized water used as the source water for the final rinse stage of the decontamination procedure and equipment rinsates. The other field blank sample (2006FB02) was from an NAPR potable water source used for soil and groundwater sample collection equipment washing. No store bought distilled water was purchased during this investigation, so a third field blank for store bought distilled water was not necessary.

Field blank samples are always analyzed for the same parameters as the related environmental samples. Therefore, both field blank samples were sent to the laboratory for analysis of explosives compounds. Field blank testing is useful in determining if other water sources used in the cleaning/decontamination procedures associated with the sampling event are free of contamination.

4.3.5 Equipment Rinsates

Three equipment rinsate samples were collected, submitted, and analyzed as part of the QA/QC program. These corresponded to dedicated (disposable) sampling equipment only. No equipment required decontamination; therefore rinsates from decontaminated equipment were not generated. 2006ER02 is rinsate from the Macrocore® Acetate liner used during soil sampling. In addition, 2006ER03 is a rinsate of the stainless steel spoon associated with the DPT technology used for soil boring advancement. 2006ER04 is a rinsate associated with the silicon/polyethylene tubing used for groundwater sampling. Laboratory-supplied analyte-free water was used to generate the rinsates.

Equipment rinsate samples are always analyzed for the same parameters as the related environmental samples. Therefore, the relevant equipment rinsate sample results for this investigation include only explosive compounds. Results from equipment rinsate samples are useful in determining if the sampling equipment was contaminant-free during the field investigation.

5.0 NATURE AND EXTENT OF CONTAMINATION

This section discusses the nature of SWMU 16 contamination determined from chemical analysis of environmental samples from the November 2006 RFI. All of the laboratory analytical data went through a formal data validation process. Complete validated data tables for the 2006 RFI field effort are included in Appendix B; in addition, relevant portions of the data validation reports for the 2006 RFI Sample Delivery Groups (SDGs) are provided in Appendix C; a summary discussion of the necessary laboratory level data adjustments to the 2006 data is presented in Section 5.5.

The 2006 PID field screening results are presented on the Test Boring Records in Appendix A (not validated). While these readings were taken to protect the field team from excessive exposure and to assist with temporary well location selection, they also provide the reader with an initial insight into historical impacts and potential geographic "hot spots". PID readings during the SWMU 16 investigation were all below background levels, as noted on the boring logs provided in Appendix A.

5.1 Human Health and Ecological Screening Values

Detected results for surface soils, subsurface soils, and groundwater media are discussed in the following sections. Detected compounds for each media are compared to applicable regulatory criteria. These criteria, and the rationale for their usage for comparison to a specific media, are described in detail below.

5.1.1 Human Health

Applicable human health criteria for soils include USEPA Region IX Industrial PRGs and USEPA Region IX Residential PRGs (USEPA, 2004), and the upper limit of means background levels (inorganics only) (Baker, 2006b). Applicable human health criteria for groundwater are USEPA Region IX Tap Water PRGs (USEPA, 2004), Federal Drinking Water Maximum Contaminant Levels (MCLs), and any inorganic background levels present in the groundwater at NAPR (Baker, 2006b).

The USEPA Region IX PRGs are tools for determining preliminary COPCs for human health risk assessments as part of evaluating and cleaning up contaminated sites. They are risk based concentrations derived from standardized equations (representing ingestion, dermal contact, and inhalation exposure pathways), combining exposure information assumptions and USEPA toxicity data. The PRGs contained in the Region IX PRG Table are generic; they are calculated without site-specific information. Region IX PRGs should be viewed as Agency guidelines, not legally enforceable standards. The PRGs for potentially carcinogenic chemicals are based on a target Incremental Lifetime Cancer Risk (ILCR) of $1x10^{-6}$. The PRGs for noncarcinogens are based on a target hazard quotient of 1.0. In order to account for cumulative risk from multiple chemicals in a medium, it is necessary to derive the PRGs based on a target hazard quotient of 0.1. Noncarcinogenic PRGs based on a target hazard quotient of 0.1 and the most recent toxicological criteria available, results in a set of values that can be used as screening criteria. In order to yield a hazard index (HI) of 0.1, the noncarcinogenic PRGs were divided by a factor of ten. For potential carcinogens, the toxicity criteria applicable to the derivation of PRG values are oral and inhalation Cancer Slope Factors (CSFs); for noncarcinogens, they are chronic oral and inhalation reference doses (RfDs). These toxicity criteria are subject to change as more updated information and results from the most recent toxicological/epidemiological studies become available. The PRG table is updated annually to reflect such changes. It should be noted that the most recent update was in October 2004 (USEPA, 2004).

Also, it should be noted that even though subsurface soil analytical results from below 10 feet would not be used in human health risk assessments due to the unlikely exposure route below that depth, all subsurface soil analytical results were screened against the PRGs for completeness.

5.1.2 Ecological

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. For a given metal, if an Eco-SSL has been established for both terrestrial plants and invertebrates, the lowest value was selected as the soil screening value. For those chemicals lacking an Eco-SSL, the literature-based toxicological benchmarks listed below were used as soil screening values.

- Toxicological thresholds for earthworms and microorganisms (Efroymson et al., 1997a)
- Toxicological thresholds for plants (Efroymson et al., 1997b)

When more than one screening value was available from Efroymson et al. (1997a and 1997b), the lowest value was selected as the surface soil screening value. For those chemicals lacking an Eco-SSL or 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, 2000), assuming a minimum default soil organic carbon content of 2.0 percent.
- Canadian soil quality guidelines (agricultural land use) developed by the Canadian Council of Ministers of the Environment (CCME, 2006).

CCME soil quality guidelines were given the lowest preference since they are background-based values that do not represent effect concentrations.

As a general rule, screening of soil results for ecological purposes would include surface soil, as well as subsurface soil results from the 1 – 2 foot depth range. At SWMU 16, no samples were collected between 1 and 2 feet bgs.

5.2 Surface Soils

Six surface soil samples were collected and analyzed as part of the Phase I RFI. The samples were analyzed for explosives. A detected results table for the combined surface soil data set is presented in Table 5-1. Results are compared to USEPA Region IX Residential Soil PRGs, Industrial Soil PRGs, and ecological surface soil screening values (see Section 5.1).

1,3,5-trinitrobenzene was the only explosive detected in very low concentrations at two different locations in the surface soil, 16SB01-00 and 16SB05-00. 16SB05 is located in between Building 1665 and Building 1666, and 16SB01 is located about 50 feet south of Building 1666. Neither detection exceeded any screening levels applicable to surface soil.

5.3 Subsurface Soils

A total of twelve subsurface soils samples were collected and analyzed as part of the 2006 RFI field activities. All twelve subsurface soil samples were analyzed for explosives. No explosives were detected in the subsurface soil.

5.4 Groundwater

One groundwater sample was collected and analyzed as part of the 2006 RFI field activities. Sample 16TW06 was submitted to the analytical laboratory for explosives.

No explosives were detected in the groundwater sample.

5.5 2006 Laboratory Data Validation Summary

More specific data validation findings, as they relate to each SDG, are discussed in Sections 5.5.2 through 5.5.4 below. Data validation reports are included in Appendix C. In addition, the Puerto Rican Chemist Certification for each STL SDG is presented in Appendix C.

5.5.1 Summary of Detected Compounds in Field QA/QC Samples

Field generated QA/QC samples for the 2006 field effort consisted of field blanks, equipment rinsates, and environmental duplicates. Other blanks were analyzed for all fractions requested in this investigation including explosives. Table 5-2 presents the detected compounds found in the equipment rinsates and field blanks.

Trip blanks were not required for this investigation as only explosives analyses were requested.

Detections in two field blanks 2006FB01 and 2006FB02 included two explosives compounds, RDX and tetryl.

Analysis of the three equipment rinsate samples resulted in the detection of three explosives compounds, all at estimated concentrations: nitrobenzene, 3-nitrotoluene, and 1,3,5-trinitrobenzene.

5.5.2 STL Savannah SDG 22012-2

This SDG (22012-2) is relevant to the analytical findings associated with the 2006 soil sampling. Laboratory analyses were performed by Severn Trent Laboratories, (Savannah, Georgia). Validation services were provided by Environmental Data Services, Inc. (Williamsburg, Virginia). Validation conclusions are as follows:

Explosives

- The MS/MSD samples exhibited unacceptable relative response factor and percent difference values, which resulted in the 2,4,6-trinitrotoluene non-detect result in sample 16SB01-01 to be qualified as estimated.

- Two equipment blank samples and one field blank samples showed some contamination, which resulted in the detected concentrations of 3-nitrotoluene in samples 16SB02-03 and 16SB01-01 to qualified as non-detects.

Only one constituent in two of the 20 groundwater samples had detected concentrations that were considered non-detects after validation. Since the impact of these changes was minimal, the data quality objectives for this SDG have been met.

5.5.3 STL Savannah SDG 22139-3

This SDG (22139-3) is relevant to the analytical findings associated with the 2006 groundwater sampling. Laboratory analyses were performed by Severn Trent Laboratories, (Savannah, Georgia). Validation services were provided by Environmental Data Services, Inc. (Williamsburg, Virginia). The only groundwater sample taken at this SDG (16TW06) did not have any qualified results.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The objectives of the Phase I RFI were to:

- Determine if any contaminants are present from past operation of the waste explosive storage building, to the extent practical, from the completion of field activities (surface soil, subsurface soil, and groundwater sampling) as described in the 2006 RFI Work Plan;
- Assess and document potential human health risks posed by the site; and
- Assess and document potential ecological risks posed by the site.

The following present specific conclusions relate to each of the RFI objectives.

Based on the analytical results from the SWMU 16 investigation, it is apparent that no contamination has resulted from the use of this building for waste explosives storage in the surface or subsurface soil. Only two detections of explosives compounds were found in the environmental samples in the surface soil, and both of these were at estimated concentrations below the reporting limit but above the method detection limit. They were three orders of magnitude lower than the lowest screening value.

While the work plan for this investigation did call for temporary wells at the soil boring locations, it is apparent that groundwater is not present to a significant extent beneath the site. The temporary well that was installed during the investigation was screened at a depth of 10 feet bgs. No groundwater was found at any of the other borings at the site, despite investigating to a depth of 37 feet bgs. The one sample from the groundwater exhibited no contamination.

6.2 Recommendations

Further evaluation of contamination at this site is not warranted based on the results of the Phase I RFI. Based on the results of the Phase I RFI, it can be concluded that the Navy's activities have not resulted in contamination to the surface soil or subsurface soil at the site. Therefore, it is recommended that this site be designated for Corrective Action Complete without Controls.

7.0 REFERENCES

Baker Environmental, Inc. (Baker), 2006a. RCRA Facility Investigation Work Plan, SWMUs 16, 27, 28, 29, and 42, and AOC A. Naval Activity Puerto Rico, Ceiba, Puerto Rico.

Baker, 2006b. Revised Final Summary Report for Environmental Background Concentrations of Inorganic Compounds, Naval Station Roosevelt Roads, Ceiba, Puerto Rico.

Canadian Council of Ministers of the Environment (CCME), 2006. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Summary Tables (Version 6.0.2). November 2006. http://www.ccme.ca/assets/pdf/ceqg_soil_summary_table_v6_e.pdf.

Efroymson, R.A., Will, M.E., and Suter II, G.W. (1997a). Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, TN. (ES/ER/TM-126/R2).

Efroymson, R.A., Will, M.E., Suter II, G.W., and Wooten, A.C. (1997b). Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Oak Ridge National Laboratory. Oak Ridge, TN. (ES/ER/TM-85/R3).

Ministry of Housing, Spatial Planning and Environment (MHSPE), 2000. Circular on Target Values and Intervention Values for Soil Remediation. Directorate-General for Environmental Protection, Department of Soil Protection, The Hague, Netherlands. February 4, 2000.

Naval Facilities Engineering Command (NAVFAC), 2004, Draft Phase II Environmental Condition of Property (ECP) Report, Naval Activity Puerto Rico, Ceiba Puerto Rico.

Naval Energy and Environmental Support Activity (NEESA). 1984. Initial Assessment Study of Naval Station Roosevelt Roads, Puerto Rico. NEESA 13-051.

Parker, B.L., 1999. Fractured Clayey Aquitards. In DNAPLs in Fractured Geologic Media, a Waterloo Educational Services Short Course, December 8-10, 1999.

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

TABLES

TABLE 4-1

SUMMARY OF 2006 RFI SOIL AND GROUNDWATER SAMPLING AND ANALYSIS
SWMU 16 - BUILDING 1666 - WASTE EXPLOSIVES STORAGE
PHASE I RCRA FACILITY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

				Analysis Requested	
Sample Media	Site ID	Sample ID	Sample Depth (ft bgs)	Explosives	Comments
Surface Soil	16SB01	16SB01-00	0.0 - 1.0	X	
	16SB02	16SB02-00	0.0 - 1.0	X	
	16SB03	16SB03-00	0.0 - 1.0	X	
	16SB04	16SB04-00	0.0 - 1.0	X	
	16SB05	16SB05-00	0.0 - 1.0	X	
	16SB06	16SB06-00	0.0 - 1.0	X	
		16SB06-00D	0.0 - 1.0	X	Duplicate
		16SB06-00MS/MSD	0.0 - 1.0	X	Matrix Spike/Matrix Spike Duplicate
Subsurface Soil	16SB01	16SB01-01	2.0 - 3.0	X	
		16SB01-02	4.0 - 5.0	X	
	16SB02	16SB02-02	3.0 - 4.0	X	
		16SB02-03	6.0 - 7.0	X	
	16SB03	16SB03-02	3.0 - 4.0	X	
		16SB03-03	6.0 - 7.0	X	
	16SB04	16SB04-02	3.0 - 4.0	X	
		16SB04-03	5.0 - 6.0	X	
	16SB05	16SB05-02	4.0 - 5.0	X	
		16SB05-03	6.0 - 7.0	X	
	16SB06	16SB06-02	4.0 - 5.0	X	
		16SB06-03	6.0 - 7.0	X	
		16SB06-03D	6.0 - 7.0	X	Duplicate
Groundwater	16TW06	16TW06	NA	X	
		16TW06D	NA	X	Duplicate
		16TW06MS	NA	X	Matrix Spike
		16TW06MSD	NA	X	Matrix Spike Duplicate
				25	

Notes:
ft bgs - feet below ground surface NA - Not Applicable.

TABLE 4-2

SUMMARY OF 2006 RFI QUALITY ASSURANCE / QUALITY CONTROL SAMPLING AND ANALYSIS
SWMU 16 - BUILDING 1666 - WASTE EXPLOSIVES STORAGE
PHASE I RCRA FACILITY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

	Analysis Requested	
Sample ID	Explosives	Comments
Equipment Rinsate Samples		
2006ER02	X	Geoprobe Acetate Liner
2006ER03	X	Stainless Steel Spoon
2006ER04	X	Tubing
Field Blank Samples		
2006FB01	X	Lab Grade Deionized Water
2006FB02	X	NAPR Potable Water
Totals	5	

TABLE 4-3

PARAMETER LISTS AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
SWMU 16 - BUILDING 1666 - WASTE EXPLOSIVES STORAGE
PHASE I RCRA FACILITY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Explosives	Quantitation Limits*		Method Number
	Water (ug/L)	Low Soil (mg/kg)	
HMX	0.1	0.25	8330
RDX	0.1	0.25	8330
1,3,5-Trinitrobenzene	0.1	0.25	8330
1,3-Dinitrobenzene	0.1	0.25	8330
Tetryl	0.1	0.25	8330
Nitrobenzene	0.1	0.25	8330
2,4,6-Trinitrotoluene	0.100	0.25	8330
4-Amino-2,6-dinitrotoluene	0.100	0.25	8330
2-Amino-4,6-dinitrotoluene	0.200	0.25	8330
2,4-Dinitrotoluene	0.100	0.25	8330
Nitroglycerin	0.650	0.50	8330
2,6-dinitrotoluene	0.100	0.25	8330
2-Nitrotoluene	0.500	0.25	8330
3-Nitrotoluene	0.500	0.25	8330
4-Nitrotoluene	0.500	0.25	8330

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

TABLE 4-4

GROUNDWATER ELEVATION SUMMARY
SWMU 16 - BUILDING 1666 - WASTE EXPLOSIVES STORAGE BUILDING
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Well Identification	Northing	Easting	Elevation (msl) Ground Surface	Elevation (msl) Top of PVC	Total Well Depth (ft)	Date of Water Level Measurement	Depth to Groundwater (ft)	Groundwater Elevation (msl)
SWMU 16								
16-TW06	804225.2928	930834.2420	148.53	148.94	10.0	11/18/06	1.95	146.99

Revised: November 20, 2007

TABLE 5-1

SUMMARY OF DETECTED RESULTS - SURFACE SOIL
SWMU 16 - BUILDING 1666 - WASTE EXPLOSIVES STORAGE
PHASE I RCRA FACILITY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Sample ID **Sample Depth (ft bgs)** **Sampling Date**	**USEPA Region IX Residential Soil PRGs**	*USEPA Region IX Industrial Soil PRGs*	Selected Ecological Surface Soil Screening Values	**16SB01-00 (0.0 - 1.0) 11/15/2006**	**16SB02-00 (0.0 - 1.0) 11/14/2006**	**16SB03-00 (0.0 - 1.0) 11/15/2006**	**16SB04-00 (0.0 - 1.0) 11/14/2006**	**16SB05-00 (0.0 - 1.0) 11/14/2006**	**16SB06-00 (0.0 - 1.0) 11/14/2006**	**16SB06-00D (0.0 - 1.0) 11/14/2006**
Explosives (mg/kg)										
1,3,5-Trinitrobenzene	183	1,847	40 [(1)]	0.025 J	0.25 U	0.25 U	0.25 U	0.021 J	0.25 U	0.25 U

Notes:

U - Not detected
J - Analyte present - Reported value is estimated
NE - Not Established
PRG - Preliminary Remedial Goal
NAPR - Naval Activity Puerto Rico
[(1)] Earthworm-based toxicological threshold for nirobenzene (Efroymson et al., 1997a) used as a surrogate

TABLE 5-2

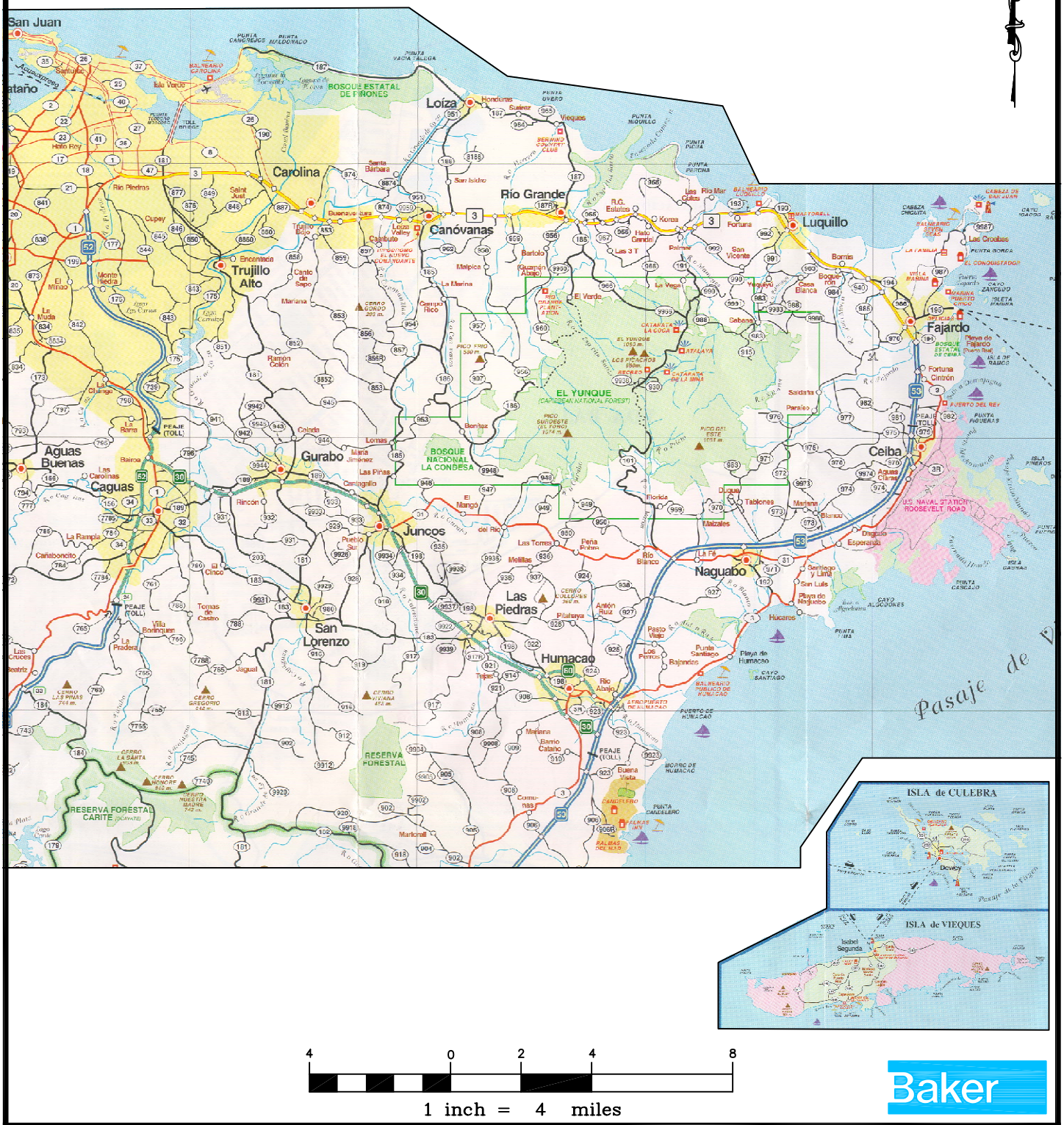
SUMMARY OF DETECTED RESULTS - QUALITY ASSURANCE / QUALITY CONTROL
SSWMU 16 - BUILDING 1666 - WASTE EXPLOSIVES STORAGE
PHASE I RCRA FACILITY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

	Equipment Rinsates			Field Blanks	
Sample ID	**2006ER02**	**2006ER03**	**2006ER04**	**2006FB01**	**2006FB02**
Sampling Date	**11/14/2006**	**11/15/2006**	**11/16/2006**	**11/18/2006**	**11/18/2006**
Method - 8330 (ug/L)					
Nitrobenzene	0.097 J	0.1 U	0.1 U	0.1 U	0.1 U
3-Nitrotoluene	0.22 J	0.14 J	0.31 J	0.5 U	0.5 U
RDX	0.1 U	0.1 U	0.1 U	0.14	0.1 U
Tetryl	0.1 U	0.1 U	0.1 U	0.077 J	0.1 U
135-Trinitrobenzene	0.13 J	0.13 J	0.13 J	0.1 U	0.1 U

Notes:
U - Not detected
J - Analyte present - Reported value is estimated

FIGURES

K_CH2M HILL CLEAN III\CTO-121 (107872)\CAD\PHASE I RFI\swmu 42\ 107872RFI_16-01



4 0 2 4 8

1 inch = 4 miles

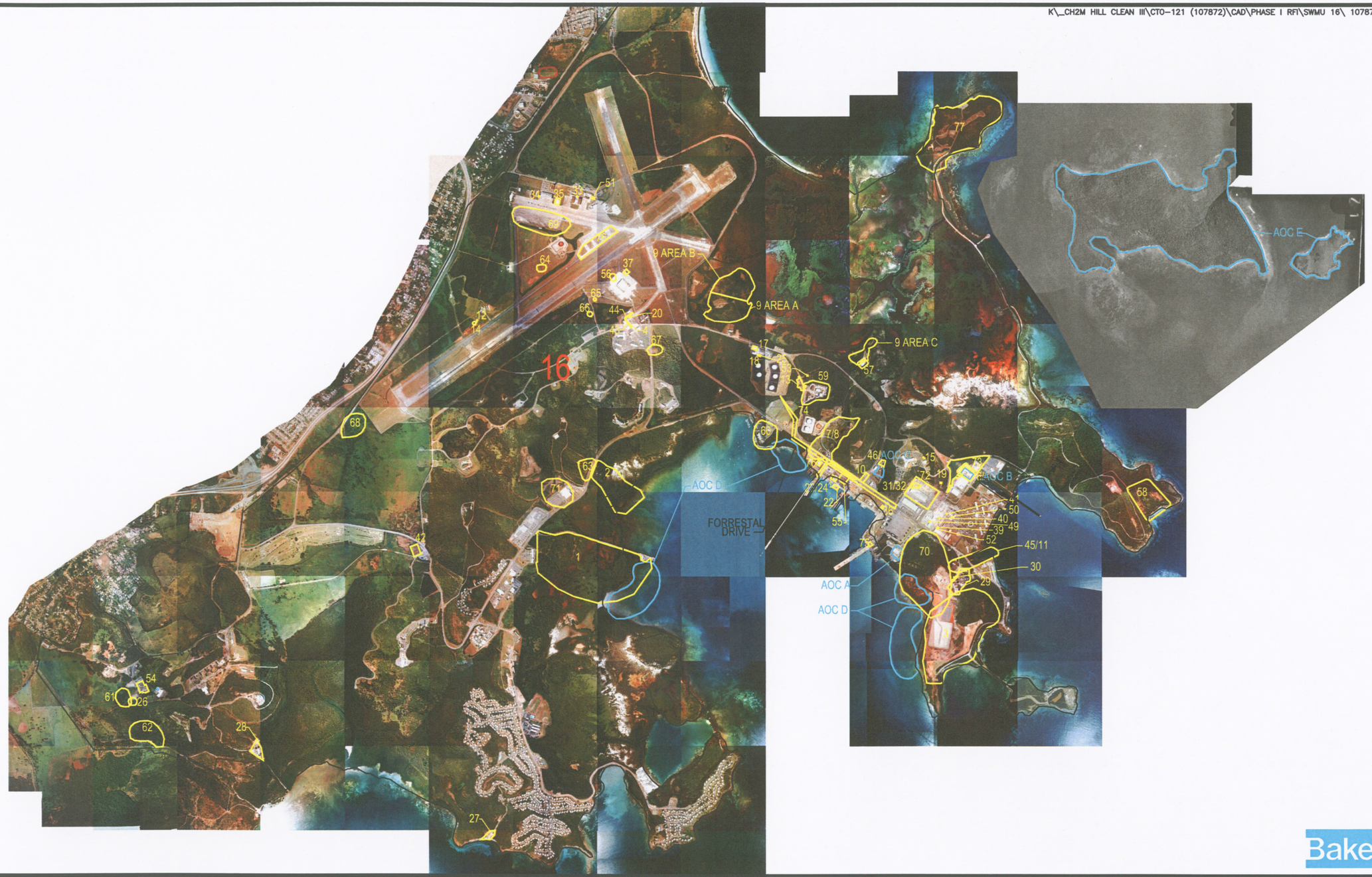
Baker

FIGURE 2-1
REGIONAL LOCATION MAP
PHASE I RFI
SWMU 16

NAVAL ACTIVITY PUERTO RICO
PUERTO RICO

SOURCE: METRODATA, INC., 1999.

K_CH2M HILL CLEAN III\CTO-121 (107872)\CAD\PHASE I RFI\SWMU 16\ 107872RFI_16-02



LEGEND

1 – SWMUs

16 – AREA OF WHICH THIS INVESTIGATION PERTAINS TO

AOC D – AOCs

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

3000 0 1500 3000

1 inch = 3000 ft.

FIGURE 2-2
NAPR LOCATION MAP
PHASE I RFI WORK PLAN FOR
SWMU 16
NAVAL ACTIVITY PUERTO RICO
PUERTO RICO

LEGEND

▭ – SWMU 16

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

400 0 200 400

1 inch = 400 ft.

FIGURE 2-3
SWMU 16 LOCATION MAP

NAVAL ACTIVITY PUERTO RICO
PUERTO RICO

50 0 50 50

1 inch = 50 ft.

Baker

LEGEND

- SITE BOUNDARY
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

FIGURE 4-1
RFI SOIL AND GROUNDWATER SAMPLING LOCATIONS
SWMU 16-BUILDING 1666-WASTE EXPLOSIVES STORAGE BUILDING
PHASE I RFI SWMU 16
NAVAL ACTIVITY PUERTO RICO
PUERTO RICO

APPENDIX A
2006 FIELD ACTIVITIES

APPENDIX A.1
SWMU 16 FIELD LOG BOOK NOTES

CONTENTS

PAGE NO.	REFERENCE	DATE
	MKD = Mark DeJohn	
	MEK = Mark Kimes	
	JHB = Joe Burawa	
	PAM = Pete Mondary	
	DNH = Darrin Hope	

Sun. Nov. 12, 2006. Today's Tasks -
Mobilize to Puerto Rico

0700 Arrive at PIT

0840 Depart for SJU

1330 Arrive at SJU. Prep to travel to Palmas del Mar MKD, JHB, & MEK travel today

11/12 MKD

NAPR

165B06

Time	Depth	ID	Recovery	PID PS	PID BG
1245	0-4	S-1	2.8	-	-
				0	0
				0	0
				0	0
1250	4-8	S-2	4.0	0	0
				0	0
				0	0
				0	0
1300	8-12	S-3	4.0	0	0
				0	0
				0	0
				0	0
1315	12-16	S-4	3.6	0	0
				0	0
				0	0
				0	0
1330	16-18	S-5	2.0	0	0
				0	0

MKD

NAPR

	Description	
1	F SAND, trace c sand; silt; tan; dry (FILL)	-03
2		1.5
3	CLAY, trace F sand; red-brown; sl mottled; damp (RESIDUM) Plastic	
4		
5	red; gray. mottled; damp	-02
6		
7	moist @ 6.8'	-03
8	↓	
9		8.5
10	SAPROLITE, lt brown; dry; soft; white	
11	becoming hard at 10.3'	
12	gray, lt brown, white; lt green	
13	weathered zone 12-14.3'; damp yellow-brn; white	
14		
15	green gray, black, white; rust; damp	
16		
17		
18	BOHE 18.0'	
19		
20		

MKD

NAPR

165B05

Time	Depth	ID	Recovery	PID PS	PID BG
1410	0-4	S-1	2.8	-	-
				0	0
				0	0
				0	0
1415	4-8	S-2	4.0	0	0
				0	0
				0	0
1420	8-10	S-3	2.0	0	0
				0	0
1425	10-12	S-4	2.0	0	0
				0	0

1650 Cleanup time. other crew is also in cleanup. Juan says contract is for 8-hs on-site. Any addt'l hours in overtime premium charge.
1655 Juan & William depart SWMU 16
1659 Gauge TW06: dry.
1701 Relocate to PWD.
1715 Assist MEK w/ SWMU 16 COC form
MKD

11/14

NAPR

	Description	
	F SAND, trace < sand; tan; dry (FILL)	0.0
1		1.5
2	CLAY, trace rock frag; ~~red~~ brown; yell	
3	damp (RESIDUUM);	
4		
5	CLAY; red & gray; damp; plastic	-02
6		
7	damp to moist	-03
8		7.8
9	SAPPROLITE; brn, yell-brn & white	
10	fairly soft; damp	
11		
12	BOHE 12.0'	

1743 Go through SWMU 29 bottles set.
1831 Depart base - done for the day

MKD 11/14/06

11/14

MKD

NAPR

165B04

Time	Depth	ID	Recovery	PS	BG
1445	0-4	S-1	2.7	—	—
				0	0
				0	0
				0	0
1450	4-8	S-2	4.0	0	0
				0	0
				0	0
				0	0
1455	8-10	S-3	2.0	0	0
				0	0
				0	0
				0	0
1500	10-12	S-4	2.0		

MKD

11/14

Description

1 F SAND, trace c sand; tan; dry (FILL) -00

2 CLAY, trace F sand; brown, yellow-tan; 1.5
3 rust; plastic; damp (RESIDUUM)
4 -02
5
6 -03
7 6.8
8 SAPPROLITE, green-gray; dk gray; white; damp
9
10 weathered zone (8-10')
11
12 BOHE 12.0'

11/14

MKD

NAPR

165B02

Time	Depth	ID	Recovery	PID PS	PID BG
1530	0-4	S-1	3.1	-	-
				0	0
				0	0
				0	0
1535	4-8	S-2	4.0	0	0
				0	0
				0	0
				0	0
1540	8-10	S-3	2.0	0	0
				0	0
1545	10-12	S-4	2.0	0	0
				0	0
1555	12-14	S-5	2.0	0	0
				0	0
1603	14-16	S-6	2.0	0	0
				0	0
1613	16-18	S-7	2.0	0	0
				0	0
1622	18-20	S-8	2.0	0	0
				0	0
1631	20-22	S-9	2.0	0	0
				0	0

MKD

11/14

NAPR

	Description	
1	F SAND, little c sand; tan; moist (FILL)	-00
2		2.0
3	CLAY, trace rock frag; red; brown; damp	
4	CLAY, trace f sand; red; brn; damp	-02
5	red; gray; damp plastic	
6	(RESIDUUM)	
7		-03 7.1
8	SAPPROLITE; tan; rust (orange); damp	
9	weathered zone	
10	green-gray; brown; black; white	
11	mainly green-gray; weathered; damp	
12		
13	gray; white; more weathering than above	
14		14
15	very soft, trace green color	no identification
16		
17	dk gray; white; soft	
18	as above	
19		
20	mainly green-gray	
21		
22		

11/14

MKD

NAPR

165B02 Cont.

Time	Depth	ID	Recovery	PS	BG
1642	22-24	S-10	2.0	0	0
—Resume	11/15 ——			0	0
0740	24-26	S-11	2.0	0	0
				0	0
0752	26-28	S-12	2.0	0	0
				0	0
0809	28-30	S-13	2.0	0	0
				0	0
0824	30-32	S-14	2.0	0	0
				0	0
0839	32-34	S-15	2.0	0	0
				0	0
0903	34-36	S-16	1.7	0	0
	2:50			0	0
0919	36-37	S-17			
	4:40	Refusal @ 37-ft bgs			

MKD

11/14-15

Description

23 SAPPROLITE (SILT, trace F sand; rock
24 frag; clay); gray; ~~white~~ white;
soft; damp
25 green-gray; white, trace rust staining
26 at 25.6'; damp
27
28 sandy w/ rock frag beginning at 27.4'
rust-brown; damp
29 greenish-gray; more cohesive
30
31
32
33
34 F gravel, trace silt particle size;
35 tan; rusty-brown; damp
36
37
38
39
40

11/14-15

MKD

Wed. Nov. 15, 2006. Today's Tasks
SWMU 16 & SWMU 29
Weather Conditions-
AM: P. Sunny, lt east wind, near 80°.
PM: Incr. clouds, mod SE wind, high 80°
0610 Arrive at PWD. Prepare for the day.
0701 Relocate to SWMU 16.
0713 ~~X~~ Gauge TW06- Dry
0727 William on site. Setup at 16SB02 to complete.
0921 Completed 16SB02 to 37 ft bgs (Probe refusal)
0930 Driller needs more liners and needs to decon; off site.
1035 Rig sets up on 16SB01.
1119 Complete sampling at SWMU 16. Drillers go to lunch. I finish up sampling.
1145 Lunch break
1220 My drill crew needs to decon & cleanup SWMU 16.
1251 Gauged 16TW06. DTW = 2.20' (T/PVC). This is probably recharge from sandy surficial layer, which became saturated after recent

MKD 11/15

(cont.) rains. Will talk to MEK; might be nice to grab GW to test infiltrate.
1256 I relocate to PWD while drill crew finishes decon.
1324 Relocate to SWMU 29 w/ drill crew & PAM (who locates borings). I spoke w/ treatment plant personnel; they cover two shifts & will have gate unlocked to 1830 or so.
1338 Borings located PAM off site
1345 Setup at 29SB05
1405 Drill leave for trailer & sand/bentonite to back fill SB05 to 10' bgs
1503 Driller returns to SWMU 29 and installs 29TW05
1511 Set up at 29SB04.
1600 Driller departs SWMU29 - Done for the day. I prep. to collect surface soil samples.
1615 Collect 29SS01-00
1700 Collect 29SS02-00, QCD, and MS/MSD
1713 Complete tasks at SWMU 26 Return to PWD.

11/15 MKD

NAPR

165301

Time	Depth	ID	Recovery	PID PS	PID BG
1040	0-4	S-1	3.8	0	0
				0	0
				0	0
				0	0
1045	4-8	S-2	4.0	0	0
				0	0
				0	0
				0	0

Bolt @ 8.0 ft bgs

1800 Depart Base - done for the day

MKD

11/15

	Description	
1	CLAY, trace rock frag; silt; red; gray; damp	00
2		
3	CLAY; gray; red; damp	-01
4		
5		-02
6	SAPPROLITE; brown, white & yellow-brn; damp	5.1
7		
8		
9		
10		
11		
12		

11/15

MKD

NAPR

165B03

Time	Depth	ID	Recovery	PID PS	PID BG
1102	0-4	S-1	2.7	-	-
				0	0
				0	0
				0	0
1107	4-8	S-2	3.6	0	0
				0	0
				0	0
				0	0
1115	8-10	S-3	1.5	0	0
				0	0
				0	0

MKO

11/15

NAPR

	Description	
1	F SAND, trace f gravel; round; tan; moist	-00
2		2.0
3	CLAY, trace rock frag; brown; damp	
4		-02
5	CLAY; red; gray; damp	
6	semi-plastic	
7		-03
8		7.7
9	SAPPROLITE; yellow-brown, gray; white; damp	
10		
11		
12		

11/15

MKO

NAPR

Sat. Nov. 18, 2006. Todays Tasks -
Groundwater sampling
Weather Conditions-
AM: M. Sunny, low 80's (calm)
PM:

0615 Arrive at PWD. Prepare for groundwater sampling (16TW06 and complete 27TW02).
0644 Relocate to SWMU 16.
0657 16TW06 DTW = 1.95' (T/PVC)
0705 Collect 16TW06 for explosives
0712 WQP Readings:

Temp	27.6° C
sp Cond	2.35 mS/cm
D.O.	2.1 mg/L
pH	7.33 SU
ORP	167.0 mV

0718 DTW = 6.61' (T/PVC)
0722 Relocate to SWMU 27.
0752 Begin collection of addt'l sample from 27TW01. DTW =
0754 Collected ~ 1.3L before TW01 went dry.
0803 27TW02 DTW = 1.72' (T/PVC)
0805 Begin addt'l sample collection from

MAD 11/18

NAPR

(cont) 27TW02
0808 Got ~ 2L from 27TW02 before it went dry.
0831 Back at 16TW06 to collect QA/QC samples per MEK instructions.
0840 Collected an addt'l 1.75L before 16TW06 went dry.
0924 Relocate to SWMU 68 to supervise temp. well abandonment. MEK says that the drillers (Jesse & William) were here at 0800 and have abandoned wells at SWMU 28.
0945 SWMU 68 abandonment complete. Relocate to SWMU 42.
1005 Abandoned 3 TWs at SWMU 42. Relocate to SWMU 27.
1031 Pulled 1L from 27TW01 & 1.5L from TW02
1058 Complete SWMU 27 abandonment
1120 I was able to complete 4th bottle for 16TW06. Driller abandons well.
1124 Relocate to SWMU 29. DNH asked me to gauge 29TW02 right

11/18 MAD

APPENDIX A.2
CHAIN-OF-CUSTODY FORMS

Serial Number 95089

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT **STL**

FedEx Airbill No: 8462 4272 0327

● STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404

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

16-002

○ Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE: SWMU 16 RFI	PROJECT NO.: CTO-121	PROJECT LOCATION (STATE):
STL (LAB) PROJECT MANAGER: Kathy Smith	P.O. NUMBER:	CONTRACT NO.:
CLIENT (SITE) PM: Mark Kimes	CLIENT PHONE: 412-337-7465	CLIENT FAX:
CLIENT NAME: Baker	CLIENT E-MAIL:	
CLIENT ADDRESS: 100 Airside Dr/ Moon Twp., PA 15108		
COMPANY CONTRACTING THIS WORK (if applicable): CH2M Hill		

PAGE 1 OF 1

STANDARD REPORT DELIVERY ●
DATE DUE 28 day TAT
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE _____

NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	MATRIX TYPE: COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	REQUIRED ANALYSIS: 8330 Explosives	NUMBER OF CONTAINERS SUBMITTED	REMARKS
11/18/06	0705	16TW06	G	X					1	
↓	↓	16TW06D	G	X					1	
↓	↓	16TW06 MS	G	X					1	
11/18/06	0705	16TW06 MSD	G	X					1	

PRESERVATIVE

TEMP. 0

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[illegible]			[signature]	11/20/06	1200			
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
[signature]	11/13/06	0630						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
KG	11/21/06	0919	YES ○ NO ○		680-22139	

STL8240-680 (12/02)

Serial Number 76709

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT

STL®

FedEx Airbill No.: 8462 4272 0290

STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404

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

16-001

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE: SWMU 16 RFI	PROJECT NO.: CTO-121	PROJECT LOCATION (STATE): PR	PAGE 1 OF 2
STL (LAB) PROJECT MANAGER: Kathy Smith	P.O. NUMBER	CONTRACT NO.	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 Airside Drive, Moon Twp., PA 15108			DATE DUE:
COMPANY CONTRACTING THIS WORK (if applicable): CH2M Hill			NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

REQUIRED ANALYSIS: 8330 Explosives

PRESERVATIVE

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT,...)	NUMBER OF CONTAINERS SUBMITTED	REMARKS
11/14/06	1245	165B06-00	G		X			1	
	1245	165B06-00D	G		X			1	
	1245	165B06-00 MS/MSD	G		X			1	
	1250	165B06-02	G		X			1	
	1255	165B06-03	G		X			1	
	1255	165B06-03D	G		X			1	
	1410	165B05-00	G		X			1	
	1415	165B05-02	G		X			1	
	1417	165B05-03	G		X			1	
	1445	165B04-00	G		X			1	
	1447	165B04-02	G		X			1	
11/14/06	1450	165B04-03	G		X			1	

TEMP.: 1.0

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
			Mark E. Kimes	11/15/06	1500			
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Mark E. Kimes	11/13/06	0630						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
KC	11/16/06	0921	YES ○ NO ○		680-22012	

STL8240-680 (12/02)

Serial Number 88035

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT **STL**

STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Website: www.stl-inc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

16-001

Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE: SWMU 16 RFI	PROJECT NO.: CTO-121	PROJECT LOCATION (STATE): PR	PAGE 2 OF 2
STL (LAB) PROJECT MANAGER: Kathy Smith	P.O. NUMBER:	CONTRACT NO.:	STANDARD REPORT DELIVERY ● DATE DUE 28-day TAT
CLIENT (SITE) PM: Mark Kimes	CLIENT PHONE: 412-337-7465	CLIENT FAX:	EXPEDITED REPORT DELIVERY (SURCHARGE) ○ DATE DUE _____
CLIENT NAME: Baker	CLIENT E-MAIL: mkimes@bakercorp.com		
CLIENT ADDRESS: 100 Airside Drive, Moon Twp., PA 15108			NUMBER OF COOLERS SUBMITTED PER SHIPMENT:
COMPANY CONTRACTING THIS WORK (if applicable):			

REQUIRED ANALYSIS: 8330 Explosives

PRESERVATIVE

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT,...)	NUMBER OF CONTAINERS SUBMITTED	REMARKS
11/14/06	1530	16SB02-00	G		X			1	
↓	1537	16SB02-02	G		X			1	
11/14/06	1535	16SB02-03	G		X			1	
11/15/06	1040	16SB01-00	G		X			1	
	1055	16SB01-01	G		X			1	
	1045	16SB01-02	G		X			1	
	1102	16SB03-00	G		X			1	
↓	1120	16SB03-02	G		X			1	
11/15/06	1107	16SB03-03	G		X			1	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
			Mal E. Kimes	11/15/06	1500			
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Mal E. Kimes	11/13/06	0630						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
KL	11/16/06	0921	YES ○ NO ○		680-22012	

STL8240-680 (12/02)

Serial Number 95086

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT **STL**

FedEx Airbill No: 8462 4272 0327

STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404

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

2006-002

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE: QA/QC	PROJECT NO.: CTO-121	PROJECT LOCATION (STATE): PR
STL (LAB) PROJECT MANAGER: Kathy Smith	P.O. NUMBER:	CONTRACT NO.:
CLIENT (SITE) PM: Mark Kimes	CLIENT PHONE: 412 337 7465	CLIENT FAX:
CLIENT NAME: Baker	CLIENT E-MAIL: mkimes@mbakercorp.com	
CLIENT ADDRESS: 100 Airside Dr., Moon Twp, PA 15108		
COMPANY CONTRACTING THIS WORK (if applicable): CH2M Hill		

PAGE 1 OF 1

STANDARD REPORT DELIVERY (●)
DATE DUE 28 day TAT
EXPEDITED REPORT DELIVERY (SURCHARGE) ( )
DATE DUE _____

NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

MATRIX TYPE (COMPOSITE (C) OR GRAB (G) INDICATE): AQUEOUS (WATER); SOLID OR SEMISOLID; AIR; NONAQUEOUS LIQUID (OIL, SOLVENT, ...)

REQUIRED ANALYSIS / NUMBER OF CONTAINERS SUBMITTED

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G)	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	8260B VOCs App IX List	8270C SVOCs App IX List	8270C LL PAHs	8082 PCBs	6010B Metals Total App IX List / 7470A Hg	8015B DRO 5030B	8015B GRO 5030B	Explosives 8330			REMARKS
11/14/06	1700	2006ER02	G	X				3	2	2	2	1	2	3	2			
11/15/06	1700	2006ER03	G	X				3	2	2	2	1	2	3	2			
11/17/06	1700	2006ER05	G	X				3	2	2	2	1	2	3	2			
11/10/06	1700	2006FB01	G	X				3	2	2	2	1	2	3	2			
11/18/06	1700	2006FB02	G	X				3	2	2	2	1	2	3	2			
11/16/06		2006ER04	G	X				3	2	2	2	1	2	3	2			

PRESERVATIVE

11/21/06 1.0
GKC
TEMP.: 1.0
0.0/0.0/0.0/1.0/0.0/1.0
0.0/0.0/0.0/0.0/4.0/6.0/1.0
0.0/0.0/1.0

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[illegible]			[illegible]	11/20/06	1200			

RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[illegible]	11/13/06	0630						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT YES / NO	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
KL	11/21/06	0519			680-22139	

STL 8240-680 (12/02)

Serial Number 76716

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT STL®

FEDEX AIRBILL NO: 8462 4272 0305

STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404

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

2006-001

Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
	CTO-121	PR
STL (LAB) PROJECT MANAGER: Kathy Smith	P.O. NUMBER	CONTRACT NO.
CLIENT (SITE) PM: Mark Kimes	CLIENT PHONE: 412 337 7465	CLIENT FAX
CLIENT NAME: Baker	CLIENT E-MAIL: mKimes@mbakercorp.com	
CLIENT ADDRESS: 100 Airside Dr. Moon Twp., PA 15108		
COMPANY CONTRACTING THIS WORK (if applicable): CH2M Hill		

PAGE ___ OF ___

STANDARD REPORT DELIVERY ●
DATE DUE 20 Day TAT
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE ___

NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	MATRIX TYPE: COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT,...)	8260B VOCs	8270C SVOCs	8270C LL PAHs	8082 PCBs	6010B Metals Total	6010B Metals Diss	9012B Cyanide	8015B DRO	5030B	8015B GRO	3550B	8330 Explosives	REMARKS
								REQUIRED ANALYSIS	App IX List	App IX List	App IX List	App IX List/7470A Hg	App IX List/7470A Hg							
								PRESERVATIVE												
								NUMBER OF CONTAINERS SUBMITTED												
11/13/06	1600	2006ER01	G	X				~~3~~ 2	2	2	2	1		1	2	2	~~3~~ 2	2		

TEMP.: 0.0

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[illegible]			Paul E. K[illegible]	11/16/06	1500			
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Paul E. K[illegible]	11/13/06	0630						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
KL	11/14/06	0916	YES ○ NO ○		680-27060	

STL8240-680 (12/02)

APPENDIX A.3
SOIL BORING LOGS AND WELL CONSTRUCTION RECORDS

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

PROJ. NO.: 107872 BORING NO.: 16SB01

COORDINATES: EAST: 930817.0345 NORTH: 804161.8569

ELEVATION: SURFACE: 149.93

Rig:	Geoprobe Track Rig 5400 DT							
	Macro Sampler	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.				11/15/2006	0.0 - 8.0	Pt. Sunny, 80s	
Length	4'							
Type								
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector Measurement
MSL = Mean Sea Level
BKG/PS = Background/Point Source
ppm = parts per million

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1					16SB01 -00 (0-1')		CLAY, trace rock fragments and silt; red and gray; damp *Collect soil sample from 0 to 1'		
2		S-1	3.8			0		2.0	147.93
3					16SB01 -01 (2-3')		CLAY; gray and red; damp *Collect soil sample from 2' to 3'		
4	4.0								
5					16SB01 -02 (4-5')		*Collect soil sample from 4' to 5'	5.1	144.83
6		S-2	4.0			0	SAPPROLITE; brown, white and yellow-brown; damp		
7									
8	8.0							8.0	141.93
9							End of Boring at 8.0'		
10									

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB01 SHEET 1 OF 1

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

PROJ. NO.: 107872 BORING NO.: 16SB02

COORDINATES: EAST: 930826.5912 NORTH: 804192.6297

ELEVATION: SURFACE: 149.46

Rig:	Geoprobe Track Rig 5400 DT							
	Macro Sampler	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.				11/14/2006	0.0 - 24.0	Pt. Sunny, 80s	
Length	4'				11/15/2006	24.0 - 37.0	Pt. Sunny, 80s	
Type								
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector Measurement
MSL = Mean Sea Level
BKG/PS = Background/Point Source
ppm = parts per million

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1					16SB02 -00 (0-1')		FINE SAND, little coarse sand; tan; moist (FILL) *Collect soil sample from 0 to 1'	
2		S-1	3.1			0	2.0	147.46
3							CLAY, trace rock fragments; red and brown; damp 3.0	146.46
4	4.0				16SB02 -02 (3-4')		CLAY, trace fine sand; red and brown; damp *Collect soil sample from 3' to 4'	
5								
6		S-2	4.0			0	red and gray; plastic; damp after 5' (RESIDUUM) *Collect soil sample from 6' to 7'	
7					16SB02 -03 (6-7')		7.1	142.36
8	8.0						SAPPROLITE (SILT, trace fine sand, rock fragments and clay); tan and rust (orange); damp	
9		S-3	2.0			0	weathered zone	
10	10.0						green-gray; brown; black and white	
		S-4	2.0			0		

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB02 SHEET 1 OF 3

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

SO NO.: 107872 BORING NO.: 16SB02

SAMPLE TYPE	DEFINITIONS
S = Split Spoon A = Auger	SPT = Standard Penetration Test (ASTM D1586)
T = Shelby Tube W = Wash	PID = Photo Ionization Detector Measurement
R = Air Rotary C = Core	MSL = Mean Sea Level
D = Denison P = Piston N = No Sample	ps/bg = point source/background

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11		S-4	2.0			0	Continued from Sheet 1 SAPPROLITE (SILT, trace fine sand, rock fragments, and clay); weathered; mainly green-gray; damp	
12	12.0							
13		S-5	2.0			0	gray and white; more weathering than above	
14	14.0							
15		S-6	2.0			0	no lithofication after 14' very soft; trace green color	
16	16.0							
17		S-7	2.0			0	dark gray and white; soft	
18	18.0							
19		S-8	2.0			0	mainly green-gray	
20	20.0							
21		S-9	2.0			0		
22	22.0							
23		S-10	2.0			0	gray and white; soft; damp	
24	24.0						green-gray and white, trace rust staining at 25.6'; damp	
25		S-11	2.0			0		
26	26.0							
27		S-12	2.0			0	sandy with rock fragments beginning at 27.4'; rust-brown; damp	
28	28.0							
29		S-13	2.0			0	greenish-gray; more cohesive	
30	30.0							
		S-14	2.0			0		

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB02 SHEET 2 OF 3

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

SO NO.: 107872 BORING NO.: 16SB02

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS

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	Elevation (Ft. MSL)
31							Continued from Sheet 2	
		S-14	2.0			0	SAPPROLITE (SILT, trace fine sand, rock fragments,	
32	32.0						and clay); greenish-gray; damp	
33		S-15	2.0			0		
34	34.0							
35		S-16	1.7			0	fine gravel, trace silt particle size; tan and rusty-brown; damp	
36	36.0							
		S-17				0		
37	37.0						Refusal at 37.0' 37.0	112.46
38							End of Boring at 37.0'	
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB02 SHEET 3 OF 3

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

PROJ. NO.: 107872 BORING NO.: 16SB03

COORDINATES: EAST: 930814.2054 NORTH: 804200.6018

ELEVATION: SURFACE: 149.32

Rig:	Geoprobe Track Rig 5400 DT							
	Macro Sampler	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.				11/15/2006	0.0 - 10.0	Pt. Sunny, 80s	
Length	4'							
Type								
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector Measurement
MSL = Mean Sea Level
BKG/PS = Background/Point Source
ppm = parts per million

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1					16SB03 -00 (0-1')		FINE SAND, trace fine gravel and coarse sand; tan; moist	
2		S-1	2.7			0	2.0	147.32
3							CLAY, trace rock fragments; brown; damp	
4	4.0				16SB03 -02 (3-4')		4.4	144.92
5							CLAY; plastic; red and gray; damp	
6		S-2	3.6			0		
7					16SB03 -03 (6-7')		7.7	141.62
8	8.0							
9		S-3	1.5			0	SAPPROLITE; yellow-brown, gray and white; damp	
10	10.0						10.0	139.32
							End of Boring at 10.0'	

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB03 SHEET 1 O 1

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

PROJ. NO.: 107872 BORING NO.: 16SB04

COORDINATES: EAST: 930842.6735 NORTH: 804200.8550

ELEVATION: SURFACE: 148.57

Rig:	Geoprobe Track Rig 5400 DT							
	Macro Sampler	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.				11/14/2006	0.0 - 12.0	Pt. Sunny, 80s	
Length	4'							
Type								
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector Measurement
MSL = Mean Sea Level
BKG/PS = Background/Point Source
ppm = parts per million

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1					16SB04 -00 (0-1')		FINE SAND, trace coarse sand; tan; dry (FILL) *Collect soil sample from 0 to 1'	
							1.5	147.07
2		S-1	2.7			0	CLAY, trace fine sand; plastic; brown, yellow-brown, rust; damp (RESIDUUM)	
3								
4	4.0				16SB04 -02 (3-4')		*Collect soil sample from 3' to 4'	
5								
6		S-2	4.0		16SB04 -03 (5-6')	0	*Collect soil sample from 5' to 6'	
7							6.8	141.77
8	8.0						SAPPROLITE; green-gray, dark gray and white; damp	
9		S-3	2.0			0	weathered zone from 8' to 10'	
10	10.0							
		S-4	2.0			0		

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB04 SHEET 1 OF 2

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

SO NO.: 107872 BORING NO.: 16SB04

SAMPLE TYPE	DEFINITIONS
S = Split Spoon A = Auger	SPT = Standard Penetration Test (ASTM D1586)
T = Shelby Tube W = Wash	PID = Photo Ionization Detector Measurement
R = Air Rotary C = Core	MSL = Mean Sea Level
D = Denison P = Piston N = No Sample	ps/bg = point source/background

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm)	Visual Description		Elevation (Ft. MSL)
11		S-4	2.0			0	Continued from Sheet 1 SAPPROLITE		
12	12.0							12.0	136.57
							End of Boring at 12.0'		
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB04 SHEET 2 OF 2

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

PROJ. NO.: 107872 BORING NO.: 16SB05

COORDINATES: EAST: 930830.2033 NORTH: 804207.0455

ELEVATION: SURFACE: 149.41

Rig:	Geoprobe Track Rig 5400 DT							
	Macro Sampler	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.				11/14/2006	0.0 - 12.0	Pt. Sunny, 80s	
Length	4'							
Type								
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector Measurement
MSL = Mean Sea Level
BKG/PS = Background/Point Source
ppm = parts per million

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1					16SB05 -00 (0-1')		FINE SAND, trace coarse sand; tan; dry (FILL) *Collect soil sample from 0 to 1'	
							1.5	147.91
2		S-1	2.8			0	CLAY, trace rock fragments; yellow-brown; damp (RESIDUUM)	
3								
4	4.0						4.0	145.41
5					16SB05 -02 (4-5')		CLAY; plastic; red and gray; damp *Collect soil sample from 4' to 5'	
6		S-2	4.0			0	damp to moist after 6'	
7					16SB05 -03 (6-7')		*Collect soil sample from 6' to 7'	
8	8.0						7.8	141.61
9		S-3	2.0			0	SAPPROLITE; fairly soft; brown, yellow-brown and white; damp	
10								

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB05 SHEET 1 O 2

Baker

Michael Baker Jr., Inc.

TEST BORING RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

SO NO.: 107872 BORING NO.: 16SB05

SAMPLE TYPE	DEFINITIONS
S = Split Spoon A = Auger	SPT = Standard Penetration Test (ASTM D1586)
T = Shelby Tube W = Wash	PID = Photo Ionization Detector Measurement
R = Air Rotary C = Core	MSL = Mean Sea Level
D = Denison P = Piston N = No Sample	ps/bg = point source/background

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm)	Visual Description		Elevation (Ft. MSL)
11		S-3	2.0			0	Continued from Sheet 1 SAPPROLITE		
12	12.0							12.0	137.41
							End of Boring at 12.0'		
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

DRILLING COMPANY: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB05 SHEET 2 OF 2

Baker

Michael Baker Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT:	Roosevelt Roads Puerto Rico, SWMU 16		
PROJ. NO.:	107872	BORING NO.:	16SB06/TW06
COORDINATES:	EAST: 930834.2420	NORTH:	804225.2928
ELEVATION:	SURFACE: 148.53	TOP OF PVC CASING:	148.94

Rig: Geoprobe Track Rig 5400 DT

	MC Sampler	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	1-5/8"I.D.	--	--	--	11/14/2006	0.0 - 18.0	Pt. Sunny, 80s	dry
Length	4'	--	--	--	11/15/2006			2.2
Type	--	--	--	--				
Hammer Wt.	--	--	--	--				
Fall	--	--	--	--				

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Direct Push P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Schedule 40 PVC Riser	1"	0	5.0
Schedule 40 PVC Screen	1"	5.0	10.0

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1, 2, 3, 4 (4.0)	S-1	2.8		16SB06-00 (0-1')	0.0	FINE SAND, trace coarse sand and silt; tan; dry (FILL) *Collect soil sample from 0 to 1' (1.5') CLAY, trace fine sand; plastic; red-brown mottled; damp (RESIDUUM)	1" PVC Riser	147.03
5, 6, 7, 8 (8.0)	S-2	4.0		16SB06-02 (4-5') 16SB06-03 (6-7')	0.0	Same as Above; red and gray mottled; damp *Collect soil sample from 4' to 5' *Collect soil sample from 6' to 7' moist at 6.8' (8.5')	Top of 1" PVC Screen at 5'; Open Borehole	143.53
9, 10	S-3	4.0			0.0	SAPPROLITE; light brown and white; soft; dry becoming hard at 10.3'	Bottom of Screen at 10'; Soil Cuttings	140.03; 138.53

DRILLING CO.:	GeoEnviroTech, Inc.	BAKER REP.:	Mark DeJohn
DRILLER:	William Rodrigez	BORING NO.:	16SB06/TW06 SHEET 1 OF 2

Baker

Michael Baker Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Roosevelt Roads Puerto Rico, SWMU 16

SO NO.: 107872 BORING NO.: 16SB06/TW06

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS

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						Continued from Sheet 1		
12.0	S-3	4.0			0.0	SAPPROLITE; gray, light brown, white, light green		
13						weathered zone from 12' to 14.3'; yellow-brown and white; damp		
14	S-4	3.6			0.0		Soil Cuttings	
15								
16.0						Same as Above; green-gray, black, white and rust; damp		
17	S-5	2.0			0.0			
18.0							18'	130.53
19						End of Boring at 18.0'		
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: GeoEnviroTech, Inc. BAKER REP.: Mark DeJohn

DRILLER: William Rodrigez BORING NO.: 16SB06/TW06 SHEET 2 OF 2

APPENDIX B
SUMMARY OF ANALYTICAL RESULTS

APPENDIX B

SURFACE SOIL ANALYTICAL RESULTS
SWMU 16 - WASTE EXPLOSIVE STORAGE BUILDING
PHASE I RFI
NAVAL AVTIVITY PUERTO RICO, CEIBA, PR

Sample ID	**16SB01-00**	**16SB02-00**	**16SB03-00**	**16SB04-00**	**16SB05-00**	**16SB06-00**	**16SB06-00D**
Lab Sample Number	**680-22012-41**	**680-22012-38**	**680-22012-44**	**680-22012-35**	**680-22012-32**	**680-22012-27**	**680-22012-28**
Sampling Date	**11/15/2006**	**11/14/2006**	**11/15/2006**	**11/14/2006**	**11/14/2006**	**11/14/2006**	**11/14/2006**
Matrix	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**
Method - 8330 (mg/kg)							
4-Amino-26-dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Amino-46-dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
13-Dinitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
24-Dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
26-Dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Nitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetryl	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
135-Trinitrobenzene	0.025 J	0.25 U	0.25 U	0.25 U	0.021 J	0.25 U	0.25 U
Picric Acid	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
246-Trinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

APPENDIX B

SUBSURFACE SOIL ANALYTICAL RESULTS
SWMU 16 - WASTE EXPLOSIVE STORAGE BUILDING
PHASE I RFI
NAVAL AVTIVITY PUERTO RICO, CEIBA, PR

Sample ID	**16SB01-01**	**16SB01-02**	**16SB02-02**	**16SB02-03**	**16SB03-02**	**16SB03-03**	**16SB04-02**
Lab Sample Number	**680-22012-42**	**680-22012-43**	**680-22012-39**	**680-22012-40**	**680-22012-45**	**680-22012-46**	**680-22012-36**
Sampling Date	**11/15/2006**	**11/15/2006**	**11/14/2006**	**11/14/2006**	**11/15/2006**	**11/15/2006**	**11/14/2006**
Matrix	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**
Method - 8330 (mg/kg)							
4-Amino-26-dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Amino-46-dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
13-Dinitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
24-Dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
26-Dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Nitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetryl	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
135-Trinitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Picric Acid	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
246-Trinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

APPENDIX B

SUBSURFACE SOIL ANALYTICAL RESULTS
SWMU 16 - WASTE EXPLOSIVE STORAGE BUILDING
PHASE I RFI
NAVAL AVTIVITY PUERTO RICO, CEIBA, PR

Sample ID	**16SB04-03**	**16SB05-02**	**16SB05-03**	**16SB06-02**	**16SB06-03**	**16SB06-03D**
Lab Sample Number	**680-22012-37**	**680-22012-33**	**680-22012-34**	**680-22012-29**	**680-22012-30**	**680-22012-31**
Sampling Date	**11/14/2006**	**11/14/2006**	**11/14/2006**	**11/14/2006**	**11/14/2006**	**11/14/2006**
Matrix	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**	**Solid**
Method - 8330 (mg/kg)						
4-Amino-26-dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Amino-46-dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
13-Dinitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
24-Dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
26-Dinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Nitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Nitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Tetryl	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
135-Trinitrobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Picric Acid	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
246-Trinitrotoluene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

APPENDIX B

GROUNDWATER ANALYTICAL RESULTS
SWMU 16 - WASTE EXPLOSIVE STORAGE BUILDING
PHASE I RFI
NAVAL AVTIVITY PUERTO RICO, CEIBA, PR

Sample ID	**16TW06**	**16TW06D**
Lab Sample Number	**680-22139-7**	**680-22139-8**
Sampling Date	**11/18/2006**	**11/18/2006**
Matrix	**Water**	**Water**
Method - 8330 (ug/L)		
4-Amino-26-dinitrotoluene	0.1 U	0.1 U
2-Amino-46-dinitrotoluene	0.2 U	0.2 U
13-Dinitrobenzene	0.1 U	0.1 U
24-Dinitrotoluene	0.1 U	0.1 U
26-Dinitrotoluene	0.1 U	0.1 U
HMX	0.1 U	0.1 U
Nitrobenzene	0.1 U	0.1 U
2-Nitrotoluene	0.5 U	0.5 U
3-Nitrotoluene	0.5 U	0.5 U
4-Nitrotoluene	0.5 U	0.5 U
RDX	0.1 U	0.1 U
Tetryl	0.1 U	0.1 U
135-Trinitrobenzene	0.1 U	0.1 U
Picric Acid	1.0 U	1.0 U
246-Trinitrotoluene	0.1 U	0.1 U

APPENDIX B

QA/QC ANALYTICAL RESULTS
SWMU 16 - WASTE EXP[LOSIVE STORAGE BUILDING
PHASE I RFI
NAVAL AVTIVITY PUERTO RICO, CEIBA, PR

Sample ID	**2006ER01**	**2006ER02**	**2006ER03**	**2006ER04**	**2006ER05**	**2006FB01**	**2006FB02**
Lab Sample Number	**680-22060-38**	**680-22139-1**	**680-22139-2**	**680-22139-6**	**680-22139-3**	**680-22139-4**	**680-22139-5**
Sampling Date	**11/13/2006**	**11/15/2006**	**11/15/2006**	**11/16/2006**	**11/17/2006**	**11/18/2006**	**11/18/2006**
Matrix	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Method - 8330 (ug/L)							
4-Amino-26-dinitrotoluene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2-Amino-46-dinitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
13-Dinitrobenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
24-Dinitrotoluene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
26-Dinitrotoluene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
HMX	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nitrobenzene	0.1 U	0.097 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2-Nitrotoluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
3-Nitrotoluene	0.5 U	0.22 J	0.14 J	0.31 J	0.26 J	0.5 U	0.5 U
4-Nitrotoluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
RDX	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.14	0.1 U
Tetryl	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.077 J	0.1 U
135-Trinitrobenzene	0.1 U	0.13 J	0.13 J	0.13 J	0.15 J	0.1 U	0.1 U
Picric Acid	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
246-Trinitrotoluene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

APPENDIX C
2006 RFI DATA VALIDATION SUMMARIES

APPENDIX C.1
STL SAVANNAH SDG 22012-2

ENVIRONMENTAL
Data Services, Inc.

EXPLOSIVES

USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22012/G6K200151

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 17, 2006

Laboratory: Severn Trent Laboratories, Sacramento, CA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	16SB06-00	G6K220151-1	Soil
1 MS	16SB06-00 MS	G6K220151-1 MS	Soil
1 MSD	16SB06-00 MSD	G6K220151-1 MSD	Soil
2	16SB06-00D	G6K220151-2	Soil
3	16SB06-02	G6K220151-3	Soil
4	16SB06-03	G6K220151-4	Soil
5	16SB06-03D	G6K220151-5	Soil
6	16SB05-00	G6K220151-6	Soil
7	16SB05-02	G6K220151-7	Soil
8	16SB05-03	G6K220151-8	Soil
9	16SB04-00	G6K220151-9	Soil
10	16SB04-02	G6K220151-10	Soil
11	16SB04-03	G6K220151-11	Soil
12	16SB02-00	G6K220151-12	Soil
13	16SB02-02	G6K220151-13	Soil
14	16SB02-03	G6K220151-14	Soil
15	16SB01-00	G6K220151-15	Soil
16	16SB01-01	G6K220151-16	Soil
17	16SB01-02	G6K220151-17	Soil
18	16SB03-00	G6K220151-18	Soil
19	16SB03-02	G6K220151-19	Soil
20	16SB03-03	G6K220151-20	Soil

The USEPA Region II SOP No. HW-16, Revision 1.3, September 1994: Nitroaromatics and Nitroamines by HPLC was used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports. Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problem or special circumstances affecting the quality of the data. Incorrect ID's were corrected on the Form Is by the reviewer.

Holding Times - All samples were extracted within 14 days for soil samples and analyzed within 40 days for all samples.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD samples exhibited acceptable % R and RPD values except the following.

MS/MSD Sample ID	Compound	MS/MSD %R/RPD	Qualifier
1	2,4,6-Trinitrotoluene	OK/69%/OK	J/UJ

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level mg/kg	Qualifier	Affected Samples
2006ER01	2,6-Dinitrotoluene	0.071 J	0.34	None	All ND
	Tetryl	0.080 J	0.39	None	
2006ER02	Nitrobenzene	0.097 J	0.49	None	
	3-Nitrotoluene	0.22 J	1.11	U	14, 16
	1,3,5-Trinitrobenzene	0.13	0.65	None	All Associated Samples ND
2006FB01	RDX	0.14	0.69	None	All ND
	Tetryl	0.077 J	0.38	None	

Initial Calibration - The initial calibrations exhibited acceptable %RSD values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D values.

Analytical Sequence Check - No discrepancies were identified.

Compound Identification - Retention times were acceptable and no further action was taken.

Compound Quantitation - No discrepancies were identified.

Field Duplicates - Field duplicate results are summarized below.

Compound	16SB06-03 mg/kg	16SB06-03D mg/kg	RPD	Qualifier
None	ND	ND	-	-

Compound	16SB06-00 mg/kg	16SB06-00D mg/kg	RPD	Qualifier
None	ND	ND	-	-

APPENDIX C.2
STL SAVANNAH SDG 22060-3

ENVIRONMENTAL
Data Services, Inc.

EXPLOSIVES

USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22139/G6K220254

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 17, 2006

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER02	G6K220254-1	Water
2	2006ER03	G6K220254-2	Water
3	2006ER05	G6K220254-3	Water
4	2006FB01	G6K220254-4	Water
5	2006FB02	G6K220254-5	Water
6	2006ER04	G6K220254-6	Water
7	16TW06	G6K220254-7	Water
7 MS	16TW06 MS	G6K220254-7 MS	Water
7 MSD	16TW06 MSD	G6K220254-7 MSD	Water
8	16TW06D	G6K220254-8	Water

The USEPA Region II SOP No. HW-16, Revision 1.3, September 1994: Nitroaromatics and Nitroamines by HPLC was used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports. Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problem or special circumstances affecting the quality of the data.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD samples exhibited acceptable % R and RPD values except the following.

MS/MSD Sample ID	Compound	MS/MSD %R/RPD	Qualifier
7	1,3,5-Trinitrobenzene	118%/OK/OK	None - Samples ND

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
2006ER02	Nitrobenzene	0.097	0.485	None	Associated samples not reported in this data package.
	3-Nitrotoluene	0.22	1.10	None	
	1,3,5-Trinitrobenzene	0.13	0.65	None	
2006ER03	3-Nitrotoluene	0.14	0.70	None	
	1,3,5-Trinitrobenzene	0.13	0.65	None	
2006ER05	3-Nitroluene	0.26	1.3	None	
	1,3,5-Trinitrobenzene	0.15	0.75	None	
2006FB01	RDX	0.14	0.70	None	Associated Samples ND
	Tetryl	0.077	0.385	None	
2006FB02	None	ND	-	-	-
2006ER04	3-Nitrotoluene	0.31	1.55	None	Associated Samples ND
	1,3,5-Trinitrobenzene	0.13	0.65	None	

Initial Calibration - The initial calibrations exhibited acceptable %RSD values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D values.

Analytical Sequence Check - No discrepancies were identified.

Compound Identification - Retention times were acceptable and no further action was taken.

Compound Quantitation - Several samples exhibited results with high % D values between columns and have been flagged (PG) by the laboratory and further qualified (J).

Field Duplicates - Field duplicate results are summarized below.

Compound	16TW06 ug/L	16TW06D ug/L	RPD	Qualifier
None	ND	ND	-	-

ENVIRONMENTAL
Data Services, Inc.

VOLATILE ORGANIC COMPOUNDS
USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO 121, Ceiba, PR SDG #: NAPR 22060-3

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 3, 2007

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER01	680-22060-9	Water
2	2006ER02	680-22139-1	Water
3	2006ER03	680-22139-2	Water
4	2006ER05	680-22139-3	Water
5	2006FB01	680-22139-4	Water
6	2006FB02	680-22139-5	Water
7	2006ER04	680-22139-6	Water

The USEPA Region II SOP HW-24, Revision 1, June 1999: Validating Volatile Organic Compounds by SW-846 Method 8260B was used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports/Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data.

Holding Times - All samples were analyzed within 14 days for preserved water samples.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD samples were not included in this data package.

Laboratory Control Sample - The LCS sample(s) exhibited acceptable %R values except the following.

LCS ID	Compound	%R	Qualifier	Affected Samples
LCS-680-60821/3	1,1,1,2-Tetrachloroethane	110%	None	All ND

Method Blank - The method blanks were free of contamination.

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
2006ER01	None	ND	ND	-	No associated samples reported in this data package
2006ER02	Toluene	2.3	11.5	None	
2006ER03	Toluene	6.9	34.5	None	
2006ER05	Toluene	3.0	15	None	
2006FB01	None	ND	ND	-	
2006FB02	Dichlorobromomethane	18	90	None	
	Chloroform	160	800	None	
	Chlorodibromomethane	2.8	14	None	
2006ER04	Toluene	2.2	11.0	None	

GC/MS Instrument Performance Check - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Target Compound List (TCL) Analytes - The Form Is were present with the required header information. All mass spectral data were included and no discrepancies were identified.

Tentatively Identified Compounds (TIC) - TICs were not reported for the samples in this data package.

Compound Quantitation and Reported Detection Limits - No discrepancies were identified.

GC/MS Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values with the exception of the following.

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
11/19/06	Acrolein	RRF 0.049	J/R	1-7
	Isobutanol	RRF 0.030	J/R	

GC/MS Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values with the exception of the following.

CCAL Date	Compound	%D/RRF	Qualifier	Affected Samples
11/24/06	Acrolein	RRF 0.048	None	Qualified due to ICAL
	Iodomethane	35% D	J/UJ	1-7
	Isobutanol	RRF 0.029	None	Qualified due to ICAL
	Chloroethane	46% D	J/UJ	1-7
	Vinyl Acetate	22% D	J/UJ	

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Field Duplicates - Field duplicate samples were not included in this data package.

ENVIRONMENTAL
Data Services, Inc.

SEMIVOLATILE ORGANIC COMPOUNDS

USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22060-3

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 3, 2007

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER01	680-22060-38	Water
2	2006ER02	680-22139-1	Water
3	2006ER03	680-22139-2	Water
4	2006ER05	680-22139-3	Water
5	2006FB01	680-22139-4	Water
6	2006FB02	680-22139-5	Water
7	2006ER04	680-22139-6	Water

The USEPA Region II SOP No. HW-22, Revision 2, June 2001: Validating Semivolatile Organic Compounds by SW-846 Method 8270C was used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports/Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples except the following.

Sample	Date Sampled	Date Extracted	# of Days	Qualifier
1	11/13/06	11/22/06	9	J/UJ
2	11/14/06	11/22/06	8	J/UJ

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD samples were not included in this data package.

Laboratory Control Sample - The LCS sample(s) exhibited acceptable %R values.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
2006ER01	Diethylphthalate	0.82	8.2	None	Associated samples not reported in this data package.
2006ER02	1,4-Dichlorobenzene	0.56	2.8	None	
2006ER03	None	ND	ND	-	
2006ER05	1,4-Dichlorobenzene	0.52	2.6	None	
2006FB01	1,4-Dichlorobenzene	0.53	2.65	None	
	Diethylphthalate	0.69	6.9	None	
2006FB02	None	ND	ND	-	
2006ER04	None	ND	ND	-	

GC/MS Instrument Performance Check - All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Target Compound List (TCL) Analytes - The Form Is were present with the required header information. All mass spectral data were included and no discrepancies were identified.

Tentatively Identified Compounds (TIC) - TICs were not reported for the samples in this data package.

Compound Quantitation and Reported Detection Limits - No discrepancies were identified.

GC/MS Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values except the following.

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
11/24/06	a,a-Dimethylphenethylamine	30% RSD	None	ND
	1,3,5-Trinitrobenzene	23% RSD	None	
	4-Nitroquinoline-1-oxide	RRF 0.032	J/R	1,2,3,7
	Methapyrilene	35% RSD	None	ND
11/21/06 MSG	2-Picoline	20% RSD	None	Samples ND
	a,a-Dimethylphenethylamine	30% RSD	None	
	Methapyriline	17% RSD	None	
	Aramite, total	21%RSD	None	

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
11/21/06 MST	4-Nitroquinoline-1-oxide	RRF 0.0243/21% RSD	J/R	4,5
	Aramite, total	21% RSD	None	Samples ND

GC/MS Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values except the following.

CCAL Date	Compound	%D/RRF	Qualifier	Affected Samples
11/28/06 0714	1,3,5-Trinitrobenzene	51%D	J/UJ	3, 7
	4-Nitroquinoline-1-oxide	RRF 0.025/21% D	None	Qualified due to ICAL
	Hexachlorophene	41% D	J/UJ	3, 7
11/28/06 0737	Phorate	33% D	J/UJ	
	Dimethoate	20.3% D	J/UJ	
11/29/06 0638	1,4-Dioxane	31% D	J/UJ	None- qualified due to holding time
	2,4-Dinitrophenol	22% D	J/UJ	
11/29/06 0727	0,0,0-Triethylphosphorothioate	25% D	J/UJ	
	Phorate	34% D	J/UJ	
11/29/06 0813	a,a-Dimethylphenethylamine	26% D	J/UJ	
	4-Nitroquinoline-1-oxide	RRF 0.034	None	Qualified due to ICAL
12/01/06 0752	2-Picoline	27% D	J/UJ	6
	Aramite, total	20.03% D	J/UJ	
11/30/06 0854	1,4-Naphthoquinone	23% D	J/UJ	4, 5
	1,3,5-Trinitrobenzene	36% D	J/UJ	
	Methapyrilene	30% D	J/UJ	
	4-Nitroquinoline-1-oxide	RRF 0.022	None	Qualified due to ICAL
	Aramite, total	32% D	J/UJ	4,5
	Diallate	32%D	J/UJ	

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Field Duplicates - Field duplicate samples were not included in this data package.

ENVIRONMENTAL
Data Services, Inc.

POLYNUCLEAR AROMATIC HYDROCARBONS

USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22060-3

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 4, 2007

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER01	680-22060-38	Water
2	2006ER02	680-22139-1	Water
3	2006ER03	680-22139-2	Water
4	2006ER05	680-22139-3	Water
5	2006FB01	680-22139-4	Water
6	2006FB02	680-22139-5	Water
7	2006ER04	680-22139-6	Water

The USEPA Region II SOP No. HW-22, Revision 2, June 2001: Validating Semivolatile Organic Compounds by SW-846 Method 8270C was used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports/Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples except the following:

Sample	Date Sampled	Date Extracted	# of Days	Qualifier
1	11/13/06	11/21/06	8	J/UJ
2	11/14/06	11/22/06	8	J/UJ

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD samples were not included in this data package.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Method Blank - The method blank was free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
2006ER01	None	ND	ND	-	Associated samples not reported in this data package.
2006ER02	None	ND	ND	-	
2006ER03	Naphthalene	0.025	0.25	None	
2006ER05	None	ND	ND	-	
2006FB01	None	ND	ND	-	
2006FB02	Fluoranthene	0.080	0.40	None	
2006ER04	None	ND	ND	-	

GC/MS Instrument Performance Check - All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Target Compound List (TCL) Analytes - The Form Is were present with the required header information. All mass spectral data were included and no discrepancies were identified.

Tentatively Identified Compounds (TIC) - TICs were not reported for the samples in this data package.

Compound Quantitation and Reported Detection Limits - No discrepancies were identified.

GC/MS Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values.

GC/MS Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values with the exception of the following.

CCAL Date	Compound	%D/RRF	Qualifier	Affected Samples
12/05/06	2-Methylnaphthalene	20.02%	J/UJ	4,5
	Acenaphthylene	20.3%	J/UJ	
	Indeno (1,2,3-cd) pyrene	30%	J/UJ	
	Dibenz (a,h) anthracene	28%	J/UJ	

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Field Duplicates - Field duplicate samples were not included in this data package.

ENVIRONMENTAL
Data Services, Inc.

PCBs
USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22060-3

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 4, 2007

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER01	680-22060-38	Water
2	2006ER02	680-22139-1	Water
3	2006ER03	680-22139-2	Water
4	2006ER05	680-22139-3	Water
5	2006FB01	680-22139-4	Water
6	2006FB02	680-22139-5	Water
7	2006ER04	680-22139-6	Water

The USEPA Region II SOP No. HW-23, Revision 0, April 1995: Validating Pesticide/PCB Compounds by SW-846 Method 8080A and SOP No. HW-23B, Revision 1.0, May 2002, were used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports/Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples except the following.

Sample	Date Sampled	Date Extracted	# of Days	Qualifier
1	11/13/06	11/21/06	8	J/UJ
2	11/14/06	11/22/06	8	J/UJ

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD sample were not included in this data package.

Laboratory Control Sample - The LCS sample(s) exhibited acceptable %R values.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
2006ER01	None	ND	ND	-	-
2006ER02	None	ND	ND	-	-
2006ER03	None	ND	ND	-	-
2006ER05	None	ND	ND	-	-
2006FB01	None	ND	ND	-	-
2006FB02	None	ND	ND	-	-
2006ER04	None	ND	ND	-	-

Initial Calibration - The initial calibrations exhibited acceptable %RSD values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D values except the following.

CCAL Date	Compound	%D	Qualifier	Affected Samples
11/27/06	Aroclor 1260	OK/15.1%	J/UJ	3-7

Analytical Sequence Check - No discrepancies were identified.

Compound Identification - Retention times were acceptable and no further action was taken.

Target Compound List (TCL) Analytes - The Form Is were present with the required header information. All pesticide chromatographic data were included and no discrepancies were identified.

Compound Quantitation - No discrepancies were identified.

Field Duplicates - Field duplicate samples were not included in this data package.

ENVIRONMENTAL
Data Services, Inc.

GASOLINE RANGE ORGANICS
USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22060-3

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 4, 2007

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER01	680-22060-9	Water
2	2006ER02	680-22139-1	Water
3	2006ER03	680-22139-2	Water
4	2006ER05	680-22139-3	Water
5	2006FB01	680-22139-4	Water
6	2006FB02	680-22139-5	Water
7	2006ER04	680-22139-6	Water

The USEPA Region II SOP HW-24, Revision 1, June 1999: Validating Volatile Organic Compounds by SW-846 Method 8260B in conjunction with SW846 Method 8015B were used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports/Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data.

Holding Times - All samples were analyzed within 14 days for water samples.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - A MS/MSD sample was not analyzed.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Method Blank - The method blanks were free of contamination.

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. mg/L	Action Level mg/L	Qualifier	Affected Samples
2006ER01	None	ND	ND	-	-
2006ER02	None	ND	ND	-	-
2006ER03	GRO C6-C10	0.015	0.075	None	Associated samples not reported in this data package
2006ER05	None	ND	ND	-	-
2006FB01	None	ND	ND	-	-
2006FB02	None	ND	ND	-	-
2006ER04	None	ND	ND	-	-

Target Compound List (TCL) Analytes - The Form Is were present with the required header information. All mass spectral data were included and no discrepancies were identified.

Compound Quantitation and Reported Detection Limits - No discrepancies were identified.

Initial Calibration - The initial calibrations exhibited acceptable %RSD values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria. No qualifications were required.

Field Duplicates - Field duplicate results samples were not included in this data package.

ENVIRONMENTAL
Data Services, Inc.

DIESEL RANGE ORGANICS

USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22060-3

Client: CH2M HILL, Inc./Baker Environmental, Inc. Date: January 4, 2007

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER01	680-22060-38	Water
2	2006ER02	680-22139-1	Water
3	2006ER03	680-22139-2	Water
4	2006ER05	680-22139-3	Water
5	2006FB01	680-22139-4	Water
6	2006FB02	680-22139-5	Water
7	2006ER04	680-22139-6	Water

The USEPA Region II SOP HW-23, Revision 0, April 1995: Validating Pesticide/PCB Compounds by SW846 Method 8080A in conjunction with SW846 Method 8051B were used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports/Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days except the following.

Sample	Date Sampled	Date Extracted	# of Days	Qualifier
1	11/13/06	11/21/06	8	J/UJ
2	11/14/06	11/22/06	8	J/UJ

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - A MS/MSD sample was not analyzed.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Method Blank - The method blanks were free of contamination.

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. mg/L	Action Level ug/L	Qualifier	Affected Samples
2006ER01	None	ND	ND	-	Associated sample not reported in this data package.
2006ER02	None	ND	ND	-	
2006ER03	None	ND	ND	-	
2006ER05	None	ND	ND	-	
2006FB01	DRO C10-C28	0.052	0.26	None	
2006FB02	None	ND	ND	-	
2006ER04	None	ND	ND	-	

Target Compound List (TCL) Analytes - The Form Is were present with the required header information. All mass spectral data were included and no discrepancies were identified.

Compound Quantitation and Reported Detection Limits - No discrepancies were identified.

Initial Calibration - The initial calibrations exhibited acceptable %RSD values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D values.

Field Duplicates - Field duplicate samples were not included in this data package.

ENVIRONMENTAL
Data Services, Inc.

TOTAL METALS

USEPA Region II - Level IV Review

Site: RCRA Facility Investigation, CTO-121, Ceiba, PR SDG #: NAPR 22060-3

Client: CH2M Hill, Inc.,/Baker Environmental, Inc. Date: January 4, 2007

Laboratory: Severn Trent Laboratories, Savannah, GA Reviewer: Christine Garvey

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2006ER01	680-22060-38	Water
2	2006ER02	680-22139-1	Water
3	2006ER03	680-22139-2	Water
4	2006ER05	680-22139-3	Water
5	2006FB01	680-22139-4	Water
6	2006FB02	680-22139-5	Water
7	2006ER04	680-22139-6	Water

The USEPA Region II SOP No. HW-2, Revision 13, September 2005 for Evaluation of Metals Data for the Contract Laboratory Program was used in evaluating the data in this summary report.

Sample Conditions/Problems - The Traffic Reports/Chain-of-Custody Records, Sampling Report and/or Laboratory Case Narrative did not indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data.

Holding Times - All samples were prepared and analyzed within 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values except those noted below. The associated samples were qualified as indicated.

Compound	%R - High/Low	Qualifier	Affected Samples
Tin 11/25/06	60% - Low	J/UJ	1
Tin 12/04/06	59% - Low	J/UJ	2-7
Mercury 12/08/06	66% - Low	J/UJ	

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited contamination for several compounds, however, all sample results are non-detect or greater than 5X the blank concentration with the exception of the following:

Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
CCB Arsenic 12/04	0.130	0.13	None	ND
Barium PBW1	1.2555	12.6	U	1
Barium PBW2	1.2405	12.4	U	2-7
Copper PBW2	0.4218	4.21	U	2
Nickel PBW1	0.2173	2.17	None	Sample ND
CCB2 Thallium 12/04	0.069	0.069	None	Samples ND
Zinc PBW2	5.385		U	6

ICP Interference Check Sample - All %R values were acceptable except the following.

Compound	%R	Qualifier	Affected Samples
Zinc 11/25	125%	J	1
Zinc 12/04	122%/OK	No action	Samples ND
Cadmium 12/04	74%/71%	No action	
Silver 12/04	OK/79%	No action	

Matrix Spike/Matrix Spike Duplicate - The matrix spike/matrix spike duplicate samples exhibited acceptable %R and RPD values except the following.

MS Sample ID	Compound	%R	Qualifier	Affected Samples
Reference 1	Barium	138%/162%/OK	None	Samples ND
	Vanadium	135%/175%/21	None	
	Chromium	OK/128%/OK	None	
	Cobalt	OK/128%/OK	None	
	Copper	OK/136%/OK	None	
	Zinc	OK/131%/OK	None	
Reference 2	Mercury	71%/74%	None	Qualified due to CRDL
	Selenium	OK/OK/24	None	Samples ND

Field Duplicates - Field duplicate samples were not included in this data package.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values except the following:

ICP Sample ID	Compound	%D	Qualifier	Affected Samples
Reference 1	Cobalt	13	None	Associated Sample ND

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Qualifier	Affected Samples
2006ER01	None	ND	None	-
2006ER02	Nickel	0.26 J	None	< CRDL
2006ER03	Nickel	0.16 J	None	
2006ER05	None	ND	None	-
2006FB01	None	ND	None	Associated samples not reported in this data package
2006FB02	Copper	79	None	
	Lead	0.69 J	None	< CRDL
2006ER04	Nickel	0.19 J	None	

Compound Quantitation - No discrepancies were identified.

APPENDIX C.3
PUERTO RICAN CHEMIST CERTIFICATION

SEVERN TRENT STL

PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-22012-2**, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz

$1.00 $1.00

A 1120796

Lic. Abraham Ortiz

Dec 22, 06

ESTADO LIBRE ASOCIADO DE PUERTO RICO

QUIMICO LICENCIADO

SEVERN TRENT STL

PUERTO RICO CERTIFICATION

I Herby certify that I have reviewed the Quality Assurance Data for Project Number **680-22060-3**, and to the best of my knowledge, the results are correct and reliable.

Abraham Ortiz

$1.00 $1.00

ESTADO LIBRE ASOCIADO DE PUERTO RICO

A 1120810

Lic. Abraham Ortiz Chaparro

Dec 29, 06

QUIMICO LICENCIADO